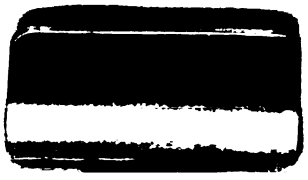

THE NEW INTERNATIONAL ENCYCLOPÆDIA

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COLORED PLATES

MAPS

ENGRAVINGS

KEY TO PRONUNCIATION.

ā as in ale, fate.
ȧ " " senate, chaotic.
â " " glare, care.
ă " " am, at.
ä " " arm, father.
á " " ant, and final *a* in America, armada, etc. In rapid speech this vowel readily becomes more or less obscured and like the neutral vowel or a short u (ŭ).
a " " final, regal, where it is of a neutral or obscure quality.
ą " " all, fall.
ē " " eve.
ę " " elate, evade.
ĕ " " end, pet. Also for *ä* in German, as in Grăfe, to which it is the nearest English vowel sound.
ẽ " " fern, her, and as *i* in sir. Also for *ö*, *oe*, in German, as in Göthe, Goethe, Örtel, Oertel, and for *eu* and *oeu* in French, as in Neufchâtel, Crèvecœur; to which it is the nearest English vowel sound.
e " " agency, judgment, where it is of a neutral or obscure quality.
ī " " ice, quiet.
ı̂ " " quiescent.
ĭ " " ill, fit.
ō " " old, sober.
ǭ " " obey, sobriety.
ǫ̂ " " orb, nor.
ŏ " " odd, forest, not.
o " " atom, carol, where it has a neutral or obscure quality.
oi " " oil, boil, and for *eu* in German, as in Feuerbach.
o͞o " " food, fool, and as *u* in rude, rule.
ou " " house, mouse.
ū " " use, mule.
ů " " unite.
ŭ " " cut, but.
u̯ " " full, put, or as *oo* in foot, book. Also for *ü* in German, as in München, Müller, and *u* in French, as in Buchez, Budé; to which it is the nearest English vowel sound.
u " " urn, burn.
y " " yet, yield.
B " " the Spanish Habana, Cordoba, where it is like a *v* made with the lips alone, instead of with the teeth and lips.
ch " " chair, cheese.
D as in the Spanish Almodovar, pulgada, where it is nearly like *th* in English then, this.
g " " go, get.
G " " the German Landtag, and *ch* in Feuerbach, buch; where it is a guttural sound made with the back part of the tongue raised toward the soft palate, as in the sound made in clearing the throat.
H " " *j* in the Spanish Jijona, *g* in the Spanish gila; where it is a fricative somewhat resembling the sound of *h* in English hue or *y* in yet, but stronger.
hw " " *wh* in which.
K " " *ch* in the German ich, Albrecht, and *g* in the German Arensberg, Mecklenburg; where it is a fricative sound made between the tongue and the hard palate towards which the tongue is raised. It resembles the sound of *h* in hue, or *y* in yet; or the sound made by beginning to pronounce a *k*, but not completing the stoppage of the breath. The character K is also used to indicate the rough aspirates or fricatives of some of the Oriental languages, as of kh in the word Khan.
n " " sinker, longer.
ng " " sing, long.
N " " the French bon, Bourbon, and *m* in the French Étampes; where it is equivalent to a nasalizing of the preceding vowel. This effect is approximately produced by attempting to pronounce "onion" without touching the tip of the tongue to the roof of the mouth.
sh " " shine, shut.
th " " thrust, thin.
TH " " then, this.
zh " " *z* in azure, and *s* in pleasure.

An apostrophe, or superior comma, ['] is sometimes used to denote a glide or neutral connecting vowel, as in tā'b'l (table), kăz''m (chasm).

Otherwise than as noted above, the letters used in the respellings for pronunciation are to receive their ordinary English sounds.

When the pronunciation is sufficiently shown by indicating the accented syllables, this is done without respelling; as in the case of very common English words, and words which are so spelled as to ensure their correct pronunciation if they are correctly accented. See the article on PRONUNCIATION.

THE NEW INTERNATIONAL ENCYCLOPÆDIA

HALL, hăl. A small and very old town in the Austrian Crownland of Tyrol, situated on the Inn, which is here navigable, six miles east of Innsbruck (Map: Austria, B 3). The parish church, built in 1271, with a monument that marks the grave of Speckbacher, leader of the Tyrolese in their struggle for independence, the gymnasium, the fifteenth-century Rathaus, the Franciscan convent, and the Münzthurm, are the chief buildings. About nine miles north of the town is the Salzberg, with salt-mines, from which salt in the form of brine is conveyed in wooden pipes to the pans of Hall. Besides salt, Hall manufactures chemicals, felt hats, buttons, fire-engines, paper, cloth, and chicory. The town is growing in favor as a summer resort. Population, in 1890, 5800; in 1900, 6200. Hall was a flourishing town in the Middle Ages, but has declined greatly on account of wars and earthquakes.

HALL, or **SCHWÄBISCH** (shvā'bĭsh) **HALL**. An old town of the Kingdom of Württemberg, Germany, situated on the Kocher, 48 miles northeast of Stuttgart (Map: Germany, C 4). It is poorly built, but has some interesting ancient buildings. The Church of Saint Michael, constructed in 1427-1525, contains a fine altarpiece. The Church of Saint Catharine, on the left bank of the Kocher, dates from the fourteenth century, and is noted for its fine high altar. The Rathaus is a stately eighteenth-century edifice. Hall has salt-works and saline baths, and carries on a trade in grain and cattle. The manufactures include iron articles, machinery, cotton yarn, leather, etc. Hall, mentioned as early as 887, owed its importance in ancient times to its saline springs. It was raised to the rank of an Imperial town in 1276, and it was in its mint that the first coins known as *Hellers* were struck. It came into the possession of Württemberg in 1802. Population, in 1890, 9000; in 1900, 9225.

HALL (AS. *heall*, *heal*, Icel. *höllr*, OHG. *halla*, Ger. *Halle;* probably connected with AS. *helan*, obsolete Eng. *heal*, OHG. *helan*, Ger. *hehlen*, Lat. *celare*, Gk. καλύπτειν, *kalyptein*, to hide, OIr. *celim*, I hide). A name given to a large inclosed space in the form of a single apartment, whether it stands alone in a separate structure or is in a larger building of which it is merely a part. The term is even used, by extension, of the feudal mansions or manor houses of which such a large room was the main part. Finally, in modern architecture, by a misuse of the term it has come to be applied to the common room out of which the others open, whether it is large or small.

In the history of architecture the term hall is applied to such interiors as the hypostyle hall of an Egyptian temple, the *apadana* of a Persian palace, or the *tepidarium* of the Roman thermæ, and we call mediæval churches with a single nave, or with several naves of equal height, hall churches. But the origin of the term is both secular and northern. The earliest Saxon buildings we have any record of are the palaces of the kings, and these seem to have consisted of one large hall, in which the king, his courtiers, and all his retainers dwelt together, and one other chamber, in which the king and his hearthmen slept, while his retainers slept in the hall. The same custom prevailed among other early Norse and Germanic tribes. The Normans built their houses on the same plane, with the hall and one solar (q.v.) or sleeping apartment. The same arrangement prevailed with slight modifications during the twelfth and thirteenth centuries. Then and later the hall, while part of the group of manor buildings, was often a separate structure, with its independent roof, as at Stokesay and Oakham castles. In the fourteenth and fifteenth centuries, when the country was more settled and prosperous and manners had become more refined, more numerous rooms were necessary. The hall, however, still retained its place as the chief apartment. In it the King or the lord of the manor gave audience, administered justice, received and entertained his retainers and guests, and performed all the acts of feudal life. Often he used it, also, as his sleeping apartment. At one end of the hall was a raised platform or dais, on which the table of the lord of the manor was placed, and where his more honored guests sat. The retainers sat at a table in the lower part of the room. The halls were more frequently roofed than vaulted, and these roofs were very carefully and elegantly constructed, as many still

remaining show. The hall of the King's palace, now called 'Westminster Hall,' built by William Rufus and restored by Richard II., is the finest example in England, being 300 feet long and 100 feet broad. Those in the Imperial and royal palaces of Germany, as at Goslar, are the earliest and best preserved of their class.

The use of such halls spread from feudal society to other branches of life, especially corporate life in the Gothic and Renaissance periods. There are three principal classes of such halls—the communal halls, the guild halls, and the college halls. The political organization of the free mediæval cities required large meeting-places for their governing bodies; they sometimes occupied the entire ground floor, as at Udine, either open or inclosed; sometimes the second floor above a basement, as at Padua (the largest in existence). The entire structure was often most imposing, as at Siena, Perugia, Gubbio, Florence, Cremona. (See PALACE.) They fell into disuse with the fall of liberty in the Renaissance. The second class, the guild halls, without being generally as imposing in Italy (except, for instance, that at Florence), attained great importance in Flanders and Northern France. Here the 'Halles' were the heirs of the great Roman markets. Each great corporation possessed one, and where the city was governed by them the communal belfry often rose from its summit, as in the halls of Ypres, Bruges, and Arras. Many of these great structures remain: the Butchers' Hall (*Halle à la Viande*) at Ghent, Ypres, and Antwerp; the Bakers' Hall (*Halle au Pain*) at Brussels; the Fishmongers' Hall (*Halle aux Poissons*) in many towns; the Cloth Hall (*Halle aux Draps*) at Ghent, Bruges, Louvain, and Brussels; the Bankers' Hall (*Bourse*) at Antwerp. The finest of all is the hall at Ypres, built between 1201 and 1304. Some are open, on piers, especially in the south of France, as at Fijeac and Cordes; others, in France also, are built entirely of wood, as at Villeneuve and Evron. Sometimes they are built around a court, as at Antwerp; but the usual type is an oblong stone structure with wooden timbered roof or vault, in one, two, or three aisles, often with a second-story gallery. The various colleges at Oxford and Cambridge and other universities had common halls, which were often of great architectural dignity and beauty, several of which remain almost unchanged. The history of the term, therefore, shows that it applies to a large meeting-place, whether of a feudal family, a corporation, or an entire community.

In more recent times it has been logically applied to large places where any audience is gathered together, especially for musical and other entertainments, such as Saint George's Hall in Liverpool, or Carnegie Hall in New York. Some of the meeting-places notable in our own history bear this name, such as Faneuil Hall in Boston, and Nassau Hall in Princeton. The large buildings at American universities, whether dormitories or recitation buildings, even when they contain no large main apartment, are generally called halls.

HALL, or HOSTEL. An institution in English universities fast dying out, chiefly by absorption into colleges. It was the earliest, and for a long time the only organization for the support of students outside the foundations of the religious orders. For the establishment of a hall, a few students by mutual agreement rented a house, chose a principal, at first generally one of their number, later a master, and applied to the university for recognition. The halls were held on lease, the rent being fixed at intervals, generally, of five years by four taxers, two masters and two citizens, and houses once occupied by students could not be let to a layman, so long as a clerk would take it. The halls were under the supervision of the university, which had the right of visitation, and gradually acquired considerable authority over them. For centuries the halls greatly outnumbered the colleges, and even after the rise of colleges many halls remained as independent establishments, largely as the residences of wealthier students. Some received endowments and became not unlike small colleges; but most kept to the original idea of a hall, that of an independent self-governing community of students living at their own expense. The rise of colleges where support was given students was the death-blow to the hall idea, and many colleges owed their origin to the absorption of older halls. This process of absorption is still going on, and the halls are now almost extinct, even those now remaining being destined to union with neighboring colleges after a longer or shorter period. See SAINT MARY HALL; SAINT EDMUND HALL.

HALL, ANNA MARIA (*née* Fielding) (1800-81). An English novelist, born in Dublin. Her mother, left a widow, took her to London, where she was educated. In 1824 she married Samuel Carter Hall, editor and author. She became known by *Sketches of Irish Character* (1829), which was followed during the next fifty years by about fifty distinct publications, consisting mostly of short stories and novels. Many of them first appeared in magazines. A good specimen of her delineation of Irish character—almost equaling Maria Edgeworth's—is *Marian* (1840). Another side of her talent is represented by *Midsummer Eve, a Fairy Tale of Love* (1848). She also succeeded in gaining popular favor by several plays. *The French Refugee* (1836), for example, ran ninety nights at Saint James's Theatre. She was an active and practical philanthropist. Consult Hall, *Retrospect of a Long Life* (London, 1883).

HALL, ARTHUR CRAWSHAY ALLISTON (1847—). An American bishop, born at Binfield, in Berkshire, England. He was educated at Christ Church College, Oxford, and entered the Cowley Fathers, or Society of Mission Priests of Saint John the Evangelist, a community bound to poverty, chastity, and obedience. In 1872 he became assistant pastor of the Church of the Advent in Boston, and, in 1882, minister to the Mission Church of Saint John the Evangelist in the same city. He was recalled to England in 1891, was elected Bishop of Vermont in 1893, and after much ecclesiastical discussion was consecrated in February, 1894, after being released from the Cowley Order. He wrote: *Confession and the Lambeth Conference* (1879); *Meditations on the Creed* (1880); *Meditations on the Collects* (1887); *The Example of the Passion* (1882); *The Virgin Mother; Christ's Temptation and Ours; A Charge on Marriage and Divorce; Confirmation;* and *Marriage with Relatives* (1901).

HALL, ASAPH (1829—). An American astronomer, born of Revolutionary stock in Goshen, Conn. At sixteen he became a carpenter, but spent his spare time in study. In 1854 he went to Central College, McGrawville, N. Y., and in spite of poor teaching, learned some mathematics in the year and a half he spent there. He studied under Brünnow at Ann Arbor, where he made his first acquaintance with astronomy, and in 1857 went to Cambridge as assistant to Professor Bond at the pitiful salary of three dollars a week. He studied mathematics and German by himself, and gradually advanced until he earned $600 a year at the Cambridge Observatory. In 1862 he took a civil-service examination and became an aid, and a year afterwards professor of mathematics in the United States Naval Observatory. This position he held until 1891 and was sent on several expeditions: in 1869 to Bering Strait, in 1870 to Sicily to observe eclipses; in 1874 to Vladivostok to observe the transit of Venus; to Texas in 1882 for the same purpose; and to Colorado in 1878 on a solar-eclipse expedition. His greatest fame came from his discovery in 1877 of the two satellites of Mars, which he called Deimos and Phobos. In recognition of this discovery he received a gold medal from the Royal Astronomical Society, and the award of the Lalande prize from the Paris Academy. In 1875 he was elected a member of the National Academy of Sciences, and afterwards was elected its president. He retired from the Government employ in 1891, and four years later went to Harvard as professor of astronomy, where he remained until 1901. In 1902 he was president of the American Association for the Advancement of Science.

HALL, BASIL (1788-1844). A British naval officer, author, and traveler, born and educated in Edinburgh. He entered the navy in 1802, saw service on the coasts of China, India, and South America, was made post-captain in 1817, and left the navy in 1823. The rest of his life was spent in travel, and scientific pursuits at home. The descriptions of his various voyages while in the navy, and of his subsequent travels, show a broad and keen observation and were well received, though his *Travels in North America* caused great indignation and met with much hostile criticism in the United States, because of his outspoken remarks upon American customs. His scientific work was mostly confined to personal experimentation, and was of little permanent value, though he was a member of many scientific societies and contributed widely to their journals. In 1842 his mental powers failed, and he died in confinement two years later. His most important writings are: *A Voyage to the West Coast of Corea and the Great Loo-Choo Island* (1818); *Extracts from a Journal Written on the Coasts of Chili, Peru, and Mexico* (1824); *Travels in North America* (1829); *Fragments of Voyages and Travels* (1831); *Schloss Hainfeld, or a Winter in Lower Styria* (1836); *Spain and the Seat of War in Spain* (1837); and *Patchwork* (1841).

HALL, CHARLES CUTHBERT (1852—). An American clergyman of the Presbyterian Church, born in New York City. He was educated at Williams College, the Union Theological Seminary, the Presbyterian College in London, and the Edinburgh Free Church College; was ordained in 1875, and succeeded Wendell Prime as pastor of the Union Presbyterian Church of Newburg, N. Y. Two years afterwards he became pastor of the First Presbyterian Church of Brooklyn, N. Y. *Qualifications for Ministerial Power* (1894) was Dr. Hall's Carew lectures at Hartford Theological Seminary. A trustee of Atlanta University and of Williams College, and long a director of Union Theological Seminary, he was chosen president of the last-named institution in 1897. Dr. Hall compiled with Lasar *The Evangelical Hymnal.*

HALL, CHARLES FRANCIS (1821-71). An American Arctic explorer. He was born at Rochester, N. H., and was for a time a blacksmith, and later became a stationer and journalist. In 1860 he sailed from New London in the *George Henry,* to discover the remains of the Franklin party, the expense of the expedition being borne largely by Henry Grinnell (q.v.). His ship was blocked by ice, and for two years he lived among the Eskimos near Frobisher Bay, returning in 1862. In 1864 he published an account of the expedition in *Arctic Researches* and in *Life Among the Esquimaux.* In the same year Hall returned to the Arctic to renew his search for evidences of the fate of the Franklin expedition. It was not till the spring of 1866 that he met Eskimos at Cape Weyton, south of Boothia Felix, who had seen Franklin and visited the deserted ships. He obtained from them silver bearing the crest of Franklin and other officers of the party. While searching for further evidence he did some interesting geographical work by filling in the gap between Rae's farthest (1846) and Parry's farthest, in Fury Strait (1825), thus completing the mapping of the north coast of the continent. At last, after five years of toil, he met natives near the south shore of King William Land, in the summer of 1869, who gave him personal or traditional information of the fate of 79 of the 105 men who died of starvation in King William Land. It is now believed that the remaining 26 reached the coast of the mainland and perished. It was thus McClintock, Hall, and Schwatka and Gilder who solved the fate of the Franklin party.

His last expedition was undertaken in 1871, at the expense of the United States Government, in the small naval vessel *Polaris,* which proved to be unfitted for Arctic work. He ascended the Smith Sound channels into the Polar Sea to 82° 11′ N., the most northern point attained up to that time by a vessel. Unable to proceed farther, the expedition spent the winter of 1871-72 at Thank God Harbor, on the Greenland coast. In the fall Hall made a sledge journey north to Cape Brevoort, and was the first to see the land on the west side of Robeson Channel and to determine approximately its extension to the north. Upon returning from this journey he was taken violently ill, and died on November 8, 1871. In the fall of 1872 the *Polaris* pushed into an impassable ice pack and drifted south for two months, when a terrible gale broke up the pack and nearly destroyed the vessel. A part of the supplies had been removed to the ice, on which 19 of the crew had taken refuge, and they were carried away from the vessel in the darkness. After experiencing all the horrors of a five months' winter drift on an ice-floe, they were picked up, off Labrador, 1300 miles from the point of separation, with 20 in the party, the Eskimo Hannah having given birth to a girl.

The ship had drifted to the Greenland shore a little south of Smith Sound, whence, in the spring of 1873, the remainder of the party retreated south in boats, and were rescued at Cape York on June 22d by a Scottish whaler. Though the expedition was unfortunate, its geographical results were very important. Hall completed the exploration of Kennedy Channel, discovered Hall Basin and Robeson Channel, extended both Greenland and Grinnell Land northward nearly two degrees of latitude, and visited the unknown Polar Sea. He was not competent to take charge of scientific work, but he was a genuine Arctic pioneer, full of resources, and undaunted by obstacles, many of which he overcame by patient and untiring effort. The scientific results of the *Polaris* expedition were important, and were published by the Government in 1879. Consult also: Davis's *Polaris North Pole Expedition* (Washington, 1876); Tyson's *Drift* (New York, 1874); Bessel's *Die amerikanische Nordpola Expedition* (Leipzig, 1879).

HALL, CHESTER MOOR (1703-71). An English scientist, inventor of the achromatic telescope. He was born at Leigh, in Essex; was a student of the Inner Temple in 1724 and a bencher in 1763. He lived at New Hall, Sutton, and was often called 'Moor of Moor Hall.' From study of the structure of the human eye he arrived at the conclusion that achromatic lenses were possible; discovered two kinds of glass in 1729, of enough variation of dispersion; and in 1733 had made several telescopes. But though there seems no doubt of the priority of his invention, he took no pains to appear in the suit of Dollond *vs.* Champness (1766). See TELESCOPE; DOLLOND, JOHN.

HALL, CHRISTOPHER NEWMAN (1816-1902). An English Congregational minister, born at Maidstone, Kent, and educated at Totteridge, at Highbury College, and at the University of London. For twelve years he was pastor of the Albion Congregational Church at Hull. In 1854 he succeeded Rowland Hill and James Sherman at Surrey Chapel, and in 1876 he went to Christ Church, Lambeth, a charge which he resigned in 1892. He became widely known in England as a total-abstinence agitator and as an evangelist. He was a friend of the North during the Civil War, and in 1867 toured America with the intention of quieting differences between Great Britain and the United States. Dr. Hall's tracts were his best-known works, especially: *Come to Jesus* (1846); *It is I* (1848); *Follow Jesus;* and many others, of which hundreds of thousands have been distributed. He wrote besides: *The Land of the Forum and the Vatican* (2d ed. 1859); a biography of his father, under the title *Conflict and Victory* (2d ed. 1874); *Lyrics of a Long Life;* and an *Autobiography* (1865).

HALL, EDWARD (c.1499-1547). An English historian, son of John and Catharine Hall, who seem to have been prominent in the Reformation, and may have been the "John Hall and his wife," prisoners in Newgate, "for the testimony of the Gospel" (1555), mentioned by John Fox. Edward Hall was educated at Eton and at King's College, Cambridge, and studied law. He was a strong defender of the Tudors, and carried his ideas of reform no further than the King, but supported the royal supremacy in Parliament, spoke in behalf of the Bill of Six Articles (1539), and was appointed (1541) a member of the commission to deal with all transgressors of that law. His *Union of the Noble and Illustre Famelies of Lancastre and York* (1542; and, the most complete edition, from the press of Richard Grafton, and with a preface by him, 1550) is especially valuable for the reign of Henry VII. and the early years of Henry VIII. It was largely used by Shakespeare in his historical plays, and was borrowed from by Grafton, Holinshed, and Stow.

HALL, FITZEDWARD (1825-1901). An American philologist, who was born at Troy, N. Y., but spent his mature years in England. He was educated at Walpole, N. H., Poughkeepsie, the Rensselaer Polytechnic Institute, and at Harvard, where he did not finish his course, as he was sent to India to look for a runaway brother. At Benares, in 1850, he was appointed to a post in the Government College, which became in 1853 an Anglo-Sanskrit professorship. In 1855 he was appointed inspector of public instruction for Ajmere and Mairwara, and a year later for the Central Provinces. In 1860 he received the degree of D.C.L. at Oxford, and two years later left India for London, where he became professor of Sanskrit, Hindustani, and Indian jurisprudence at King's College, received the post of librarian at the India Office, and in 1864 was made examiner in Hindustani and Hindi on the Civil-Service Commission. In 1880 he succeeded Max Müller as examiner in Sanskrit, and from 1887 to his death was examiner in English also. His edition of the *Vishnupurâna* is marked by wide reading and by many quotations from unpublished manuscripts in his own possession. About 1870 he turned his attention to English philology, and published: *Recent Exemplifications of False Philology*, an attack on Richard Grant White (1872); *Modern English* (1873); *On English Adjectives in -able, with Special Reference to 'Reliable'* (1877); *Doctor Indoctus* (1880); and other volumes. The most lasting monument to his activity in English philology is his work on the *Oxford Dictionary*, and on Wright's *English Dialect Dictionary*. A valuable library of a thousand Oriental manuscripts and many books he gave to Harvard University. From 1869 until his death he lived at Marlesford, in Suffolk. His principal works in Sanskrit are: *Atmabodha* (1852); *Sânkhyaprâvachana* (1856); *Sâryasiddhânta* (1859); *Vâsavadattâ* (1859); *Sânkhyasâra* (1862); and *Dasarûpa* (1865); and in Hindi, a *Reader* (1870), and Ballantyne's *Hindî Grammar* (1868).

HALL, GEORGE HENRY (1825—). An American painter, born in Boston. He studied at Düsseldorf and in Paris, and traveled in Spain, Italy, and Egypt. In 1868 he was elected an Academician. His works include: "Group of Spanish Children;" "Young Lady of Seville;" "The Seasons;" "Studies of Grapes;" "Bric-a-Brac of Damascus;" "April Showers;" and some portraits.

HALL, GERTRUDE (1863—). An American author, born in Boston. She was educated in Florence, and published several volumes of verse, from *Verses* in 1890, including *Allegretto* (1894), *The Age of Fairy Gold* (1899), *April's Sowing* (1900), and a translation into English of Rostand's *Cyrano de Bergerac.*

HALL, GRANVILLE STANLEY (1845—). An American educator. He was born at Ashfield, Mass.; graduated at Williams College in 1867, and subsequently spent several years studying philosophy and psychology in Germany. He was professor of psychology at Antioch College, Ohio, from 1872 to 1876, and at various periods was lecturer on the same subject at Harvard and at Williams. In 1884 he was chosen professor of psychology at Johns Hopkins University, and in 1888 he became president of Clark University, Worcester, Mass. He became an important contributor to educational literature, and is a leading authority in that field. He was also appointed editor of the *American Journal of Psychology* and the *Pedagogical Seminary*. Among his books are: *Aspects of German Culture* (1881); *Hints Toward a Select and Descriptive Bibliography of Education* (1886), with John M. Mansfield; and *The Contents of Children's Minds on Entering School* (1894).

HALL, ISAAC HOLLISTER (1837-96). An American Orientalist, born at Norwalk, Conn., and educated at Hamilton College. After eleven years at the New York bar he was appointed professor at the Protestant College of Beirut, where in 1876 he discovered a Syriac manuscript of the Philoxenian version of the Gospels, Acts, and, in part, the Epistles. This he published in 1884. He returned to America in 1877; distinguished himself by his studies of epigraphy, especially as the first to decipher the Cypriote inscriptions; in 1885 was appointed curator of the Metropolitan Museum of New York City, and later lectured on New Testament Greek at Johns Hopkins University. In 1884 he deciphered "Antilegomena Epistles" from the Syriac manuscript discovered by the Rev. W. F. Williams, which he published (1886) in facsimile. He also compiled a *Critical Bibliography of the Greek New Testament as Published in America* (1884).

HALL, Sir JAMES (1761-1832). A British geologist and chemist, noted for his application of chemical tests to geological hypotheses. He was born in Haddingtonshire, Scotland, the eldest son of Sir John Hall, Baronet, and succeeded to the baronetcy in 1776. Having become interested in geology during the early part of his career, he associated intimately with James Hutton, then the most eminent name in that science, and was ultimately led to accept his uniformitarian theory of geology, which explains the phenomena of the earth's crust by steady and progressive natural changes. In testing the theory he traveled extensively, and studied the rocks in different parts of Scotland, as well as in the Alps, in Italy, and in Sicily. He also had recourse, for the same purpose, to experiments in his laboratory, but, owing to Hutton's disapproval of that method, did not publish the results until after the latter's death in 1797. These made good his contention in some respects against the opponents of Hutton's system. On some points, however, he differed from his master, explaining, for example, the boulders on the Jura and similar phenomena at Corstorphine by the supposed action of a sea flood instead of by the glacial theory which is now generally accepted. He was also deeply interested in the study of architecture, and in 1813 published an *Essay on the Origin, History, and Principles of Gothic Architecture*, whose ideas had already been presented in less elaborate form before the Royal Society of Edinburgh in 1797. He aims to prove that Gothic architecture is an evolution begun by reproducing in stone crude wattle buildings, and he constructed a miniature wattle-work cathedral in Gothic style to illustrate his argument. Hall took part in Parliamentary life, representing the borough of Michael in Cornwall from 1807 to 1812. After his death, which occurred at Edinburgh in 1832, an account of a machine which he invented for the regulation of high temperatures was given before the Geological Society of London.

HALL, JAMES (1793-1868). An American journalist and author, born in Philadelphia. He studied law, but joined the army in 1812, and served at Lundy's Lane and Fort Erie. Meanwhile he continued his legal studies, and in 1820 he removed to Shawneetown, Ill., where he began practice at the bar, and edited the *Illinois Gazette*. Later he was judge of the Circuit Court and then State treasurer, meanwhile editing at Vandalia, Ill., the *Illinois Intelligencer*. At Cincinnati he conducted the *Western Monthly Magazine* (1833-37), and was engaged in banking. Among his publications are: *Letters from the West* (1829); *Legends of the West* (1832); *Tales of the Border* (1835); *Life of W. H. Harrison* (1836); *History of the Indian Tribes* (3 vols., 1838-44); and *The Romance of Western History* (1847). His collected works were published in four volumes in 1853-56.

HALL, JAMES (1811-98). An American geologist and paleontologist, born in Hingham, Mass. He studied under Amos Eaton at the Rensselaer Polytechnic Institute, where he subsequently occupied the chair of geology. In 1836 he was appointed to the Geological Survey of New York, and was soon placed in charge of the work in the western part of the State. The report of the survey which appeared in 1843 laid the foundation for the proper classification of the Paleozoic formations in America, and was the means of establishing the office of State Geologist, with Hall as its occupant. He now devoted himself to a comprehensive study of the older fossil-bearing rocks, and published his researches from time to time in various reports and monographs, which have come to be regarded as classics by students in this branch of geology. He was president of the American Association for the Advancement of Science in 1856, of the Geological Society of America in 1889, and was elected honorary president of the International Congress of Geologists at Washington in 1891. He received many honors from foreign scientific societies, including the Wollaston medal of the London Geological Society. Among his more important contributions to geology are the following: *Geology of New York*, part iv. (1843); *Palæontology of New York* (8 vols., 1847 et seq.); *Graptolites of the Quebec Group* (1865); and portions of the *Report of the Geological Survey of Iowa* (1858-59), and of the *Report on the Geological Survey of the State of Wisconsin* (1862).

HALL, JOHN (1829-98). An American clergyman, born of Scotch parentage at Market Hill, County Armagh, Ireland, and educated at Belfast College. He was licensed to preach by the Belfast Presbytery in 1849, was a missionary in West Ireland for three years, held a pastorate for an equal period at the First Presbyterian

Church in Armagh, and in 1858 accepted a call to Saint Mary's Abbey, Dublin, where he remained for nine years, actively occupied in Church work and in matters relating to popular education. In 1867 he came to America as a delegate from the General Assembly of the Presbyterian Church in Ireland, and shortly after his return was called to the pastorate of the Fifth Avenue Presbyterian Church in New York City, where he remained until his death. He was a member of the International Sunday-School Committee from 1872 to 1896, served as a trustee of Princeton University and a director of the Union Theological Seminary; delivered many lectures at Yale on the Lyman Beecher foundation; and from 1882 to 1891 was chancellor of the University of the City of New York (now New York University). Among his best-known writings are: *Family Prayers for Four Weeks* (1868); *Care Cast upon the Lord* (1869); *Papers for Home Reading* (1871); *Questions of the Day* (1873); *Preaching: Manner and Matter* (1874); *God's Word Through Preaching* (1875); *You and Your Children* (1877); *Foundation Stones for Young Builders* (1881); *A Christian Home and How to Maintain It* (1883); *Light unto My Path* (1895). Consult T. C. Hall, *John Hall, Pastor and Preacher* (New York, 1902).

HALL, John Vine (1774-1860). An English religious writer and advocate of total abstinence. He was born at Diss, Norfolk. When a young man he fell into drunken habits, but after a hard struggle reformed, and became a teetotaler. From 1814 to 1850 he was a bookseller at Maidstone. From 1854 till his death (1860) he devoted himself to religious and temperance work. His *Sinner's Friend* (1821) is said to have been translated into thirty languages and circulated in millions of copies. Consult his autobiography, *Conflict and Victory,* edited by his son, the Rev. Newman Hall (London, 1874).

HALL, Joseph (1574-1656). An English bishop, remarkable for his learning, piety, and misfortunes. He was born July 1, 1574, at Ashby-de-la-Zouch, Leicestershire. He was educated at Emanuel College, Cambridge, of which he became a fellow (1595). Entering the Church, he became, in 1617, Dean of Worcester; was one of the English deputies to the Synod of Dort (1618-19); was consecrated Bishop of Exeter in 1627; and in 1641 was translated to Norwich. In the latter years of his life he was accused of Puritanism, and incurred the displeasure of Archbishop Laud. In 1641, having joined the prelates who protested against the validity of all laws passed during their forced absence from Parliament, he was committed to the Tower and threatened with prosecution for high treason; but was set at liberty at the end of seven months, on finding bail for £5000. On his return to Norwich he found his revenues sequestrated and his property pillaged. He rented a small farm at Higham, near Norwich, to which he retired (1647), and died September 8, 1656. His works, mostly of a controversial character, have been published, with autobiography, notes, etc., by Pratt (London, 1808); Peter Hall, a descendant of Joseph (Oxford, 1837-39); and Philip Wynter (Oxford, 1863). Of his other works, the most read now are his devotional treatises (*Select Devotional Works,* 1830), in seven parts, of which a number have been separately reprinted. His poetical *Satires,* written at college, were praised by Pope. For his life, consult John Jones (London, 1826).

HALL, Lyman (1725-90). A signer of the Declaration of Independence. He was born in Connecticut, and remained there until his graduation from Yale College in 1747, after which he removed to the parish of Saint John, in Georgia. This parish was largely peopled by New Englanders, and to them is chiefly due Georgia's final decision to throw in her lot with the other colonies. The people of this parish, disgusted with the indecision of their fellow colonists, endeavored to ally themselves with the Committee of Correspondence in Charleston, S. C., and when this proved infeasible decided to refrain from trading with the other colonists of Georgia, and particularly with the people of Savannah. In 1775 they sent Hall as their delegate to Congress, where he was allowed to debate, but being the only representative of Georgia, could not vote when the voting was done by whole colonies. Soon afterwards Georgia joined her sister colonies and elected five delegates to the Congress, among them Hall. He was reëlected in 1776, and again in 1780.

HALL, Marshall (1790-1857). An eminent English physiologist and physician, born at Basford, Notts. At the age of twenty (having been previously apprenticed to a chemist) he entered on the study of medicine at the University of Edinburgh, where, in 1812, he took his degree of M.D. After three years' subsequent attendance at the leading schools of medicine on the Continent, he commenced practice in Nottingham in 1815, and rapidly obtained a high provincial reputation. In 1826 he removed to London, where his career as a physician was eminently successful. His name is well known in connection with the doctrine of the reflex function of the nervous system. He admitted that the phenomena of which he treated had been long known to physiologists; but he believed himself to have been the first to show their independence of sensation, to bring them together under one generalization, to establish with precision the laws of their production, to assign them their just rank in physiology, and to apply the doctrine to the elucidation of disease. His last bequest to the science of medicine and the cause of humanity was the description of a simple and easily applied method of restoring suspended respiration, which has been the means of saving many from untimely death, and is known as 'the Marshall Hall method.' It is briefly as follows: The insensible person is laid on his back. His mouth is opened, and the tongue, grasped with a towel or handkerchief, is pulled forward. The lower part of the body is then elevated for a moment, to let water in the larynx and mouth run out by gravitation. The body is then laid on its back, with the left arm bent backward and upward, and placed under the head. The body is then gently rolled over on the face, the tongue being held forward, and then rolled back again. The object kept in view is to compress the thorax and empty the lungs by means of the weight of the body. The manœuvre must be repeated once every four seconds, deliberately, and preferably by the watch; for rescuers are apt to be too hasty and to perform the manipulation incompletely through nervousness. This method of resuscita-

tion has been largely superseded by the 'Sylvester method,' described under RESPIRATION.

HALL, OWEN (real name JAMES DAVIS). An English dramatic author. He was educated at University College, London, and practiced as a solicitor in London from 1874 to 1886. In the latter year he deserted the law for journalism. was editor of the *Bat* in 1885-87, and of *Galignani's Messenger* in 1888-90. In 1899 he founded and became editor of a weekly magazine known as the *Phœnix*. He is best known by his plays, such as: *A Gayety Girl; An Artist's Model; The Geisha; A Greek Slave; Florodora;* and *The Silver Slipper.*

HALL, ROBERT (1764-1831). A celebrated English Baptist preacher and writer. He was born at Arnesby, near Leicester, May 2, 1764, the son of a Baptist minister and the youngest of fourteen children. He was feeble in body and precocious in intellect. At the age of fifteen he was sent to a Baptist academy at Bristol. In 1781 he entered King's College, Aberdeen. Graduating M.A. in 1784, he became (1785) assistant Baptist minister and tutor in the academy at Bristol. He was a fluent, rapid, and impressive speaker, and was liberal, but not heterodox, in his religious views. In consequence of a disagreement with his colleague, he went, in 1790, to Cambridge, where, by his elaborate composition and vivid eloquence, he rose to the highest rank of British orators. He was not less distinguished for his writings and published discourses. His *Apology for the Freedom of the Press* (1793), and sermon on *Modern Infidelity* (1800), extended his reputation. In 1806 he resigned because of poor health, and in 1807 he settled in Leicester. He married in 1808, after a whimsical courtship; returned to Bristol in 1826, and died there February 21, 1831. He was an indefatigable student, learning Italian at sixty that he might enjoy Dante. Nearly all his life he suffered from ill health, and had at times attacks of insanity; yet few men have performed more intellectual labor. A complete edition of his works, with a memoir by Dr. O. Gregory, and observations on his character as a preacher by John Foster, was published in London, in six volumes (1831-33; 11th ed. 1853). His miscellaneous works are in Bohn's *Standard Library*, and an edition of his *Work of the Holy Spirit* appeared in London (1886). Consult his life, by Hood (London, 1881).

HALL, SAMUEL CARTER (1800-89). A British author and editor, born near Waterford, Ireland. He went to London in 1821, became a reporter of debates in the House of Lords in 1823, commenced a year later the study of law, though he never practiced, and had a varied experience as editor of magazines and books. In 1824 he married Anna Maria Fielding, who became well known as a skillful delineator of Irish life and customs. He edited the London *Art Journal* from 1839 to 1880; introduced during his period of supervision the engraving of sculpture and other innovations; and exposed the prevalent frauds in the sale of pictures alleged to be by the old masters. In 1880 he was granted a pension by Lord Beaconsfield. He frequently collaborated with his wife, rendered her valuable assistance in the preparation of her very popular *Ireland*, and edited, with extensive critical and explanatory annotations: *The Book of Gems* (1836-38); *The Book of British Ballads* (1842); *Gems of European Art, the Best Pictures of the Best Schools* (1843-45); *The Beauties of the Poet Moore* (1844); *The Baronial Halls and Picturesque Edifices of England* (1848); *The Gallery of Modern Sculpture* (1849-54); and *Selected Pictures from the Galleries and Private Collections of Great Britain* (1862-68). The best known among his original works are: *The Trial of Sir Jasper: A Temperance Tale in Verse* (1873); *An Old Story: A Temperance Tale in Verse* (1875); *A Memoir of Thomas Moore* (1879); *Rhymes in Council; Aphorisms Versified* (1881); and *Retrospect of a Long Life, from 1815 to 1883* (1883).

HALL, WILLIAM EDWARD (1835-94). An English writer on international law, born at Leatherhead. He was educated at University College, Oxford, where he took the degree of A.B. in 1856 and A.M. in 1859, and in the latter year won the chancellor's prize for a notable essay on *The Effect Produced by the Precious Metals of America upon the Greatness and Prosperity of Spain.* He studied at Lincoln's Inn, and was called to the bar in 1861, but turned his energies toward a study of modern history and international law. He traveled widely, and became well known as an art collector, upon which subject he also wrote extensively. In 1867 he attracted public attention by the publication of an able treatise entitled *A Plan for the Reorganization of the Army.* In 1874 appeared his first work on international law, *The Rights and Duties of Neutrals.* This was followed in 1880 by his great work, *International Law*, the publication of which marked an epoch in the literature of the subject, and secured for its author at once recognition as one of the greatest living authorities in that branch of law. The book reached a fourth edition in 1895, and was accepted as a standard work in Europe and America as well as in England. He also wrote *A Treatise on the Foreign Powers and Jurisdiction of the British Crown* (1894). He was elected in 1882 a member of the Institut de Droit International, and in 1891 was appointed one of the English commissioners for the settlement of the Newfoundland fisheries question with France.

HALLAM, ARTHUR HENRY (1811-33). An English essayist, son of Henry Hallam. He was a young man of great promise, and was educated at Eton, and at Trinity College, Cambridge. On graduating in 1832, he began the study of law; but the next year went abroad with his father, and died suddenly at Vienna. At Cambridge he formed a close friendship with Alfred Tennyson, to whose sister he was engaged to be married. Hallam's name has been rendered memorable through its connection with Tennyson's "In Memoriam," in which the poet employs the premature death of his friend as the starting-point of the well-known elaboration of his views on life and death. Hallam's *Remains in Prose and Verse* were published in 1834.

HALLAM, HENRY (1777-1859). An English philosophical historian and critic. He was the only son of John Hallam, Dean of Bristol and Canon of Windsor, and was born in Windsor on July 9, 1777. He was educated at Eton, and at Christ Church, Oxford, where he graduated B.A. in 1799; studied law at the Inner Temple, of which society he became a bencher; and was in practice on the Oxford circuit until 1812, when

an inheritance, through his father's death, together with a Government sinecure, allowed him to follow his natural bent for historical study and literary work. His literary aptitude had been early exhibited by precocious productions in the *Musæ Etonenses* (1795), and his contributions to the *Edinburgh Review* and other periodicals soon brought him into prominence among the most noted writers of the day. His first extended work, *A View of the State of Europe During the Middle Ages* (1818), was the result of ten years' preparation, occasionally relieved by intervals of Continental travel. His other important works are: *The Constitutional History of England from the Accession of Henry VII. to the Death of George II.* (1827), and *Introduction of the Literature of Europe in the Fifteenth, Sixteenth, and Seventeenth Centuries* (4 vols., 1837-39). Marked by conscientious and extensive research in original sources, by impartial analysis and criticism, together with ease and lucidity of style, these works long remained standard authorities, unsurpassed in their accuracy of details by the more extended modern works which have replaced them in the estimation of scholars. They went through several editions, and were translated into the leading European languages. In politics Hallam was a Whig; his candor and general temperament, however, unsuited him for the conflicts of parties, and he took no active part in them, but he displayed a genuine interest in all questions of social improvement. He acted with the Wilberforce party for the abolition of slavery, as well as in other humane schemes, and was one of the original promoters of the Society for the Diffusion of Useful Knowledge. In 1830 he was one of the recipients of the two fifty-guinea gold medals instituted by George III. for historical preeminence. Washington Irving received the other medal. Other honors included a D.C.L. degree, fellowship of the Royal, Antiquarian, and other learned societies, and trusteeship of the British Museum. Hallam's life was saddened by much domestic affliction, ten out of his eleven children, and his wife, having died before him.

HALLAM, Robert, Bishop of Salisbury (c.1360-1417). An English ecclesiastic. Educated at Oxford, he was a prebendary of Salisbury Cathedral by 1394, and six years afterwards was Archdeacon of Canterbury. After having been chancellor of Oxford University (1403-05), he was made Bishop of Salisbury in 1407 and a cardinal in 1411. He was a noted reformer, a leader of the party which tried to assert the supremacy of the Papal Council over the Pope himself, and he maintained so high a standard of independence throughout his investigation of abuses, while preserving the unity of his Church, that his death was considered responsible for the reactionary movement of Roman Catholicism in England.

HALLBERG-BROICH, häl'bĕrg-broiĸ, Theodor Marie Hubert, Reichsfreiherr von (1768-1862). A German soldier and author, known also by the pseudonym Eremit von Gautine, born in the Duchy of Jülich. He entered the military service of the Electorate of Bavaria, and subsequently, after extensive travels, became so active a patriot in the German cause that he was imprisoned by the French invaders for eight months in Paris. In 1813 he organized the militia forces enrolled between the Rhine and the Maas, and on January 6, 1814, crossed the Rhine at Coblenz in command of 30,000 troops. His writings, marked by original viewpoints and a somewhat bizarre style, include: *Reise durch Skandinavien* (1818); *Reise durch Italien* (1830); *Reise durch England* (1841); and *Deutschland, Russland, Kaukasus, Persien* (2 vols., 1844). Consult Giftel, *Leber des preussischen Generals Freiherrn von Hallberg-Broich* (Berlin, 1863).

HALLE, or **HALLE AN DER SAALE**, häl'le ăn dĕr zä'le (Lat. *Halæ Saxonum*). An important city in the Prussian Province of Saxony, situated on the right bank of the Saale, and on a number of islets, in latitude 51° 29′ N., and longitude 11° 58′ E., 21 miles by rail northwest of Leipzig (Map: Prussia, D 3). Halle has broad promenades on the site of its ancient fortifications, and abounds in mediæval buildings and monuments. Among the prominent churches are the splendid edifice of Saint Maurice, founded in the twelfth century and containing a fine choir and altar, and a pulpit with reliefs; the sixteenth-century Marktkirche, with its four towers; and the cathedral, consecrated in 1523. The chief secular edifices and monuments are the Rathaus, dating from the fifteenth century and recently renovated; the Rote Turm, a clock tower 276 feet high, dating from the fifteenth century; the neighboring statue of Roland, erected at a more recent date; a statue of Handel, who was born here; the new Ratskeller, built in 1893, in the Gothic style, and used partly for municipal offices; the remains of the Moritzburg, the former residence of the archbishops of Magdeburg; the Archbishop's residence, adjoining the cathedral and containing some valuable collections of the provincial museum; and, lastly, the buildings of the famous university. (See Halle, University of.) The interesting cemetery is like an Italian campo santo, and has handsome arcades. Besides the university the educational institutions include two gymnasia, the Francke Institutions (comprising a Latin high school, a 'real' school, a seminary for teachers, etc.); also the provincial museum with prehistoric antiquities, the municipal museum devoted to art, and the municipal theatre. Halle has a zoölogical garden and important hospitals, and is the seat of numerous historical, scientific, and economic societies.

It is a very important industrial town. At the head of the local industries for centuries has been the production of salt, which is obtained on an islet of the Saale, the yearly output amounting now to nearly 9000 tons. The workmen who are engaged in the salt-works are known as Halloren, and differ from the rest of the population of Halle in the matter of dialect and certain customs. In olden times they formed a separate caste. The metal industries developed greatly during the second half of the nineteenth century, and Halle has now over fifty large establishments for the manufacture of machinery, besides numerous establishments for the production of other iron and copper articles. There are also many starch factories. Additional manufactures are of chemicals, chocolate, cocoa, chicory, malt, sugar, beer, spirits, etc. Sugar-beets are raised in the vicinity, and there are brown-coal mines. The commerce, mostly in grain, sugar,

and colonial goods, is quite extensive, a considerable part of the traffic being by river. The town has good railroad connections. There is an electric street railway.

Halle is administered by a chief burgomaster, a burgomaster, an executive board of 16, and a municipal council of 54 members. The city owns the water-works, two gas plants, an electric plant since 1900, and an abattoir. The budget of 1902 balanced at $1,625,600, the most significantly large item of expenditure being for education. The municipal debt amounted to $6,116,124. Halle began to grow only in the second half of the nineteenth century. From 52,620 in 1871 the population, almost wholly Protestant, increased to 71,484 in 1880, 101,401 in 1890, and 156,611 in 1900, the extraordinary increase during the last decade being due to the annexation of suburbs.

Halle, first mentioned about 800 as the Castle of Halla, and as a town in 1064, is of very ancient origin. It was presented by Otho I. to the Archbishopric of Magdeburg, and began to grow in importance with the foundation of the monastery of Neuwerk in 1116. As a member of the Hanseatic League it attained considerable commercial prominence, and succeeded in freeing itself from the rule of the Archbishops of Magdeburg. Its independence, however, was of short duration, owing to the internal conflicts between the common people and the patricians, which gave Archbishop Ernest an opportunity to regain the town in 1478. The Reformation became an issue in Halle in 1522, and in 1541 a Lutheran superintendent was appointed. By the Treaty of Westphalia the town came into the possession of Brandenburg. Taken by the French in 1806, it was annexed to Westphalia in the following year, and passed to Prussia in 1813. Consult: Hertzberg, *Geschichte der Stadt Halle*, vols. i.-iii. (Halle, 1889-92); Schrader, *Geschichte der Universität Halle* (Berlin, 1895).

HALLE, UNIVERSITY OF. A German university which came into existence through the rivalry between conservative Saxony and progressive Brandenburg, and because the Hohenzollerns desired to have a more centrally located Lutheran university than that at Königsberg. The new foundation was united with a Ritter academy already existing, and was formally opened in 1694, with over 700 students. Thomasius and A. H. Francke were the most influential in determining the progressive character of the institution, which has been called the first modern university. In the earlier half of the eighteenth century it was preëminently the chief resort for Protestant Germany, having 1500 students on the average; later on, Göttingen became a strong rival. From the beginning, Halle was one of the leading theological schools of Germany, a distinction it has never lost, though it changed from its original pietism to a bold rationalism in the latter half of the eighteenth century. In the period of the Napoleonic Wars the university was twice suspended for its strong Prussian utterances. In 1817 the old and honorable University of Wittenberg (founded 1502) was united with it. The main university building was erected in 1832-34; nearly all the others in the seventies and eighties. Much attention is given to instruction in agriculture. Halle had in 1901 about 2000 students. The library, founded in 1696, contains over 210,000 volumes and 800 manuscripts, besides the Ponickau collection of books on Saxony and Thuringia with 15,000 volumes and 1000 manuscripts. Among the great names of Halle are those of Chr. Wolf, F. A. Wolf, Schleiermacher, Gesenius, Tholuck, Leo, and Bergk. Halle was also the seat of the scientific society Academia Naturæ Curiosorum, founded by J. B. Bausch in 1652, and now known as the Leopoldinisch-Karolinische Akademie. See ACADEMY, *passim*.

HALLE, äl, ADAM DE LA. See ADAM DE LA HALLE.

HALLÉ, hăl'lē, Sir CHARLES (or KARL HALLE) (1819-95). A German-English pianist and conductor. He was born at Hagen in Westphalia, his father being the town kapellmeister, and was regarded when but a young child as a musical prodigy. After serious study with Rink at Darmstadt, he went to Paris (1836), where he laid the foundation of all his subsequent success. He earned for himself a solid reputation during the twelve years of his stay there, and was in friendly contact with Cherubini, Chopin, Liszt, and Kalkbrenner. The political disturbances of 1848 caused his removal to London, where he was enthusiastically received. It was in Manchester, however, that he gained his most enduring fame, and did his best and most important work. He had been appointed director in 1853 of the Gentlemen's Concerts, and in 1857 commenced a series of subscription concerts with his famous orchestra, which up to the time of his death was the greatest musical educational factor in the north of England. Although his greatest interests were in Manchester, he was closely connected with the musical life of London, in 1861 performing all Beethoven's sonatas in eight matinée concerts. In 1880 he also produced Berlioz's *Faust* in the same city. In 1888 he was made a knight by the Queen (Victoria), and the same year married Madame Norman Neruda, with whom in 1890 and 1891 he made a tour of Australia. His compositions were entirely instrumental, and included many orchestral arrangements, and a method for the pianoforte. He died in Manchester.

HALLÉ, WILMA MARIA FRANCISCA, Lady. See NERUDA, WILMA MARIA FRANCISCA.

HAL'LECK, FITZ-GREENE (1790-1867). An American poet, born at Guilford, Conn. He was educated in Guilford, and in 1811 became a clerk in a New York bank, where he remained for twenty years. He was afterwards the confidential agent of John Jacob Astor in his commercial affairs, and was appointed by him one of the original trustees of the Astor Library in New York. In 1849 he retired to his native place, where he spent the remainder of his life. Halleck wrote verses from his boyhood, but in his collected poems he included nothing juvenile. In 1819 he became associated with Joseph Rodman Drake (q.v.) in contributing the humorous series of "The Croaker Papers" to the *Evening Post*. The illness of Drake soon put an end to these papers, and Halleck commemorated his friend's death in the most beautiful and best-known of his poems, beginning "Green be the turf above thee" (1820). His longest poem, *Fanny* (1819), is a satire on the literature, fashions, and politics of the time. It obtained a factitious popularity, but hardly repays reading. In 1822-23 Halleck visited Europe, and in 1827 published an edition of his poems, among them the popular and good

verses on "Alnwick Castle," and on "Burns." These, with "Marco Bozzaris" (1825), constitute his chief claim to remembrance as a poet of a slight though genuine lyric vein, and of distinct capacity for society verse, who was yet artist enough to confine his production to a very moderate compass. Consult: Wilson, *The Life and Letters of Fitz-Greene Halleck* (New York, 1869); *The Poetical Writings of Fitz-Greene Halleck*, edited by Wilson (ib., 1869).

HALLECK, Henry Wager (1815-72). An American soldier, the general-in-chief of the United States Army from 1862 to 1864. He was born in Westerville, N. Y., on January 16, 1815, studied for a time at Union College, and graduated at West Point in 1839. He then served for a year as assistant professor of engineering at West Point; was assistant to the Board of Engineers at Washington in 1840 and 1841; and from 1841 to 1846, except for a few months in 1845, when he was in Europe for the purpose of examining various public works, was assistant engineer in repairing the fortifications of New York harbor. Soon after his return from Europe, he delivered a series of lectures before the Lowell Institute of Boston, which he published in 1846 as *Elements of Military Art and Science*, which in a new edition (1858) was much used during the Civil War as a training manual for volunteer officers. In 1847, during the Mexican War, he was sent to the Pacific Coast, and here served as aide-de-camp to Commander Shubrick from October, 1847, to June, 1848 (for part of this period serving as Lieutenant-Governor of Mazatlán); was chief of staff during Lieutenant-Colonel Burton's campaign in Lower California, and from August, 1847, to December, 1849, served as Secretary of State for California under the military governments of Generals Mason and Riley. In 1849 he was a member of the California Constitutional Convention, and of the committee which draughted the State Constitution. From December, 1852, to August, 1854, he was inspector and engineer of lighthouses, and from April, 1853, to August, 1854, was also a member of the board of engineers for fortifications on the Pacific Coast. He resigned from the army on August 1, 1854; became a successful lawyer in San Francisco; was elected president of the Pacific and Atlantic Railroad in 1855, and from 1850 until 1861 was director-general of the New Almaden quicksilver mines. Soon after the outbreak of the Civil War he reëntered the army (August 19, 1861), with the rank of major-general, and from November 9, 1861, to March 11, 1862, commanded the Department of Missouri, which then embraced Missouri, Iowa, Minnesota, Illinois, Arkansas, and western Kentucky. In this capacity he quickly put a stop to the peculations of contractors, thoroughly trained the disorganized troops, dismissed hundreds of placemen, and in general substituted order and system for the chaos which had resulted from his predecessor's laxity and incapacity. He planned the western campaign of 1862, and on April 11th assumed command in person at Pittsburg Landing (Shiloh). On May 30th his forces entered Corinth. On July 11th he was appointed General-in-Chief of the Armies of the United States, and at once proceeded to Washington, where he served in this capacity until March 12, 1864, after which, until April, 1865, he was chief of staff of the Army. He then was in command successively of the Military Division of the James, the Division of the Pacific, and the Division of the South until his death. As a soldier he was a strict disciplinarian, an excellent organizer, and a skillful strategist; but his genius was more adapted to the map than to the field, and on many occasions he is considered to have fallen far short of the requirements of a general-in-chief. He published: *Bitumen: Its Varieties, Properties, and Uses* (1841); *A Collection of Mining Laws of Spain and Mexico* (1859); *International Law, or Rules Regulating the Intercourse of States in Peace and War* (1861; abridged ed. for schools and colleges, 1886); and a translation of Jomini's *Vie politique et militaire de Napoléon* (1864).

HALL EFFECT. See Electricity.

HALLEIN, hăl'līn. A town in Salzburg, Austria, 10 miles south of the city of Salzburg, on the right bank of the river Salza (Map: Austria, C 3). It is noted for its extensive saltworks and saline baths, and has also important cotton, needle, and button factories. The Dürnberg, a mountain 2388 feet above the level of the sea, contains the largest salt-mine in the Austrian Salzkammergut, from which the salt is conveyed in large wooden conduits to the works within the town. Good rock salt is also obtained from Dürnberg. Hallein dates from the tenth century. Population, in 1890, 5200; in 1900, 6600.

HAL'LEL (Heb., praise). A part of the Jewish hymnal service. The term usually signifies the Egyptian Hallel, so called because of its connection with the Passover festival. This Hallel comprises Psalms cxiii.-cxviii., and is chanted in synagogues on the festivals of the Passover, Pentecost, Tabernacles, and the eight days of the Hannucah festival or Feast of Lights, and also at the close of the meal on the first evening of the Passover. It was this Hallel, or at any rate part of it, that was sung by Christ and His disciples at the Passover meal (Matt. xxvi. 30; Mark xiv. 26). Another Hallel, called the 'great Hallel,' was a general thanksgiving chant. Jewish authorities dispute in the Talmud as to what Psalms it should include. Some identify it with the usual Hallel (Psalms cxiii.-cxviii.); others make it Psalms cxx.-cxxxvi., cxxxv. 4-cxxxvi., or cxxxvi. alone.

HALLELUJAH, hăl'lē-lōō'yà, or **ALLELUIA** (Heb. *Halelu Yāh*, praise ye Yahweh). An ascription of praise to God derived from the Old Testament, where it appears at the end of certain psalms, and in general use as an expression of thankfulness. It is retained in the Greek and Latin liturgies in the original form, and was so also by the Church of England in the first Prayer-Book of Edward VI., though it is now translated by "Praise ye the Lord." Being an expression of gladness and triumph, it was reserved for seasons and festivals which expressed these emotions. Thus, in the Roman Catholic Church, it is never used from Septuagesima to Easter; and in some mediæval office books, the office of the Saturday before Septuagesima made a special mention of it, even personifying it, and taking a quaint and tender farewell of it: "Thou shalt go from us, O Alleluia; thou shalt return to us again in peace, O Alleluia." During the entire Easter season, on the contrary, and also in a

slightly less degree during the octaves of Christmas, Epiphany, and Corpus Christi, it is used continually at the end of antiphons, introits, communions, and other parts of the service. The three-fold repetition of it at the end of the mass, called the greater Alleluia, was in the Middle Ages sung by the deacon to a very prolonged melody or neuma. (See NEUMES.)

HALLELUJAH VICTORY. The name given to the victory of the Britons over the Picts, at Mold, Flintshire, Wales, March 30, 430, from the war-cry of the former, which had been suggested by Saint Germain, Bishop of Auxerre, on the eve of the battle.

HALLÉN, hâl-lān', ANDERS (1846—). A Swedish dramatic composer, born at Göteborg. He was educated under Rheinberger, Reineke, and Rietz, and from 1872 to 1878 was conductor of the Göteborg Musical Union, although he had important interests in Berlin, and resided there most of the time. He composed several important operas, which received their first presentation at the Royal Opera, Stockholm, of which in 1892 he became musical conductor; and also published numerous German and Swedish songs. His music, not generally known outside of Sweden and Germany, is exceedingly popular among the Swedish singing societies of the United States. His compositions include the operas *Harald der Viking* (1881), *Hexfallen* (1896), the song-cycles *Vom Pagen und der Konigstochter* and *Traumkönig und sein Lieb*, symphonic poems, and choral rhapsodies.

HALLER, hăl'lẽr, ALBRECHT VON (1708-77). An eminent physiologist, anatomist, botanist, and poet, born at Bern, Switzerland. Two years after the death of his father, an able lawyer, he went, in 1723, to the University of Tübingen, where he became the pupil of the anatomist Duvernoy. In 1725 he removed to Leyden, where he obtained the degree of doctor of medicine in 1727. He then visited London, whence he proceeded to Oxford, and afterwards to Paris, where for six months he studied anatomy and botany; later he became the pupil of Johann Bernoulli, the celebrated mathematician, at Basel. He returned in his twenty-second year to his native city, and commenced practice as a physician. The professor of anatomy, Meig, having fallen ill, Haller undertook the duties of his class; he likewise devoted much of his time about this period to the botany of the Alps, and also published a descriptive poem, *Die Alpen*. In 1735 he was appointed physician to the hospital, and shortly afterwards principal librarian and curator of the cabinet of medals; but in 1736 he left Bern to become professor of medicine, anatomy, botany, and surgery in the new university at Göttingen. For the next eighteen years he devoted himself wholly to teaching and to original research. He took an active part in the formation of the Royal Academy of Sciences of Göttingen, and the memoirs of the society contain many of his papers. During the period from 1736 to 1753 he published 86 works on medical subjects. He was appointed physician to the King of England in 1739. In 1753 he returned to Bern. Among his most important writings are his *Elementa Physiologiæ Corporis Humani* (1757-66)—by far the most important of his works—and his four *Bibliothecæ*, or critical catalogues of works on botany, surgery, anatomy, and medicine. Haller's eminence as a man of science was duly recognized in his own lifetime. He was ennobled by the Emperor of Germany in 1748, and the universities of Oxford and Utrecht in vain endeavored to obtain him as their professor. His name is especially connected with the doctrine of muscular irritability. (See MUSCLE.) While his name is indelibly recorded in the annals of science, it should also be remembered that by his work as a poet Haller greatly contributed to the movement which toward the end of the eighteenth century brought new life to German poetry. Others of his works were: *Icones Anatomicæ* (1743-50); *Opuscula Pathologica* (1755); and *Opuscula Botanica* (1749). For his *Life*, consult Frey (Leipzig, 1879).

HALLES, âl, LES. A large building on the Grande Place of Bruges, Belgium, erected in the thirteenth century, now used as offices of the city Government, and as a market. Its massive belfry, 350 feet in height, is the subject of Longfellow's poem "The Belfry of Bruges." It contains a remarkable set of chimes dating from 1748.

HALLES CENTRALES, âl sĕn'trâl'. The great central market of Paris, an enormous group of metal structures consisting of a system of pavilions planned to cover 22 acres. Between the pavilions are covered streets 48 feet in width, with a roof about 48 feet above the ground, intersected by an avenue 105 feet wide. Each pavilion is divided into 250 small shops, rented for 20 centimes a day, and beneath are cellars 12 feet in height. The provisions sold in the market are brought during the night in wagons, the total number of which is estimated at 15,000. The early hours of the morning to 8 o'clock in summer and 9 in winter are devoted to auction sales, after which the retail trade commences.

HAL'LETT, BENJAMIN FRANKLIN (1797-1862). An American statesman and editor, born at Barnstable, Mass., son of Benjamin Hallett (1760-1849), the ship-master and founder of sailors' Bethels. He was educated at Brown University, studied law, worked on a paper in Providence, R. I., and in 1827 became editor of the *Boston Advocate*, from which he resigned in 1831, because his crusades against Masonry, against slavery, and in behalf of temperance were ruining the subscription list. He turned against Henry Clay when the latter refused to commit himself to the Anti-Masonic Party; and when Masonry no longer was an issue, Hallett joined the Democratic Party. Long chairman of its national committee, he did much to nominate Pierce and Buchanan. He was appointed district attorney by the former in 1853, and wrote the Democratic platform in 1856.

HALLETTE, à'lĕt', A. (1788-1846). A French mechanic, born at Arras, where he founded a machine-shop. He improved the hydraulic press used for the extraction of oil, and invented a new system of propulsion tubes for atmospheric locomotives, the *tube propulseur Hallette*. Consult his monograph with that title (Paris, 1844).

HAL'LETTSVILLE. A city and the county-seat of Lavaca County, Tex., 101 miles west by south of Houston; on the San Antonio and Aransas Pass Railroad (Map: Texas, F 5). It carries on considerable trade in cotton, cottonseed

oil, and live-stock; and has several cotton-gins, a cottonseed-oil mill, etc. The water-works and electric light plant are owned by the municipality. Population, in 1890, 1011; in 1900, 1457.

HALLEVI, JUDAH. See HALEVI, JUDAH.

HAL'LEY, EDMUND (1656-1742). An English astronomer and mathematician, born at Haggerston, London, the son of a soap-manufacturer. He was educated at Saint Paul's School, and afterwards at Queen's College, Oxford, which he entered in 1673. In 1676 he published a paper on the orbits of the principal planets; also observations on a spot on the sun, from which he inferred its rotation round its axis. In November of the same year he went to Saint Helena, where for two years he applied himself to the formation of a catalogue of the stars in the Southern Hemisphere, which he published in 1678 (*Catalogus Stellarum Australium*). On his return he was chosen a Fellow of the Royal Society, and deputed by that body to go to Danzig to settle a controversy between Hooke and Hevelius as to whether it is profitable to use telescopic or plain sights for astronomical observations. In 1680 he made a tour of the Continent, during which he made observations with Cassini at Paris on the great comet which goes by his name, and the return of which he predicted. His observations on this comet formed part of the foundation of Newton's calculation of a comet's orbit. Halley returned to England in 1681, in 1683 published his theory of the variation of the magnet, and the next year made the acquaintance of Newton. In 1686 Halley published an account of the trade winds and monsoons on seas near and between the tropics, and in 1692 his hypothesis relative to the change in the variations of the magnetic needle. To test the truth of this by obtaining measures of the variations in different parts of the world, he was sent in 1698 in command of a ship to the Pacific; but his crew mutinied, and he was obliged to return. The next year, however, he sailed again, and the result of his observations was a chart for which he was rewarded by the rank of captain in the navy with half pay for life. Soon after he made a chart of the tides in the channel, and surveyed the coast of Dalmatia for the Emperor of Austria. On the death of Wallis, in 1703, he was appointed Savilian professor of geometry at Oxford. In 1705 he published his researches on the orbits of the comets. In 1713, on the resignation of Sir Hans Sloane, he became secretary of the Royal Society; in 1716 he made valuable experiments with the diving-bell, which were afterwards published; and in 1721, after the death of Flamsteed, he became astronomer royal. In this office, and engaged especially in studying the moon's motions, he passed the rest of his life. In 1729 he was chosen a foreign member of the Academy of Sciences, Paris. Halley was the author of numerous other researches of great importance besides those mentioned. His *Tabulæ Astronomicæ* did not appear till 1749. Among his principal discoverics may be mentioned the long inequality of Jupiter and Saturn, and that of the slow acceleration of the moon's mean motion. He was the first to predict the return of a comet, and also to recommend the observation of the transits of Venus with a view to determine the sun's parallax. See COMET.

HALLEY'S COMET. See COMET.

HALLIARDS, or **HALYARDS** (probably a variant of *hallier*, from OS. *halian*, OHG. *halôn*, *holôn*, Ger. *holen*, Eng. *hale*, to haul; connected with Lat. *calare*, Gk. *καλεῖν*, *kalein*, to summon; explained by popular etymology as *haulyards*, or *haleyards*). Ropes used to hoist yards, gaffs, sails, etc. They usually take their name from the object hoisted; as, *topsail* halliards, *jib* halliards, *ensign* halliards, etc.; but in some instances they have other designations, the *crowfoot* halliards (so called because it is made fast to the awnings by several small lines spread out in fancied resemblance to a bird's foot), *throat* and *peak* halliards on gaffs, etc.

HAL'LIWELL-PHIL'LIPPS, JAMES ORCHARD (1820-89). An English antiquary and biographer of Shakespeare, born in Chelsea, London. His taste for original research was exhibited while yet a student at Cambridge, and he was made a fellow of the Royal Society and of the Society of Antiquaries when but eighteen years old. After the founding of the Shakespeare Society in London (1841), he gradually devoted more and more of his time to the study of the great dramatist. Rejecting the popular method of constructing the poet's biography from internal evidence, Halliwell discredited the personal application even of the sonnets, and set himself through years of investigation to collect and sift contemporary and traditional evidence to be found chiefly in Stratford-on-Avon and neighboring villages. The result of his labor was issued in his *Outlines of the Life of Shakespeare* (1st ed. 1881; 9th ed. 1890), but before he left the ranks of Shakespearean critics he had published a superb folio edition of the plays (16 vols., 1852-65). In 1863 he was largely instrumental in preventing the sale of Shakespeare's birthplace, and the foundations of New Place, where he died, and he aided generously in turning the one into a museum, and clearing the site of the other. Ever open to give and receive suggestions or criticisms from other Shakespearean students, his assistance was valuable, both directly and indirectly, through the collections of old literature and Shakespearean and other documents he presented or bequeathed to the Chetham Library, Manchester (1851), Smithsonian Institution, Washington (1852), the Penzance public library (1866-88), the Edinburgh University Library (1872), and the Birthplace Museum (1889). Many of his own numerous books were printed for private circulation only.

HALL MARKS. See PLATE MARKS.

HAL'LOCK, GERARD (1800-66). An American journalist, born at Plainfield, Mass. He graduated at Williams College in 1819, taught at Amherst Academy (1819-21), and after a short course at Andover, at Salem. In 1824 he started the *Boston Telegraph*, which was united with the *Recorder* a year later. He acquired a part interest in the *New York Observer* in 1827, and in 1828 joined David Hale in the management of the *Journal of Commerce*. He built a schooner, the *Evening Edition*, which met incoming vessels at Sandy Hook and brought back news; and in 1833 established a pony express between New York and Philadelphia, which gave the *Journal of Commerce* another great advantage. Hallock opposed abolition, but did much to further libera-

tion of the slaves. He was one of the founders of the Southern Aid Society (1854); and in 1861 the use of the mails was forbidden his paper, and he was indicted for 'encouraging rebels.' Unwilling to give up his principles, he retired from journalism, and lived at Hallock's Castle in New Haven, where he was known as a liberal and generous citizen. Hallock was one of the founders of the Associated Press of New York.

HALLOCK, WILLIAM ALLEN (1794-1880). An American editor, brother of Gerard Hallock. He was born at Plainfield, Mass., and was educated at Williams College and at Andover Theological Seminary. From the foundation of the American Tract Society (1825), he was its corresponding secretary until ten years before his death. He edited the *American Messenger*, and in addition to his labors as editor and reviser of the publications of the society, wrote several biographies and many tracts. Consult Knight, *Memorial of William Allen Hallock* (New York, 1882).

HALL OF FAME. See RUHMESHALLE.

HALL OF FAME FOR GREAT AMERICANS. A structure on the grounds of the New York University, completed in 1900, and designed to commemorate the achievements of distinguished citizens of the United States. It consists of a colonnade, 500 feet in length, following the curve of a terrace which supports three of the university buildings, and resting on a granite corridor which contains a long hall and five rooms, intended for a museum for the preservation of portraits and mementos of those whose names are inscribed in the colonnade. The colonnade contains 150 panels seven feet long and one and one-quarter feet high, designed to be filled by bronze tablets bearing the name of the person commemorated, the dates of his birth and death, and a selection from his writings. The agreement between the university and the donor of the Hall of Fame provided that no name shall be inscribed except of a person born in what is now the territory of the United States, and of a person who has been dead at least ten years. Fifty names, if selected, were to be inscribed during 1900, and five additional names every five years thereafter, completing the full number by the year 2000. Nominations were received from the general public by the University Senate, who transmitted the names seconded by any member to a board of 100 electors selected from educators, writers, and others interested in American history, 51 votes being necessary to a choice, subject to the final approval of the University Senate. The first fifty names were required to include representatives of a majority of fifteen classes: authors and editors; business men; educators; inventors; missionaries and explorers; philanthropists and reformers; clergymen and theologians; scientists; engineers and architects; lawyers and judges; musicians, painters, and sculptors; physicians and surgeons; rulers and statesmen; soldiers and sailors; distinguished men and women outside these classes. Panels left vacant by these restrictions may be filled the ensuing year. The announcement of the new foundation created wide interest. It was favorably considered by the press, and some papers offered prizes for the lists of names which should approach most closely to the final choice of the electors. The Senate received over 1000 names, of which 200 were submitted to the electors, who were themselves invited to add to the nominations. From the names suggested, the electors chose 29, as follows: George Washington, Abraham Lincoln, Daniel Webster, Benjamin Franklin, Ulysses S. Grant, John Marshall, Thomas Jefferson, Ralph Waldo Emerson, Robert Fulton, Henry Wadsworth Longfellow, Washington Irving, Jonathan Edwards, Samuel F. B. Morse, David G. Farragut, Henry Clay, George Peabody, Nathaniel Hawthorne, Peter Cooper, Eli Whitney, Robert E. Lee, Horace Mann, John James Anderson, James Kent, Henry Ward Beecher, Joseph Story, John Adams, William Ellery Channing, Gilbert C. Stuart, Asa Gray. Of the remaining names, those which received the votes of ten or more electors were by that fact placed in nomination for the next election.

HALLOPEAU, ä'lō'pō', FRANÇOIS HENRI (1842—). A French physician, born in Paris and educated there. He was appointed hospital physician in 1877, and became a member of the Academy of Medicine in 1893. Besides special monographs on diseases of the skin, Hallopeau wrote a standard *Traité élémentaire de pathologie générale* (4th ed. 1893).

HALLORAN, LAWRENCE HAYNES (1766-1831). An English poet and author, born probably in Ireland. He was first a teacher in a private school near Exeter. Afterwards he took orders, and was chaplain in the English fleet during the battle of Trafalgar. He published a descriptive poem, "The Battle of Trafalgar," in 1806. He went to South Africa as chaplain to the forces there, but owing to his defense of two officers court-martialed for dueling in 1810, and his satirical pamphlet, *Cap-Abilities, or South African Characteristics* (1811), he was banished. On his return to England he led a wandering life, and was ultimately condemned to seven years' transportation for forgery. He opened a school in Sydney, Australia, where he died. His works include: *Odes, Poems, and Translations* (1790); *Lacrymæ Hibernicæ, or the Genius of Erin's Complaint* (1801); and *The Female Volunteer*, a drama (1801).

HALLOW-EVEN, or **HALLOWE'EN.** The name popularly given to the eve or vigil of All Hallows, or festival of All Saints, which being the 1st of November, Hallowe'en is the evening of the 31st of October. In England it was long customary to crack nuts, duck for apples in a tub of water, and perform other harmless fireside revelries. Sometimes there were ceremonies of a more superstitious character, as, for example, charms to discover who should be the husband or wife of the person inquiring. Consult Brand, *Popular Antiquities*, edited by Ellis (London, 1813).

HALLOW-FAIR. A market held in some places in Scotland during November, i.e. at Hallowtide.

HALLSTATT (häl'stät) **EPOCH.** The name applied to the last stage of bronze or the first stage of iron culture in Europe. It is so called from the necropolis of Hallstatt, Upper Austria, near the border of Salzburg. It is associated with the Celtic language group and the Alpine race of Ripley, who characterizes the

Hallstatt culture of the eastern Alpine highlands as more highly evolved than that of the Neolithic period in the West due to Oriental influences. It appeared a thousand years or more before the Christian Era. It flourished chiefly in Carinthia, Southern Germany, Switzerland, Bohemia, Silesia, Bosnia, Southeastern France, and Southern Italy. Consult Deniker, *Races of Man* (London, 1900).

HÄLLSTRÖM, hĕl'strēm, IVAR (1826—). A Swedish composer, born in Stockholm. He was educated for the legal profession, and was private librarian to the Crown Prince, who became Oscar II. of Sweden. In 1861 he was appointed the successor of Lindblad as director of the National School of Music at Stockholm. He is essentially a national composer, and all his writing is marked by the characteristics of Scandinavian music in general, and the Swedish folk-music in particular. He composed several operas, the most successful of which was *Den Bergtagna*, or the *Mountain King*. Other works include the operas, *Hertig Magnus; Den förtrollade katten*, or *The Enchanted Cat; Neaga*, or *Nyaga* (libretto by Carmen Sylva); *Idyl* for soli, chorus, and orchestra, which, in 1860, won the prize of the Musical Union of Stockholm.

HALLUCINATION (from Lat. *hallucinatio, alucinatio*, hallucination, from *alucinari*, to wander in mind). In the states of dreaming, hypnosis, and insanity (qq.v.), we find a derangement, temporary or permanent, of the normal train of ideas (see ASSOCIATION) and their attendant affective processes; in hallucination and illusion (q.v.) we have an abnormal condition of single ideas or representations. (See IDEA.) An illusion may be defined here, provisionally, as a distorted perception; an hallucination is "an image of memory which differs in intensity from the normal" (Wundt), a centrally aroused idea which by its strength and vividness simulates the reality of an external object, and is, therefore, accepted as real by the perceiving subject. Hallucinations are characteristic of certain forms of insanity; the religious visionary holds intercourse with the Virgin Mary; the melancholiac hears insulting or threatening voices (delirium of persecution). Sane persons, especially those engaged in intellectual pursuits, are also liable to hallucinations after a period of concentrated mental work. The commonest forms of hallucination are, perhaps, the 'hypnagogic,' visions or voices seen or heard in the drowsy interval preceding sleep. Hallucinations are ordinarily auditory or visual, though they may also arise within the spheres of taste, smell, and touch.

Hallucinations may be set up by hyperæmia of the brain, membranes, and cortex; by the action of drugs (morphium, ether, etc.); and by disturbances of brain nutrition, resulting in anæmia. The common factor in all these cases is a deposition, in the cerebral cortex, of products of decomposition, which at first enhance the irritability of the area affected, and presently serve themselves as stimuli to brain action.

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HALLUF. See WART-HOG.

HALLUIN, à'lwăn'. A town in the Department of Nord, France, on the Belgian frontier (Map: France, K 1). It has extensive manufacturing establishments of cotton, linen, etc. Population, in 1901, 16,500.

HAL'LUX VAL'GUS (Lat., wry toe). The technical name of a deformity of the great toe, which is generally caused by wearing too small a shoe, the toe, for lack of room, being forced out of its normal position so that it sometimes overlaps the other toes. This malformation, which is most common among women, not unfrequently results in osseous changes which may necessitate amputation of the toe.

HALLWICH, hăl'vĭk, HERMANN (1838—). An Austrian politician and historian, born at Teplitz, and educated at Prague. From 1871 to 1897 Hallwich was a member of the Austrian House of Deputies, allied with the German Left, and prominent as a speaker on questions dealing with commerce and tariff. As an historian he is best known as an ardent defender of Wallenstein. He wrote: *Wallensteins Ende. Ungedruckte Briefe und Akten* (1879); *Heinrich Matthias Thurn als Zeuge im Prozess Wallenstein* (1883); and *Gestalten aus Wallensteins Lager* (1885).

HALM, FRIEDRICH, the pseudonym of MÜNCH-BELLINGHAUSEN, E. F. J., Baron von (q.v.).

HALM, hälm, KARL (1809-82). A German philologist, born at Munich in 1809. From 1839 he taught at Speier and Hadamar; in 1849 he became rector of the newly founded Maximiliansgymnasium at Munich, and in 1856 professor in the university there and director of the royal library. His principal works are critical editions of *Cicero* (1845-56), *Quintilian* (1868-69), and *Cornelius Nepos* (1871); *Cicero's Orations* with commentary (1845-48); and *Select Orations of Cicero* (1854-66); in the Teubner series, *Æsop's Fables* (1852), *Florus* (1854), and *Tacitus* (4th ed. 1891). His shorter treatises comprise: *Lectiones Stobenses* (Speier, 1841-42); the *Catalogue of the Fathers of the Latin Church* (1865); and his rich *Catalogue of the Munich Library*, vol. i. (1865).

HALMA, ăl'mă', NICOLAS (1755-1828). A French mathematician, born at Sedan, and educated there and in Paris. He took holy orders, and was principal of the college at Sedan (1791-93). Removed from this position by the suppression of the colleges, he went to Paris and was in quick succession engineer, surgeon, professor at the Prytanée and at the Military School of Fontainebleau, librarian and instructor of the Empress, and librarian of the Department of Bridges and Highways. Then he undertook, at the instance of Delambre, the translation of Ptolemæus on astronomy, together with the commentaries of Theon on the first two books, and other material (1813-16). But the success and merits of his work were small, and an appointment as assistant curator of the Bibliothèque Sainte Geneviève and as canon of Notre Dame were much more remunerative. His further works include translations and criticisms of Greek mathematicians and chronologists, and text-books of geography, besides many miscellaneous writings.

HALMAHERA, hăl'mă-hā'rā. An island of the Moluccas. See GILOLO.

HALMOTE, or **HALIMOTE** (from *hall* + *mote*, AS. *gemot*, assembly). An ancient English court, held by the lord of a manor for the purpose of administering the laws and customs of the manor. It was composed of the freeholders of the manor, and came later to be known as the *Court Baron* or manorial court. See COURT BARON.

HALMSTAD, hälm'städ. A town in Sweden, and capital of Halland Län, situated at the mouth of the Nissa on the east shore of the Cattegat, about 76 miles south-southeast of Göteborg (Map: Sweden, E 8). The town possesses a castle, now the residence of the Governor; a church dating from 1462, and a high school. It is an important railroad centre, and has regular steamship connection with most of the Swedish coast towns as well as with Copenhagen and Lübeck. It is the chief export town for a large part of Southern Sweden. The chief manufactures are cloth, beer, and machinery. The town exports lumber, fish (the river abounding in salmon), oats, butter, and woolen goods; the chief imports are food-stuffs, fertilizers, petroleum, and jute. Population, in 1901, 15,400. Halmstad received municipal privileges in 1307, and has been the scene of many important events in the history of Sweden, among them the defeat of the Danes by Charles XI. in 1676.

HALO (Lat. *halos*, from Gk. ἅλως, halo, disk, threshing-floor, from ἁλεῖν, *halein*, to grind). The general name given to a class of optical phenomena, described more specifically as GLORY, CORONA, ANTHELIA, PARHELIA, MOCK SUNS, SUN-DOGS, PARASELENA, MOCK MOONS, etc. When the light of the sun or moon or bright star shines through a delicate cloud, or layer of fog or mist, a variety of optical phenomena are produced which may be classified as (a) circular rings around the sun or moon or star as a centre; (b) horizontal rings around the zenith as a centre; (c) partial arcs around the sun or the zenith; (d) vertical columns of light either through the sun or moon, or through points around the horizon symmetrically placed with reference to the sun; (e) elliptical rings around the central luminary. If the observer is so located that his shadow is projected upon a cloud, a bank of fog, or a meadow covered with drops of dew, he may see similar circles of light around his shadow or his anti-solar point, which circles have been described under ANTHELIA. The circles around the sun really occur much more frequently than those around the moon, but are less frequently observed, owing to the brightness of the sun; they can, however, easily be seen by viewing the reflection of the sky in the surface of still water or an unsilvered glass plate.

Halo is the general term by which we designate a variety of optical phenomena whose study is a branch of physical optics. The circular rings of class (a), when they are quite near the sun, namely, within fifteen degrees, and, in fact, usually within five degrees, are the result of the interference of waves of light that have passed around the minute globules of water, or sometimes of dust, in the hazy atmosphere. This process was called diffraction by Sir Isaac Newton, who showed that in the rear of every small object there is a bright spot instead of a shadow, and surrounding this bright spot a series of concentric rings or bands of brilliant colors. If one looks at the sun through a mass of small particles or fibres of rather uniform size, as those of wool, a similar series of concentric rings will be seen, the angular diameter of which increases as the diameters of the fibres diminish; on this principle Dr. Thomas Young based the construction of his eriometer for the determination of the diameter of small particles and the fibres of textile materials. The largest rings that have been seen about the sun are those known as Bishop's rings, observed after the eruption of Krakatoa. These are about ten, twelve, or fifteen degrees in radius, and must have resulted from the presence of a very delicate layer of the finest imaginable dust or aqueous globules whose diameters probably did not exceed 0.0002, or one five-thousandth of an inch. On the other hand, particles that have a diameter of 0.0013 may produce rings having a radius of one degree, which would, therefore, very closely encircle the sun or moon, whose radius is only one-quarter of one degree. All these circles are known as 'glories.'

For large globules of water, such as compose the lower clouds, the diffraction phenomena become inappreciable, and are replaced by more complicated phenomena of reflection and refraction. In the higher alto-stratus and alto-cumulus clouds formed of small globules of water the range of diameters is usually rather large, and a series of overlapping circles is seen when the sun or moon is behind them. In the highest cirrus clouds the particles of ice form more delicate circles. For particles of a much smaller size than those that usually occur in clouds, the phenomena of diffraction are replaced by the colors of thin plates. Brilliant illustrations of these clouds occurred in the green, blue, and red suns seen when the sun was examined through the clouds of vapor that were thrown off by the eruption of Krakatoa in 1883. The study of this subject led to the experiments by Kiessling, and more especially by Dr. Carl Barus, whose publications on cloudy condensation form the stepping-stones to our present limited knowledge of the growth of minute water-globules from a diameter somewhat less than the tenth of the length of the sodium-wave up to a diameter equal to that wave-length itself. Consult *Bulletin* No. 12, United States Weather Bureau, 1895.

In the small circles or glories referred to, the red circles are outermost, and the blue ones within; the term 'halo' is applied by meteorologists more especially to circles of larger radius formed by reflection and refraction within the drops of water, such as the rainbow and the halos of twenty-two and twenty-five degrees radius. In rainbows or halos formed by one reflection the red is innermost, namely, on the side toward the sun; and the blue is outermost, or away from the sun. Circles formed by two reflections have the red outside and the blue inside.

The complex and beautiful halo phenomena that are seen in the winter time result from the reflection and refraction of light by innumerable crystals of ice or simple snowflakes, which produce, in general, a hazy appearance in the air. When the sky is cloudless and of a pale blue near the zenith, these crystals of ice, settling down very slowly through the still air, may be sufficiently numerous to reflect enough sunlight to produce gorgeous effects. The simplest ice crystal is a regular hexagonal prism whose ends are either planes perpendicular to the axis or

more commonly hexagonal pyramids. When a ray of light within a prism strikes an inner surface at an angle of incidence of about 80.5° it is totally reflected. When a beam of light passes through the two sides of a prism whose angle is 60°, in such a way as to suffer the minimum deviation, the latter will amount to about 21° 50′. Bearing these principles in mind, as also the fact that in an ordinary cloud the prisms have every possible position, we see that the general result will be that crystals that are near the position of minimum deviation will conspire to refract the light in the same direction; some of the others will send the light in any direction, so the general result will be a bright circle of light surrounding the sun as a centre; its angular radius from the sun will be about 21° 50′, or the so-called halo of 22°, which has a dark interior, an inner reddish edge, and a bright exterior.

In still air the slender prisms of ice are likely to be suspended more nearly vertically. Therefore, their surfaces reflect a little sunlight as from a vertical mirror to the eye. When the observer is in the midst of a cloud or fog of such prisms, he sees a reflection of the sunlight forming a band of white light around the horizon at about half the apparent angular attitude of the sun. This is called the *parhelic circle*. When other combinations of reflections from snow crystals occur so as to double or treble the brightness of particular spots in this parhelic circle, these spots are called mock suns, sun-dogs, or parhelia. A vertical arc may be produced by the reflections from the horizontal surfaces of snowflakes, and this arc may extend for a very considerable distance above and below the sun.

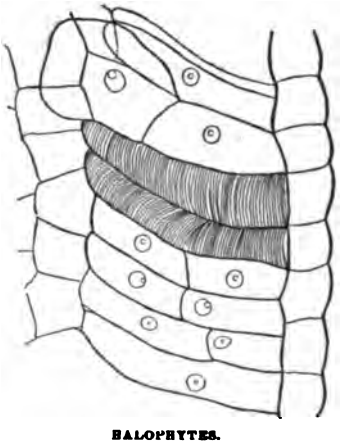
The most brilliant attendant of a halo is the tangential arc, which is sometimes seen touching the halo of 46° at its summit; it can only be seen when the sun's altitude is between 12° and 30°, and is due to the reflection of the sunlight through ice needles whose refracting edges are horizontal. The geometrical study of halos was most thoroughly worked out by Bravais, in his memoir of 1847 in the *Journal de l'Ecole Polytechnique*, vol. xviii. (Paris); it is also quite fully presented by Mascart, *Traité de l'optique* (Paris, 1896). The complete application of the theory of interference to the explanation of the phenomena of the supernumerary rings that accompany halos, and especially rainbows, was given by Dr. Thomas Young in 1804, but has more recently been presented in both elementary and analytical methods by Dr. J. Pernter, of Vienna. The idea that cloudy particles are not solid small spheres of water, but hollow vessels like a soap-bubble, was abundantly disproved by Clausius, but still finds occasional mention in popular text-books. However, the arguments for and against this vesicular theory (consult Kober, in Poggendorn's *Annalen*, Berlin, 1871) show that it can have no standing in science. An exhaustive work on optical meteorology was in course of preparation in 1903 by Prof. J. Pernter of Vienna.

HALOANDER, hă'lō-ăn'dĕr, GREGORIUS (1501-31). A German jurist whose family name was Meltzer. He was born at Zwickau, and was educated in Leipzig. He published, at Nuremberg, under the protection and with the help of Wilibald Pirkheimer: the *Pandectæ* (1529); *Institutiones* (1529); *Codex Justinianeus* (1530); and, in Greek with a Latin version, *Novellæ Constitutiones* (1531). He also edited Epictetus's *Enchiridion* (1529). Consult: Schmidt, *Symbolæ ad Vitam Gregorii Haloandri* (Leipzig, 1866), and Flechseg, *Gregor Haloander* (Zwickau, 1872).

HAL'OGENS (from Gk. *ἁλς*, *hals*, salt + *-γενης*, *-genēs*, producing, from *γίγνεσθαι*, *gignesthai*, to be born). The name given to the four non-metallic elements, fluorine, chlorine, bromine, and iodine. The term was originally used by Berzelius, on account of the ease with which these elements form salts. The halogens combine directly with many of the other elements, much heat being evolved in the process. With hydrogen, they form the well-known hydrofluoric, hydrochloric, hydrobromic, and hydriodic acids, respectively. The halogens exhibit an unmistakable gradation of physical properties. Thus, fluorine is a colorless gas; chlorine is a yellowish-green gas easily condensed to a liquid; bromine is a dark-red volatile liquid; iodine is a lustrous grayish-violet solid. See FLUORINE; BROMINE; CHLORINE; IODINE.

HALOPH'ILOUS PLANT (from Gk. *ἁλς*, *hals*, salt + *φίλος*, *philos*, loving). See HALOPHYTE.

HAL'OPHYTE (from Gk. *ἁλς*, *hals*, salt + *φυτόν*, *phyton*, plant). Plants which grow naturally in soils or waters rich in various salts, especially those with alkaline reactions. Common salt is quantitatively much the most important of these substances, although in certain localities alum, saltpetre, and other salts are abundant



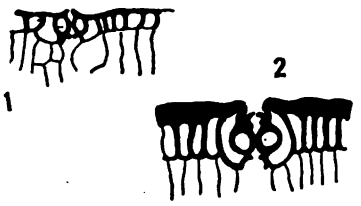
HALOPHYTES.

Longitudinal section of the stem of samphire, showing obliquely arranged palisade cells, also isolated water tracheids.

enough to be of ecological importance. The vegetation of the oceans and salt seas and lakes, as well as that along their marshy shores, represents the greater part of the halophytic vegetation of the world; however, there are great interior halophytic areas in arid climates, where seas or salt lakes have formerly existed. Sometimes salt springs or small areas of salty soil disclose a halophytic vegetation. While a great many species have, perhaps, become perfectly adjusted to soils or waters rich in salt, it is, nevertheless, true that these conditions are unfavorable for the development of the great majority of plants; and experiments have shown that many halophytes may grow as well, if not better, in soils or waters

with a low salt content. This is not true, however, in the case of such extreme halophytes as the marine algæ.

EFFECTS OF SALT ON THE GROWTH AND STRUCTURE. Almost all plants can take up limited quantities of ordinary salt without injury, although most plants probably do not need it in their normal life processes. All but natural halophytes and a few xerophytes soon perish if large quantities of salt are present in the soil. Probably the injurious effects of salt are due to the increased difficulty of osmotic absorption by the root, and to the inhibiting action of salt on the plant's normal life processes. Structures and conditions that have been experimentally shown to result from growth in salt solutions are reduction in leaf surface, increase of leaf thickness (due to richer development of palisades and water-storage cells), reduction of intercellular spaces. All of these are well-known xerophytic characters, so that halophytes, with the exception of submerged marine plants, are now regarded as a class of xerophytes whether the soil in which they grow be dry or wet. The structures noted, as well as others, doubtless serve to reduce transpiration, and it may be supposed that this is an advantage, because of the lessened osmotic absorption. See XEROPHYTES.



HALOPHYTES.

Cross-section of leaf of Sonneratia acida: 1, in ordinary soil condition; 2, when grown in salty soil, showing the great thickening of the cuticle in the latter.

Halophytes belong to a great number of families, some of which, as the Chenopodiaceæ, Frankeniaceæ, Plumbaginaceæ, are particularly rich in halophytic members. One of the most interesting features of halophytes is the wide distribution of their species. It is easy to see how coastal forms should be similar over wide areas, but why the same forms should also occur in many continental interiors is not so apparent. Perhaps the former interior seas had marine connections; in this case the interior halophytes form the best-known group of relict plants (q.v.). It must be remembered, however, that migrations are easier than has been generally supposed, and that given a congenial habitat in a congenial climate, a species or genus characteristic of such places is pretty likely to appear sooner or later. The various halophytic formations and societies are treated under BEACH PLANTS; BENTHOS; DESERT VEGETATION; DUNE VEGETATION; MANGROVE SWAMP; PLANKTON; and SWAMP.

HALPINE, or **HALPIN**, CHARLES GRAHAM (1829-68). An American soldier and poet, born in Oldcastle, County Meath, Ireland, and educated at Trinity College, Dublin. After a short journalistic experience in Dublin, he came to America in 1851. For a few months he was the associate editor of the Boston *Post;* served as the Washington correspondent of the New York *Times*, and after short connections with various metropolitan papers, was associate editor of the New York *Times* until 1857, when he became editor-in-chief of the New York *Leader*. At the outbreak of the Civil War he enlisted in the Sixty-ninth Regiment, New York Volunteers. He served as assistant adjutant-general on General Hunter's staff and under General Halleck, accompanied the former on his Shenandoah expedition in 1864, resigned from the service soon afterwards on account of failing health, and was brevetted a brigadier-general of volunteers. His experiences and observations as a soldier found humorous expression in the popular poems and stories written over the pen-name of Miles O'Reilly. He became editor of the New York *Citizen* in 1864, and strongly advocated civil-service reform; was elected register of New York County in 1867, and died in the following year from his continued literary exertions. His best-known writings, apart from fugitive poems, are: *Lyrics by the Letter H* (1854); *Life and Adventures, Songs, Services, and Speeches of Private Miles O'Reilly* (1864); and *Baked Meats of the Funeral: A Collection of Essays, Poems, Speeches and Banquets of Private Miles O'Reilly* (1866). His complete *Poetical Works* appeared in 1869.

HALS, hȧls, FRANS (c.1584-1666). A Dutch portrait and genre painter, the greatest, next to Rembrandt. He was born at Antwerp, not at Mechlin, as is often stated, probably in 1584. He went to Haarlem before 1600, and studied there under Karel van Mander (q.v.). He led a careless and jovial life, but was held in high esteem by his fellow townsmen. Like his brother, Dirk, he was an honorary member of the chamber of rhetoric; he belonged to the civic guard, and was head of the painters' guild, and of an important school of painting. He was twice married. He was usually in debt, and in 1664 the municipality of Haarlem allowed him a yearly pension of two hundred florins, which he enjoyed until his death on September 7, 1666.

The artistic development of Hals may best be studied in his large *doelenstukken* (portrait groups of the city guard) in the Museum of Haarlem. The earliest of these, the "Banquet of the Officers of Arquebusiers of Saint George" (1616), is in his first manner. There are traces of the old Haarlem School, in particular of Van Mander, but Hals is already an independent master. His grouping is freer than that of the old school; his color, though still brown in tone, is more luminous, and applied in a broader manner; and his characterization far superior.

His second manner (1627-39) is represented by three *doelenstukken* in the Haarlem Gallery: the "Banquet of Officers of the Arquebusiers of Saint George and Saint Andrew" (1627); "Officers of Saint Andrew" (1633), the most serious and finest of the groups; and the "Officers and Sergeants of Saint George" (1639), nineteen figures, among which is that of the artist himself. To these may be added a similar piece, the so-called "Shooting Gallery" (1637), in the city hall of Amsterdam. During this period his pictures are characterized by a light gray tone, greater breadth of execution, and greater seriousness of character. Another portrait group of the Haarlem Museum, the "Governors of the Elizabeth Hospital" (1641), in the peculiar treatment of light and in its rich golden hue, shows the influence of Rembrandt—an influence, however, which was only temporary and experimental. Before 1635 his color began to grow deeper, and

a darker gray tone pervaded his pictures. His treatment continued to grow broader, attaining a breadth perhaps never achieved by another master. This last manner is represented in the Haarlem Museum by two fine portrait groups: "Governors of the Hospital for Old Men," and the "Lady Governors of the Hospital for Old Women," both of 1665.

Frans Hals was one of the greatest portrait painters of all times. All details are subordinate to the character and expression of the face; the colors, however bright, serve to emphasize the carnation of the face. No painter has exceeded him in expression. He left over one hundred and sixty works, most numerous in Dutch and German galleries, and in those of Paris, Saint Petersburg, and New York.

The most interesting example of the portraits of the first period is that of the "Artist and His Wife in a Park" (1624), at Amsterdam; others are those of an unknown "Nobleman and His Wife," at Cassel; of "Jacob Olycan and His Wife" (1625), in The Hague; and of a "Young Married Couple" (1627), in Berlin. The Louvre possesses three fine examples of his second manner: "Nicholas Berensteyn and His Wife" (1629); the "Berensteyn Family," an admirable group composed of father, mother, six children, and two nurses; and a "Girl of the Berensteyn Family," the most charming of Hals's feminine portraits. Other prominent examples are the "Nurse with Child," in the Berlin Museum; the life-size figure of William van Heythuysen, in the Liechtenstein Collection, Vienna, his masterpiece, according to Bode; another of the same subject in the Museum of Brussels.

The portraits of his last period show no decline. Among the best are those of an old man and his wife in private possession, Paris; of Descartes, in the Louvre; the "Young Man in a Soft Hat," at Gotha; and three well-known portraits of unknown men in the Hermitage at Saint Petersburg. The Metropolitan Museum of New York has portraits of an unknown man, and of Hals's wife, and one of two gentlemen, attributed to him.

Hals is the father of Dutch genre painting. In his genre pieces he found an amusement and freedom not possible in ordered portraits. They are painted in a broader style with more humor. Most of them date from his early period. Among the best are: the "Jolly Trio" (1616), in private possession in the United States, of which there is a replica by Dirk Hals in the Berlin Museum; the "Herring Vender" (1516), in the Baring Collection, London; "Junker Ramp and His Mistress," in private possession, Haarlem. To the same period belong a number of pictures of singing boys and flute-players in the galleries of Brussels, Berlin, Königsberg, Schwerin, etc.; and of jovial drinkers at Amsterdam, Cassel, etc. Especially fine examples of this genre are the "Fool Playing a Lute," at Amsterdam, and "La bohémienne," in the Louvre. The original of the famous "Hille Bobbe," an old woman with an owl upon her shoulder and a tankard of wine in her hand, is in the Berlin Museum. There are replicas at Dresden and in the Metropolitan Museum, New York, probably by Frans Hals the younger. The latter museum also possesses a genre piece of a "Smoker."

Hals was the head of a large school, and exercised a great influence upon Dutch painting. Among his pupils were Verspronk, the portrait painter; his brother, Dirk Hals, and Adriaen Van Ostade, genre painters; the greatest genre painters of Holland—Metsu, Ter Borch, and Steen (q.v.)—were under his influence. Five of his sons were painters. Of these the most important was FRANS HALS THE YOUNGER (1620-c.1669), who copied his father's pictures. Examples of his independent works are in the Arenberg Gallery and in the Royal Palace at Brussels, in the Schwerin Gallery, and in the museums of Berlin and Königsberg.

Consult: Van der Willigen, *Les artistes de Haarlem* (Haarlem, 1870); Vosmaer and Unger, *Frans Hals Galerie* (Amsterdam, 1873); Knackfuss, *Frans Hals* (Leipzig, 1897). The chief authority on Hals is W. Bode; see his *Studien zur Geschichte der holländichen Malerei* (Braunschweig, 1883).

HÄLSCHNER, hĕlsh'nĕr, HUGO PHILIPP EGMONT (1817-89). A German criminalist. He was born at Hirschberg, Silesia, was educated at Breslau and Berlin, and in 1847 was made professor of law at Bonn, where he lectured on the history and nature of criminal law. In 1868 he was made a life member of the Prussian Upper House. His principal publications are: *System des preussischen Strafrechts* (2 parts, 1858 and 1868); *Das Recht Deutschlands im Streit mit Dänemark* (3d ed. 1863), an important work in which the disputes between Germany and Denmark are treated from the standpoint of the legal historian.

HAL'STEAD, MURAT (1829—). An American journalist, born in Ross Township, Butler Co., Ohio. He was educated at Farmers' College, near Cincinnati, became a member of the staff of the Cincinnati *Commercial* in 1853, and in 1865 its chief owner. This journal was subsequently consolidated with the *Gazette* of Cincinnati, as the *Commercial-Gazette*, of which he became the editor-in-chief. He was afterwards editor of the Brooklyn *Standard-Union*, and then became a special newspaper correspondent and magazine writer, in which capacity he visited the Philippine Islands during the Spanish-American War. His books include a *Life of William McKinley*, a *Life of Admiral Dewey*, and *The Galveston Tragedy*.

HAL'STED, BYRON DAVID (1852—). An American botanist, born at Venice, N. Y. He was educated at the Michigan Agricultural College, and, after two years' teaching in that institution, at Harvard. In 1879 he became editor of the *American Agriculturist*. He was elected professor of botany at Iowa Agricultural College (1885), and at Rutgers College (1889). Halsted gained most fame by his knowledge of weeds and fungi injurious to agriculture. He wrote: *The Vegetable Garden* (1882); *Farm Conveniences* (1883); and *Household Conveniences* (1883).

HALSTED, GEORGE BRUCE (1853—). An American mathematician, born at Newark, N. J. He graduated at Princeton in 1875, and studied at Johns Hopkins and in Berlin. He was instructor in Princeton until 1884, when he was appointed to the chair of mathematics in the University of Texas. Halsted wrote on mathematics, philosophy, and formal logic in the *Popular Science Monthly*, in *Mind*, and the *American Journal of Mathematics;* and published: *Mensuration* (1881); *Elements of Geometry* (1885);

FRANS HALS

"HILLE BOBBE," FROM THE PAINTING IN THE NATIONAL GALLERY, BERLIN

Elementary Synthetic Geometry (1892); *Pure Projective Geometry* (1895); and *Non-Euclidean Geometry* (1900).

HALS'WELLE, KEELEY (1832-91). An English painter, born in Richmond, Surrey. He first worked as an engraver, and afterwards studied at the Royal Scottish Academy in Edinburgh. He exhibited "Vino Veritas" in 1857, and "The Bridge of Sighs" in 1858. The best-known of his Roman pictures are "Roba di Roma" and "Non Angli, sed Angeli." His landscapes usually treat Surrey scenery. His work is marked by beautiful color and free, vigorous handling.

HALYS, hā'lĭs. The old name of the Kizil Irmak (q.v.), the largest river in Asia Minor.

HALYSITES, hăl'ĭ-sī'tēz (from Gk. ἁλυσις, *halysis*, chain). A fossil coral found in rocks of Ordovician and Silurian age in North America, Europe, and Australia, and distinguished by the chain-like figure produced by a cross-section of its mass upon the surface of a rock in which it is imbedded. Halysites is a very characteristic fossil of the Niagara series, and two species, namely, Halysites catenularius and Halysites escharoides, are common in the Silurian coral reefs of North America and England, where they are known as 'chain corals.'

HAM, ăN. A town and fortress in the Department of Somme, France, on the Somme, 36 miles from Amiens by rail, and 70 miles north-northeast of Paris (Map: France, K 4). It is celebrated for its mediæval castle, strengthened by modern additions, which has frequently served as a prison for political offenders. Louis Napoleon, afterwards Emperor, was a prisoner here from 1840 to 1846. After the coup d'état of December 2, 1851, the Republican generals Cavaignac, Lamoricière, Changarnier, and others were kept here for some time. The donjon, a round tower, is 110 feet high, 110 feet broad, and has walls 36 feet thick. Other noteworthy features of the town are the twelfth-century Romanesque Church of Notre Dame, recently restored, a belfry, public library, and museum. Population, in 1901, 3300.

HAM (AS. *hamm*, OHG. *hamma*, dialectic Ger. *Hamme*, ham, haunch; connected with Gael. *cam*, Lat. *camur*, crooked). Properly, the hind part or angle of the knee; but usually applied to the cured thigh of the ox, sheep, or hog, more especially the last. Ham-curing and bacon-curing are performed in a variety of methods, each country or district having its own peculiar treatment. The essential operations are salting and smoking. The curing of pork-hams forms a large and important item in the industry of various countries. See PACKING INDUSTRY.

HAM (perhaps originally the name of a deity to be compared with the first element in the name Ammizaduka, an early Babylonian king). According to Gen. x. 6-20, the second son of Noah, and ancestor of a group of people which includes Cush (Ethiopia), Egypt, Put, Canaan, and Babylonia, represented by Nimrod. The origin and meaning of the name are quite obscure. Older explanations connecting the word with a supposed name for Egypt, *Kemi* or *Chemi*, signifying 'black,' or rendering it as 'hot' with reference to the district from which the Hamites came, are now discarded. The critical view of the tenth chapter of Genesis is that it is a composite production which has undergone much manipulation at the hands of editors. Ham has been substituted for Canaan, who, according to Gen. ix. 25, is in reality the 'younger son' of Noah, and who merited the curse of his father. According to an earlier version, the three sons of Noah were Shem, Canaan, and Japhet—representing three groups settled in Palestine. When the originally local tradition, through circumstances which cannot be considered here, was extended into one of general ethnic significance, Japhet, originally Phœnicia (as it seems), became a term for the distant outlying nations of the north and northeast, and the near and distant islands to the west in the Mediterranean; Shem became not only the ancestor of the Hebrews and their immediate relatives, but also of other nations like the Elamites (i.e. the Persians) who were favorable to the Hebrews; while Ham became the designation for all nations who, as enemies of the Hebrews at one time or the other, are 'accursed.' Hence, Egypt, Babylonia, Assyria, and the Canaanites with their offspring are put among the Hamites. Viewed in this light, the list of nations in the tenth chapter of Genesis, while not altogether lacking in historical value, is of interest chiefly as revealing the geographical horizon of Jewish writers in the sixth and fifth centuries B.C., and the principles guiding these writers in their grouping of the nations known to them. A problem that is still unsolved is to determine the source whence the writer or writers obtained the name Ham, which will also explain the substitution of Ham for Canaan. Consult the commentaries on Genesis (chapter x.) by Gunkel, Holzinger, Strack, Dillmann, Delitzsch, Ball, and others; also Knobel, *Die Völkertafel der Genesis* (*Giessen*, 1850); Glaser, *Geschichte und Geographie Arabiens*, vol. ii. (Berlin, 1890).

HAM, EAST and WEST. Two English municipalities, east suburbs of London, from which they are separated by the river Lea (Map: London, D 9). Their growth and importance are due to their proximity to the metropolis, and to the numerous factories established in their midst to evade the prohibitive enactments of the Metropolitan Board of Works. Both city administrations are of a high order. West Ham owns a fine town hall, municipal buildings, a public hall, free libraries, a well-equipped technical institute, an electric-lighting plant, electric tramways, isolation hospitals, a lunatic asylum, public baths, and recreation grounds. East Ham is well provided with libraries, parks, and recreation grounds, electric lighting, and tramways, a new town hall, technical institute, and public baths. Population, East Ham, in 1891, 32,700; in 1901, 96,000; West Ham, in 1891, 204,900; in 1901, 267,300.

HAMA, hä-mä' (the *Hamath* of the Bible). A city of Syria, situated on both banks of the Orontes, about 120 miles north of Damascus (Map: Turkey in Asia, G 5). It is irregularly built with narrow, crooked, ill-paved streets, and houses built mostly of mud. It has a number of mosques and well-stocked bazaars. Its manufactures consist chiefly of rough woolen mantles, and cotton fabrics; trade is with the neighboring Bedouins. The population is estimated at 50,000. See HAMATH.

HAMADAN, hä'mä-dän'. A town of Western Persia, in Irak-Ajemi, situated in a very

fertile and picturesque region, about 180 miles southwest of Teheran (Map: Persia, C 4). It is unattractive in appearance, but has a number of fine well-stocked bazaars, several mosques, and two tombs of special interest, one claimed to be that of Mordecai and Esther, and the other of the Arabian philosopher Avicenna (q.v.). Hamadan is famous for its copper ware, leather trunks and saddlery, carpet, silver, and gold works. Commercially the town is of considerable importance, owing to its position on the route between Bagdad and Teheran. The population is estimated at 25,000, including about 1000 Jewish families. Hamadan is generally believed to occupy the site of the ancient Ecbatana (q.v.).

HAM'ADRY'AD (Lat. *hamadryas*, from Gk. *ἁμαδρυάς*, *hamadryas*, from *ἅμα*, *hama*, with + *δρῦς*, *drys*, tree). A venomous serpent, the largest of Oriental cobras (*Naja* or *Ophiophagus bungarus*). It is nowhere numerous, but widely distributed, occurring in damp, forested regions from Ceylon to the Philippines, and is known as the 'giant cobra,' and in some parts of India as 'sunerkor.' It grows to a length of 13 feet, and probably more, and has a hood which it can expand; but differs from the common cobra by the presence of a pair of large shields on the head behind the parietals. It is variable in color, but usually, when adult, is some shade of brown, with broad dark cross-bands. It is fierce in disposition, rarely showing any fear of man (though exhibiting much intelligence in captivity), and often climbs trees and conceals itself in their hollows. It feeds altogether upon snakes, which it chases swiftly, seizes behind the head, and swallows head foremost. It is said that a man bitten by a vigorous snake of this species will die in three minutes, and an elephant in two hours. Were it not so rare it would be the most dangerous reptile in the world. See COBRA and KRAIT. Consult Fayrer, *Thanatophidia of India* (London, 1874).

HAMADRYAD. The mandrill. See BABOON.

HAMADRYADS. See NYMPHS.

HA'MAN. A character introduced into the Book of Esther as an 'Agagite' (Amalekite) chief minister of Ahasuerus, King of Persia. When Mordecai the Jew refused to obey the order to bow down before Haman, the latter made an attempt to destroy all the Jews in the kingdom; Queen Esther, however, foiled his design, and Haman was hanged on the very gibbet which he had prepared for Mordecai. See ESTHER, BOOK OF.

HAMANN, hä'mân, JOHANN GEORG (1730-88). A German writer and a very original thinker, sometimes called the 'Magician of the North.' He was born at Königsberg, in Prussia. His early life was somewhat checkered, and he frequently changed his dwelling-place. In 1759 he returned to his home in Königsberg, and devoted himself to the study of the ancient languages and Oriental literature. As an author Hamann was little esteemed by his contemporaries. His language was figurative and symbolical in the highest degree, and frequently concealed rather than revealed the depth of his thinking. Yet he had the friendship of many eminent authors, and the influence which he exercised upon Herder, Goethe, and Jacobi was considerable. All his writings exhibit a deeply spiritual faith in the unseen and the eternal. Among them the *Sokratische Denkwürdigkeiten* (1759) and *Kreuzzüge des Philologen* (1762) are perhaps less oracular than the rest. His complete works were published by Roth (Berlin, 1821-43), in seven volumes; an eighth volume by Wiener (Berlin, 1843) contains additions and explanations and an indispensable index. His correspondence with Jacobi was published by Gildemeister (Gotha, 1868), who also wrote his biography (4 vols., 1857-63). For his life, consult Poel (Hamburg, 1874-76).

HAMASA, or **HAMASAH**, hä-mä'sä. (Ar. *ḥamāsah*, bravery, from *ḥamisa*, to be firm). The name of a famous anthology of Arabic poetry, collected by Habib ibn Aus et-Tai, surnamed Abu Temmam (c.807-846), and divided by him into ten books. The first book is the longest, and deals with the heroes of pre-Islamic times, illustrating the quality of hamasah (valor), which names the book, and also the whole collection. The remaining books deal with (2) Lamentations; (3) Manners; (4) Love; (5) Satires; (6) Hospitality; (7) Descriptions; (8) Travel; (9) Pleasantries; (10) Blame of Women. The collection is made with singularly good taste, and is taken from extempore works rather than from the standard poets. It is of great historical value, since it pictures very faithfully the life and the characteristics of the early Islamic era. There are three editions of the Arabic (1) by Freytag (2 vols., Bonn, 1828-47); (2) the Bulak edition (A. H. 1256); (3) the Calcutta edition (1856). The Hamasah has been translated into German by Friedrich Rückert (Stuttgart, 1846), and selections have been rendered into English by Lyall, *Ancient Arabic Poetry* (London, 1885). See ABU TEMMAM.

HAMATH, hä'math. A city in Northern Syria, situated on the banks of the Orontes (the modern el-Asi). The name signifies 'fortress' or 'sacred inclosure;' by the Greeks the city was called Epiphania, by the Christians Emath Epiphania; but the old name still maintains itself as Hama. Hamath is mentioned as early as the inscriptions of Thothmes III. (B.C. 1503-1449), and Seti I. (B.C. 1356-1347). King Tou (or Toi), of Hamath, sent to David a message of congratulation upon his victory over Rehob (after B.C. 1026; II. Sam. viii. 9). Hamath was evidently the capital of a State whose boundaries extended to the northern limits of Israel, 'the entrance of Hamath,' which probably was the opening between the Nasairiyeh Mountains above Tripoli and the north point of Lebanon. It is doubtful whether Solomon exercised any authority north of this point. Irchuleni of Hamath was one of the allied kings against whom Shalmanezer II. fought at Karkar in B.C. 854. In II. Kings xiv. 28, the text is too corrupt to permit any conclusion as to the author's thought, and the passage cannot be used to prove a conquest of Hamath by Jeroboam II. of Israel. Ini-ilu of Hamath paid tribute to Tiglath-pileser III. in B.C. 730, who annexed 19 districts of the land to Assyria. Sargon conquered Hamath in B.C. 720 and flayed King Ilu-bidi alive. According to II. Kings xvii. 24-30, Hamathites were transported to Samaria; a confusion with some other name is probable. Hamath belonged successively to the Assyrian, the Chaldean, the Persian, and the

Seleucid kingdoms. In the Asmonean period Jonathan, the Judean high priest, marched with an army into the country of Hamath for the defense of Demetrius. Hamath submitted peaceably to Abu Ubaida, the Moslem leader, in 639, and the Christian church was changed into a mosque. In the period of the Crusades the Ismailians took possession of Hamath. Tancred conquered the city in 1108 and massacred the Ismailians; but the Christians lost it to the Turk Togtekin in 1115. In 1178 the city passed into the hands of Saladin. A flourishing period for Hamath was the reign of Abulfeda (1310-31). In 1812 Burckhardt visited the city and saw the famous stones covered with Hittite inscriptions, which have not yet been deciphered. (See HITTITES.) For the modern town see HAMA. Consult: Burckhardt, *Travels in Syria and the Holy Land* (London, 1822); Delitzsch, *Wo lag das Paradies* (Leipzig, 1881); Winckler, *Alttestamentliche Untersuchungen* (Leipzig, 1892); Ed. Meyer, *Geschichte des Alterthums*, vol. i. (Stuttgart, 1884).

HAMBACH, hăm'bäc. A village of Bavaria, situated in the Rhine Palatinate, 15 miles west of Speier. Population, in 1900, 2244. It has an old castle, and is famous chiefly on account of the Hambacher Fest, a revolutionary meeting which took place here on May 27, 1832, attended by about 30,000 persons. This gathering marked the beginning of an open republican movement in Germany, and was followed by a series of reactionary measures on the part of the Bavarian Government. Most of the leaders of the gathering were compelled to seek safety abroad, and some were imprisoned. The fortieth anniversary of the Hambacher Fest was celebrated on May 27, 1872, with the approval of the Bavarian King.

HAM-BEETLE. A cosmopolitan beetle (*Necrobia rufipes*) of the family Cleridæ, also called 'red-legged ham-beetle,' which is particularly abundant in the Southern and Western United States, and occasionally ruins many hams in the packing houses and storehouses. The injury is generally due to careless packing or to the accidental cutting or cracking, or even to a considerable stretching or fraying of the canvas covering of the hams. It is a small, rather slender beetle of dark-bluish color, with reddish legs. Its larva is a slender grub, white at first, with a dark head and two small hooks at the end of the body. When full-grown it is grayish-white with a series of brown patches above. It transforms to pupa within a paper-like cocoon. There are several generations each year, and the winter is passed both in the larval stage and as an adult.

HAM'BLET, PRINCE OF DENMARKE, HYSTORIE OF. The probable source of Shakespeare's *Hamlet*, an English translation of one of Belleforest's *Histoires tragiques*, which, in their turn, were copied from Bandello's tales. The French version was published in 1570, and was at once extremely popular in England; the translation was made before 1596, possibly by 1589. See AMLETH.

HAM'BLIN, JOSEPH ELDRIDGE (1828-70). An American soldier of the Civil War, born at Yarmouth, Mass. Long a member of the Seventh Regiment of the New York militia, he enlisted in 1861 as adjutant in Duryea's Zouaves, and served in Virginia under Butler, McClellan, Meade, Grant, and Sheridan in the Sixty-fifth New York. He especially distinguished himself at Cedar Creek, where he was wounded. He was brevetted brigadier-general, and in 1865 promoted to full rank, with the brevet of major-general, for his gallantry at Sailor's Creek. After the war he was prominent in the New York National Guard.

HAMBLIN, THOMAS SOWERBY (1800-53). An American actor, born in Pentonville, near London. As a member of the Sadler's Wells Theatre Company he won some success in London, especially at Drury Lane (1820); but gained much more in New York City, whither he came (1825) with his wife, Elizabeth Blanchard. In 1830, after extended American tours, he and James H. Hackett leased the Bowery Theatre in New York City, and soon after gained entire control of it. He lost heavily when this theatre was burned (1836); was not very successful in an English tour; and later became manager of the second and of the third Bowery Theatre. The Park Theatre was burned during the first year of his management (1848). 'Handsome Tom Hamblin' was an excellent actor, though somewhat uneven; a liberal manager; an excellent business man; and a great favorite with the public. Hamblin's principal rôles were Hamlet, Macbeth, Othello, Rollo, and Pierre.

HAMBURG, hăm'bûrg. A city-State and a city of the German Empire, with a gross area of 159 square miles, of which the city occupies 30 square miles (Map: Germany, D 2). The city-State embraces, in addition to the city, four contiguous districts, one of which belongs also to Lubeck. It lies mostly in one body, around the city itself, on the north side of the Elbe, at the head of the river's estuary-like mouth. It is bordered by Schleswig-Holstein on the north and Hanover on the south. The city-State comprises also small scattered districts, including Ritzebüttel (with Cuxhaven) and the island of Neuwerk, both at the mouth of the Elbe. Nearly one-half of the total area is in farms and gardens, and a rather large percentage is in meadow. Grain, vegetables, and hay are the chief crops. The fruit output is considerable, and is excellent. The live-stock holdings are heavy.

The city of Hamburg is situated on the north bank of the Elbe, at the mouth of the Alster, in latitude 53° 33′ N. and longitude 9° 59′ E., and with its suburbs extends for over 5 miles along the river-front; it is the largest port on the Continent of Europe, and the third largest in the world. Its climate is damp, mild in winter and cool in the summer. The mean annual temperature is over 46° F.; rainfall, 28 inches. The city consists of two radically different parts. The central part—since the disastrous fire of 1842 reconstructed according to modern ideas—by its broad, well-lighted, well-drained streets, and fine, lofty houses, offers a striking contrast to the remaining part, much of which is devoted to wholesale business, and is intersected by canals, along which goods are conveyed in lighters to and from the warehouses. The ancient ramparts, converted into gardens and walks, now constitute an inner park-like girdle, separating the old city from the adjacent suburbs of St. Pauli, Altona (q.v.), Ottensen, Rotherbaum, St. Georg, Borgfelde,

Hohenfelde, and Uhlenhorst. In most of these suburbs attractive villas may be found. The beauty of the city is greatly enhanced by two large sheets of water formed by the Alster, and known as the Binnen-Alster, or Alsterbassin, and Aussen-Alster. They are surrounded by good hotels, handsome private houses, and fashionable promenades. Two splendid bridges span the Elbe, over sixty bridges span the canals in the city, and there are numerous steam ferries. The harbor, with its vast traffic, is one of the sights of the city, and splendid views of it are to be had from different elevations. Of the several fine public buildings, the most noteworthy are the Exchange, containing a commercial library, with over 100,000 volumes; the Rathaus, an elaborate structure in Roman Renaissance, completed in 1897; the Seewarte (the buildings of the German Meteorological Station); and the Deutsches Schauspielhaus, completed in 1900. The principal churches are: Saint Nicholas, built from designs by Sir Gilbert Scott, at a cost of $1,000,000, as a memorial of the fire of 1842, a fine Gothic building, with one of the loftiest spires in Europe (485 feet high); Saint Michael's, built in the eighteenth century, in the Renaissance style, and also distinguished by a lofty spire (426 feet high); and Saint Catharine's, dating from the fifteenth century, and archæologically interesting, being one of the few churches that escaped the fire.

Among the streets of Hamburg the Jungfernstieg is the most famous and the busiest thoroughfare. The Alter Jungfernstieg and the Neuer Jungfernstieg are handsome quays, which bound the Alsterbassin. The Neurwall and the Alterwall, near the Exchange, are the centre of commercial life, and the Rödings-Markt and the Katharinenstrasse contain fine residences of merchants of the seventeenth and eighteenth centuries. Of the new streets, the Kaiser-Wilhelm-Strasse, opened in 1892, is the most important. The Anlagen are a fine public promenade, laid out on the site of the old fortifications, and the Sandthor-Quai and the Kaiser-Quai, where the large steamships lie, are the most prominent quays along the Elbe. Hamburg is not rich in public monuments. The statue of Lessing, by Schaper, the monument to the sons of Hamburg who fell in the war of 1870-71, by Schilling, and the Hansa fountain, deserve mention.

Situated on a low plain, far from any mountains, the city derives its drinking-water from the Elbe. Formerly this was so polluted that Hamburg suffered from cholera epidemics more than any other city in Northern Europe; but since 1893, when a newly devised and enormous filtering plant was put into operation, there has been no recurrence of the epidemic. A well-constructed sewerage system drains the city perfectly, discharging the refuse into one sewer tunnel which empties into the river with the outgoing tide, and is automatically dammed by the incoming tide. Garbage is burned in municipal crematories erected in 1893. The streets are well paved with asphalt or smooth square stones, and are kept very clean, the principal ones being washed and swept every day, and the less frequented ones cleaned a few times a week. The struggle against cholera epidemics led the city authorities to revise also the building regulations. This was necessitated by the fact that the poorer classes of the population are housed in the mediæval portion of the town, in crowded houses facing narrow streets and small, poorly ventilated courts; a considerable part of them (6½ per cent. in 1890) lived in cellars. The new rules require more sanitary arrangements, and, in case of cellars, more light and better safeguards against dampness.

Hamburg has a large number of hospitals, the most noteworthy being the Epidemic Hospital, opened in 1894, and considered one of the best in the world. Connected with the hospitals are stations equipped with large ovens for disinfection by heat of all kinds of household goods. Food inspection is in charge of the Hygienic Institute, where a thoroughly equipped bacteriological laboratory is maintained. A special sanitary service is maintained in the harbor, to see that all the sanitary regulations are complied with on incoming ships. Municipal baths and washhouses were established in 1855. The establishments are built and run after the British model. (See LIVERPOOL; GLASGOW; MANCHESTER; etc.) The effect of all these measures is seen in the diminished death-rate, which declined from 30 per 1000 in 1865 to less than 20 in 1895 and about 17 in 1900. Hamburg owns both its gasworks and electric plant; but they are operated by a private company paying the city a high rental, and rendering excellent service under the strict supervision of the city authorities. The street cars are also in the hands of private companies, who pay the city a tax of one pfennig per passenger, in addition to all ordinary taxes levied by the city, besides keeping the streets in repair within the limits of one or two feet on either side of the tracks. At the expiration of the charter the property of the company reverts to the city. Electricity is supplanting the use of horse-power on most of the lines. There is also a line operated by steam, belonging to the Prussian Government, and connecting the various railway depots in the city. The fares range from 2½ cents upward, according to class and distance. The charitable institutions are numerous and well endowed. For the purposes of poor relief, the city is divided into nine districts, which are in turn subdivided into some 1600 smaller districts. The work of relief is administered by a charity board, composed of three Senators and fifteen members of the Lower House, elected for five-year terms. The amount spent for relief was 2,820,000 marks in 1884, 5,023,000 marks in 1893, and 6,538,000 marks in 1899. There are also a great many private societies and asylums for the relief or reception of needy persons. Besides the hospitals mentioned above, there are two general hospitals, a seamen's hospital, an establishment for the insane, with an agricultural colony at Langenhorn (1893), and other special institutions.

There are several large and excellent private schools, over 160 public schools, a school of art, and conservatory of music, in addition to the Johanneum, a public grammar school, founded in 1528. The city also maintains a correctional school (Strafschule), to which children may be sent for periods of from eight days to eight weeks, an orphan school, a school for deaf and dumb, and one for the blind. There are, besides, schools for technical instruction, building construction, machine-building, navigation, and phar-

macy. The public library contains over 600,000 volumes and 5000 manuscripts. The Kunsthalle, or public art gallery, is an important edifice in early Italian Renaissance. Its collection of paintings is extensive but third-rate. The Natural History Museum is excellent, as is also the Industrial Art Museum. An observatory, botanical museum and gardens, a fine zoölogical museum, and State laboratory, are among many other institutions of a scientific or educational nature; there are also several theatres and a great number of public gardens and places of amusement. The first German theatre for opera was established in Hamburg in 1678.

The geographical situation of Hamburg makes it the commercial emporium of Northern Europe. Through the Elbe, with its numerous branches and canals, ships leaving Hamburg can reach the heart of Germany; it is also the terminus of seven lines of railway, which furnish direct communication with all the German cities. In 1888 Hamburg became a member of the German Customs Union. This stimulated its trade still further, and about 1890 new docks were constructed at Cuxhaven for ocean steamers, involving an expenditure of $40,000,000. The dock and harbor facilities are the most complete in the world; vessels drawing 23 feet can go up the harbor at high tide. The number and tonnage of vessels entering the port in the last years of the last three decades of the nineteenth century were as follows: 1880, about 6000 ships, of 2,800,000 tons; 1890, about 8000 ships, of over 5,000,000 tons; 1900, 13,100 ships, of 8,000,000 tons. The number of vessels and the tonnage of the mercantile navy of Hamburg surpass that of Holland. In 1880 Hamburg had 475 ships, of 230,000 tons; in 1890, 587 ships, of 538,000 tons; in 1900, 8,793 ships, of 989,000 tons. In 1900 the imports of Hamburg by sea, river, and land were valued at about $951,000,000; the exports, $285,000,000. The leading nations in respect to the amount of exports and imports are Great Britain and the United States. In 1893 the imports from Great Britain amounted to $93,762,766, the exports to $93,137,778. In the same year imports to the value of $42,047,698 came from the United States, and the exports were $39,410,896. But in 1900 the United States outstripped Great Britain in imports, the respective figures being $114,954,000 and $108,052,000. In the amount of exports the figures were $103,530,000 for Great Britain and $52,598,000 for the United States. The chief articles of import and export are foodstuffs and raw materials. Manufactured articles constitute about one-fourth of the total value. Hamburg is one of the largest coffee marts, and in money-exchange transactions is among the foremost cities of the world. It is also one of the principal emigration ports of Germany, 405,998 persons having left during 1891-95, of whom 356,365 were bound for the United States. Among the principal industries are cigar-making, spirit and sugar refining, brewing, meat-curing, machine and ship building, coffee-roasting, chocolate manufacture, flour-milling, manufacture of furniture, pianos, leather, ivory, and celluloid, etc.

The city-State of Hamburg constitutes one of the States of the German Empire. Its official name is the Free and Hansa City of Hamburg (Freie- und Hansa-Stadt Hamburg). Its constitution is democratic. The executive power is vested in a Senate of eighteen members, chosen for life by the two governing bodies. One-half of the Senators must have studied law or finance, and seven of the remaining nine must be members of the merchants' guild. The Senate elects a first and a second burgomaster from its own members, for a term of two years. The legislative power is confined to the House of Burgesses, consisting of 160 members, who are elected for six years, one-half retiring every three years. The Senate, however, has a veto power in all matters except those pertaining to taxation and revenue. In case of a deadlock between the two bodies, the matter is referred to a joint arbitration board, or to the Supreme Court of the German Empire.

The administration of the city-State is divided into several departments, each being presided over by a Senator. The chief departments are:

1. The Board of Health—(Medicinal-Collegium).
2. Board of Public Works—(Bau-Deputation).
3. Police Board—(Polizei Behörde).
4. Board of Charities—(Armen-Deputation).
5. Prison Board—(Gefängniss-Deputation).
6. Department of Finance—(Finanz-Deputation).
7. Harbor Administration—(Hafen-Verwaltung).
8. Board of Education—(Oberschulbehörde).

Hamburg is the seat of the upper Hanseatic court and of the three provincial courts of Bremen, Hamburg, and Lübeck. It sends three members to the Imperial Parliament at Berlin.

Hamburg virtually has a municipal fire-insurance institution, making insurance compulsory for every householder; it also subsidizes a private employment bureau, and maintains a municipal pawnshop, established in 1650. The debt is heavy, but is largely offset by productive public property, as, for instance, the harbor and its equipment. The debt has latterly grown rapidly, and amounted to about $105,500,000 at the close of 1900. In 1902 the expenditures amounted to $25,500,000; the revenues, $9,000,000. Of the expenditures $5.000,000 went for public buildings, $5,300,000 for the service of the debt, $4,200,000 for the police department, and $2,750,000 for education. About $600,000 of the revenues is earned by the municipal lottery.

The population of the city has more than doubled within the thirty years 1871-1900, having risen from 339,000 to 706,000. Hamburg is the largest city, according to population, in Germany, next to Berlin. The total population of the city-State in 1900 was 768,349, nearly all Protestants.

Somewhere between 805 and 811 Charlemagne founded the castle of Hamburg as a defense against the heathen Slavs. In 831 an episcopal see was erected there (soon to be united with that of Bremen), and Hamburg became a centre of civilization for Northern Europe. The town was repeatedly burned and plundered by Norsemen, Danes, and Slavs. In 1189 it received important commercial privileges from Frederick Barbarossa. By treaties with Lübeck and Bremen, in 1241 and 1249, it initiated the Hanseatic League (q.v.). From that time it increased rapidly in wealth and commercial importance, augmenting its territory by the purchase of the township of Ritzebüttel, at the mouth of the Elbe (where the harbor of Cuxhaven is now situated), and several villages and islands in the vicinity of the town. Under the protection of the German emperors, Hamburg soon became powerful enough to defend itself and its com-

merce, both by sea and land, and carried on war for a considerable period against the Dutch and the Danes, though with varying success. Maximilian I. declared Hamburg an Imperial city in 1510, though the act was not confirmed by the Imperial Chamber till 1618. In 1529 the city officially adopted the Reformed religion, and the large number of religious refugees from the Iberian Peninsula and Holland enriched it greatly during the sixteenth and seventeenth centuries. After 1750 its commerce developed wonderfully, owing to the American and French revolutions, the wars between England and France, and the downfall of the trade of the Netherlands. Napoleon's Continental system, however, proved fatal to its commerce, especially after 1810, when it was made a part of the French Empire. In 1813-14 the city endured a terrible reign of pillage and oppression at the hands of the French general Davout. By 1814 its population had sunk from 100,000 to 55,000. In 1815 it entered the German Confederation as a free city of the Empire. It thrived exceedingly, in spite of a disastrous fire which swept off a quarter of the city in 1842. After forming part of the North German Confederation, Hamburg became a member of the German Empire in 1871. Jealousy of its commercial privileges kept Hamburg out of the Zollverein till 1888. In 1892 a severe outbreak of cholera killed nearly 9000 of the inhabitants.

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HAMBURG. A breed of domestic fowls, noted as economical egg-producers. They are of trim build, resembling Leghorns, and of great beauty of plumage. Six varieties are recognized —the golden spangled, silver spangled, golden penciled, silver penciled, black and white. The large black 'redcap' and the Dutch 'campine' are also in this class. The designations refer to the markings. The 'spangles' or 'moon eyes' are round or oval spots; the 'pencilings' are bars of reddish bay or black, or of clear silvery white and black. The most popular varieties are the spangled (see Colored Plate of POULTRY), because of their fine form as well as beauty of coloration. Their 'points' are as follows: Comb, square at front, tapering nicely into a long spike, full of points by no means plain, firmly and evenly set on the head; face, red; ear-lobes, moderate size, round as possible, and clear white; legs, leaden blue; carriage, graceful; plumage, very profuse. (Thus far the specifications belong to the whole Hamburg breed.) Silver-spangled cock: Color, clear, silvery-white ground, every feather tipped or spangled, the breast as bold as possible, but showing the spangle, the bars of the wing regular and bold; neck, back, and saddle nicely tipped; bow well marked (by no means cloudy, brown, or brassy); back, as green as possible. Silver-spangled hen: The white clear and silvery, the spangles large, green as possible, distinct and clear. Golden-spangled cock: Ground, rich; clear spangles, large and distinct. Hen: Color, very black and rich ground, the back glossy green; the neck, back, and saddle nicely striped; bow of wing well marked.

HAMDI BEY, hăm'dē bā, OSMAN (1842—). A Turkish statesman and scholar, son of Edhem Pasha, born in Constantinople and educated in Paris. He was Governor of Bagdad (1868-70), a delegate to the Vienna Exposition in 1873, General Secretary of Foreign Affairs, then Governor of Pera, in 1882 director of the Imperial museums at Stambul, and (1888) connected with the Department of the National Debt. A painter, with some reputation for his rendering of Oriental interiors, he founded in 1882 a Turkish Ecole des Beaux-Arts, which is not limited in its courses by the provisions of the Koran. He edited with Reinach *La nécropole royale de Sidon* (1892-93), and built at his own expense, near the Tchinili Kiosk, a Greek building, in which the sarcophagi from the Sidon Necropolis might rest.

HAMEL, à'mĕl', LOUIS ERNEST (1826-98). A French historian and politician, born in Paris. He was educated at the Lycée Henri IV. and in the law school of the University of Paris; but he practiced little, preferring literature and politics. He was a contributor to the liberal sheets; was an editor of *L'homme libre;* was three times defeated as candidate for the National Assembly; but in 1878, 1881, and 1884 was elected to the Parisian municipal council. Besides his earliest work, *Les dernier chants,* a book of verse (1851), his writings are historical: *Histoire de Saint-Just* (1859); *Histoire de Robespierre* (1865-67), in three volumes, of which the publishers refused, for fear of prosecution, to publish the last two volumes until they were compelled to do so at their own risk by legal decision; *Monsieur Michelet, historien* (1869); *Précis de l'histoire de la révolution française* (1870); *Histoire de la république française sous le Directoire et sous le Consulat* (1872); *Histoire des deux conspirations du général Malet* (1873); *Histoire illustré du second Empire* (1873); *Souvenirs de l'homme libre* (1878); *Histoire du premier Empire* (1882); *Histoire de la Restauration* (1887); *Histoire du règne de Louis Philippe* (1889); *Histoire de la seconde République* (1891); and *Histoire du second Empire* (1893-94).

HAMELIN, hăm'e-lĭn, THE PIED PIPER OF. See PIED PIPER OF.

HAMELN, hä'mĕln. The capital of a circle in the Prussian Province of Hanover, situated at the confluence of the Hamel with the Weser, 25 miles southwest of Hanover, with which it is connected by rail (Map: Prussia, C 2). The Weser is crossed by a suspension bridge. The town has an old-fashioned appearance, and contains many specimens of mediæval and Renaissance architecture. It has a 'real' gymnasium. The chief industrial establishments are sugar-refineries, tanneries, distilleries, machine-works, flour-mills, paper-mills, etc. The commerce is quite important, and there is considerable shipping in the harbor. Hameln is noted on account of the legend of the Pied Piper of Hameln (q.v.).

Hameln had its origin in the Abbey of Saint Boniface. It was sold to the Bishop of Minden in 1259, but the transaction did not meet with the approval of the townspeople, who, after

a bloody battle, placed themselves under the protection of Brunswick. The town was a flourishing member of the Hanseatic League. It was taken by the Swedes in 1633, and surrendered to the French in 1757 and in 1803. It finally passed to Prussia in 1866. Population, in 1890, 13,675; in 1900, 18,965.

HAMERIK, hä'me-rĭk, ASGER (1843—). A Danish composer. He was born at Copenhagen, and, despite the opposition of his parents, studied music unaided, and when but fifteen years of age had so far succeeded in his ambition as to be able to study openly, under Gade, Matthison-Hansen, and Haberbier. In 1862 he went to Berlin to become a pupil of Von Bülow, and two years later, when studying in Paris, met Berlioz, with whom he visited Vienna (1866-67). His *Hymne de la paix*, written for the Paris Exhibition, earned for him a gold medal, and was greatly esteemed for its splendid orchestration. He wrote several operas, which were produced either in France or Italy, and in 1871 was appointed director of the Peabody Conservatory of Baltimore, and also of the Peabody symphony concerts. In 1890 the King of Denmark conferred upon him the honor of knighthood. Not long afterwards he resigned his post in Baltimore and returned to Europe. Among his more important works are: *Der Wanderer* (1872), a festival cantata; *La Vendetta* (1870), an Italian opera; the choral work *Christliche Trilogie*. The operas *Tovelille* and *Hjalmar and Ingeborg* were only given in part. He also composed much successful chamber music, and was particularly happy in his solo work for the 'cello.

HAMERLING, hä'mĕr-ling, ROBERT (1830-89). An Austrian poet, dramatist, and novelist, born March 24, 1830, at Kirchberg am Walde, in Lower Austria. For four years he was a choir-boy at the Cistercian Monastery of Zwetl. Later he went to a gymnasium in Vienna, and afterwards matriculated for the study of medicine. Besides natural science, Hamerling cultivated classical and Oriental languages and also philosophy. In 1855 he became a professor in Triest, but ten years later chronic illness forced him to withdraw. An Imperial decree now granted him a pension, and he was likewise helped out by a Viennese lady. On July 13, 1889, after years of pain, he died in his villa near Gratz. Hamerling's style is rich and highly colored, his ideas are daring and keen. His mastery over his language is notable. Among his many writings some of the most striking are: *Ein Sangesgruss vom Strande des Adria*, poetry (1857); *Sinnen und Minnen*, youthful poems (1859, 1886); *Gesammelte Kleinere Dichtungen* (1871, 1890); *Blätter in Winde* (1887, 1888); the epic *Ahasver in Rom* (1886; 23d ed. 1892), a description of Nero's Rome; Der *König von Sion* (1868, 1890); *Die Lieben Todsünden* (1887); *Homunculus* (1880, 1890); *Danton und Robespierre*, a tragedy (1871, 1877); *Aspasia*, a novel of the time of Pericles (1876). Selections from his *Works* appeared in 1901. Consult: Kleinert, *Robert Hamerling, Ein Dichter der Schönheit* (Hamburg, 1889); Polzer, *Robert Hamerling, Sein Wesen und Wirken* (ib., 1890); Rabenlechner, *Hamerling, Sein Leben und Seine Werke* (ib., 1895); id., *Hamerling* (Dresden, 1902).

HAM'ERTON, PHILIP GILBERT (1834-94). An English writer on art, painter, and etcher. He was the son of a solicitor, and was born at Laneside, near Shaw, Lancashire. His mother died when he was an infant, and his father, who was an inebriate, died ten years later. For these and other reasons Hamerton's boyhood was lonely. He gave up in displeasure his preparation for Oxford, turned to poetry and art, and began writing for the reviews. He traveled in Wales, visited France, and in 1857 began his periodic encampments on an island in Loch Awe in the Scotch Highlands, described in *A Painter's Camp in the Highlands and Thoughts About Art* (1862). This notable work was followed by the more technical *Etching and Etchers* (1868); *Contemporary French Painters* (1868); and *Painting in France After the Decline of Classicism* (1869). In 1869 he founded the *Portfolio*, an excellent art magazine, which he edited till his death. Among his other numerous writings are: *The Intellectual Life* (1873); *Life of Turner* (1879); *The Graphic Arts* (1882); *Human Intercourse* (1884); *Landscape* (1885); and *French and English* (1889). Hamerton, who had married a French woman, passed his latter years in France, and died at Boulogne-sur-Seine. Like Ruskin, Hamerton was an art interpreter to his generation, the medium between the artist and the public. For this he was eminently suited because of the catholicity of his taste, and his agreeable style. Consult *Philip Gilbert Hamerton: An Autobiography and a Memoir by His Wife* (London, 1896).

HAMI, hä'mē, or **KOMUL**, kō'mụl. A small town of Chinese Turkestan, situated in a fertile district 30 miles south of the eastern end of the Tian-Shan or 'Celestial Mountains,' near the northern verge of the desert of Gobi, about 60 miles southeast of Barkul. Its elevation above the sea is about 3000 feet. The oasis of Hami, which has an area of between 80 and 100 square miles, produces wheat, barley, maize, millet, pumpkins, watermelons, and excellent grapes. The poppy is also grown. The 'town' consists of an old town (Lao-ch'êng), built about two centuries ago, and a new town (Sin [or Hsin] Ch'êng), surrounded with moated walls, 20 feet in height, pierced with four gates, each surmounted with a tower in true Chinese style. The Mohammedan quarter, built over 300 years ago and called Khamil, is about a mile off. It is surrounded by a mud wall, and contains some 250 to 300 families. Here the kings of Hami lie in a mausoleum, the dome of which is covered with green-colored tiles. The population of the old town is said to be about 5000. Hami is advantageously situated as a trade centre, as here the great travel-route from east to west forks into two branches—one, the Tian-Shan Nan-lu, running along the south side of the Celestial Mountains to Kashgar and Yarkand; and the other, the Tian-Shan Peh-lu, proceeding by an easy pass 9000 feet high over the mountains along their northern foot to Kulja and beyond.

HAMIL'CAR (Phœnician, grace of Melkart, Gk. *'Αμίλκας*, *Amilkas*). A name borne by several distinguished Carthaginians, the most celebrated of whom were: (1) The commander of the great Sicilian expedition, B.C. 480. (2) One of the commanders of a Carthaginian army defeated by Timoleon, the Corinthian general, at the Crimissus, B.C. 339. (3) (Surnamed Rhodanus) the ambassador to Alexander the Great after the fall

of Tyre (B.C. 332). (4) Governor of Sicily, B.C. 317. (5) The son of Gisco, who succeeded the preceding, and carried on military operations against the Syracusans and other States with great success, but was at length taken prisoner and put to death (B.C. 309). (6) A commander during the First Punic War, who was very successful against the Romans by land in Sicily, but was afterwards defeated in a sea fight off Ecnomus, and was thereafter recalled to Africa to oppose Regulus.

The greatest of all was Hamilcar, surnamed Barca or *Barak*, 'lightning.' While very young he was appointed to the command of the Carthaginian forces in Sicily, in B.C. 247, at which time the Romans had possession of almost all the island. Hamilcar's first care was to discipline his infantry thoroughly; he then established himself on Mount Hercte, and from this point made pillaging excursions in all directions, sending his privateers along the coast of Italy as far north as Cumæ, thus obtaining abundant supplies for his troops. From this position the Romans endeavored to dislodge him, but in vain. After three years he left Hercte, and established himself on Mount Eryx, keeping up his communication with Drepanum and the sea, where the same tactics were repeated on both sides, and with the same want of success on the part of the Romans. The Carthaginian admiral, Hanno, having been totally defeated off the Ægates Islands, B.C. 241, Hamilcar was compelled to evacuate his fortress and evacuate Sicily. While Hamilcar was engaged in Sicily he had made large promises to his mercenary troops which he was unable to fulfill; they revolted in consequence, and were joined by some of the African tribes. Hanno endeavored to suppress the revolt, but failed; Hamilcar was accordingly appointed to the command, and succeeded in utterly defeating the rebels, capturing all their towns and putting to death their leaders. Hamilcar was next appointed commander-in-chief of the Carthaginian Army, and was engaged for some time in wars with the neighboring tribes, which were abruptly ended by Hamilcar's entering upon his Spanish campaign about B.C. 236. His great aim was to found a new empire in Spain, from which, as his basis, he might assail the Romans. Such a kingdom he saw would increase the power and wealth of his native country, and atone to her for the loss of Sicily and Sardinia. This end he did not himself accomplish, but he prepared the way for its accomplishment by Hasdrubal and Hannibal. He marched westward, while the fleet under his son-in-law, Hasdrubal, cruised along the coast; he then crossed over the Strait of Gibraltar, and made war on the natives of Spain, in the course of which he penetrated to the very heart of the country, subdued many tribes and cities, and amassed immense wealth. He spent nine years in Spain, and at length, in B.C. 228, met his death on the field of battle while fighting against the Vettones. His military genius is considered scarcely inferior to that of his son Hannibal.

HAMILTON. The capital of Dundas and Normandy counties, in the western district of Victoria, Australia, on Grange Burn Creek, 50 miles northeast of Portland, and 198 miles west of Melbourne, with which it has railway connection. It is a pastoral, agricultural, and stock-raising centre, with important biennial exhibitions and race meetings. Population, in 1901, 4026.

HAMILTON. The capital of the Bermudas (q.v.), situated on Hamilton Island. Population, in 1901, 2246.

HAMILTON. The capital of Wentworth County, Ontario, Can., a city and port of entry on Burlington Bay, at the southwestern extremity of Lake Ontario, and on the Grand Trunk and the Great Western railways, 70 miles northwest of Buffalo, N. Y. (Map: Ontario, D 4). The port is reached by a canal dug through a sandbar which, stretching across the bay for five miles, serves as a breakwater for a fine harbor. Desjardins Canal, four miles long, connects the harbor with Dundas. There is daily steam communication with other lake ports, and an extensive trade with the Maritime Provinces. Hamilton is the centre of Western Canada's fruit district. The output of its numerous industries comprises iron wares, sewing-machines, agricultural implements, glass, cotton, woolen, and tobacco products, musical instruments, and other manufactures. It is the fifth city of importance in the Dominion, and is frequently styled the Canadian Birmingham. The United States is represented by a consul. The city sends two representatives to the Dominion House of Commons, and one to the Provincial Legislature; it is the seat of Anglican and Roman Catholic bishops. The town, laid out in 1813, is built on a plateau, has wide streets, market and county-house squares, and many elegant residences on the rising ground which culminates in 'the Mountain,' 250 feet high, with its inclined railway. It has Wesleyan Female College, and a Mechanics' Institute, a free public library, a lunatic asylum, an excellent race course, electric street railways, and an extensive system of water-works in connection with Lake Ontario. The sandbar, known as Burlington Beach, is a popular summer resort, with a good hotel. Population, in 1891, 48,980; in 1901, 52,550.

HAMILTON. A market town and municipal borough in Lanarkshire, Scotland, on the left bank of the Clyde, 11 miles southeast of Glasgow (Map: Scotland, D 4). The inhabitants are chiefly employed in neighboring coal and iron mines, and limestone quarries; market-gardening and muslin-weaving are minor industries. The town is irregularly built on rising ground, commanding fine views. Its prominent structures are the burgh buildings with a clock tower 130 feet high, the county buildings, in the Grecian style, and the cavalry barracks. The town owns its gas and water works. It gives the title to the first peer of Scotland, the Duke of Hamilton and Brandon, whose famous family seat, Hamilton Place, in the midst of extensive pleasure grounds, is adjacent to the demesne of Cadzow Castle with the remains of its forest, where primeval oaks and a herd of the original breed of wild cattle are preserved. Population, in 1891, 24,859; in 1901, 32,775. Consult Grant, *The Commissariat Record of Hamilton* (Edinburgh, 1898).

HAMILTON. A village in Madison County, N. Y., 28 miles southwest of Utica; on the New York, Ontario and Western Railroad (Map: New York, E 3). It is the seat of Colgate University (q.v.) with the Hamilton Theological Seminary

(Baptist). Lumber-yards and a canning-factory represent the leading industries. The water-works and electric-light plant are owned and operated by the municipality. Population, in 1890, 1744; in 1900, 1627.

HAMILTON. A city and the county-seat of Butler County, Ohio, 25 miles north of Cincinnati; on the Great Miami River, the Miami and Erie Canal, and the Cincinnati, Hamilton and Dayton, the Pittsburg, Cincinnati, Chicago and Saint Louis, and other railroads (Map: Ohio, B 7). The splendid water-power derived from both the river and canal has materially aided the city's development as a manufacturing centre; its industrial establishments include breweries, paper, flour, and woolen mills, iron-foundries, machine-shops, and safe, agricultural implement, and tool works. The first settlement here was made in 1791, when Gen. Arthur Saint Clair built a fort and called it Fort Hamilton in honor of Alexander Hamilton. Hamilton was first incorporated in 1810. The city is governed under a charter of 1898, by a mayor, chosen every three years, and a board of control, consisting of five members, elected at large. This board, superseding the old city council, has been subdivided, each member being the head of a department. The members in the first instance were appointed by the Common Pleas Judge for terms ranging from one to five years; subsequently they were elected for a period of five years. The water-works, gas plant, and electric-light plant are all owned and operated by the city. Population, in 1890, 17,565; in 1900, 23,914.

HAMILTON. A famous noble Scotch family of English origin. The name, obviously territorial, was doubtless taken from some one of the many English manors called Hamilton, scattered through Buckinghamshire, Hampshire, Surrey, Lancashire, Rutlandshire, Yorkshire, and Leicestershire. The pedigree of the family is traced to 'Walter Fitz-Gilbert (or Gilbertson) of Hamilton,' who, in 1296, held lands in Lanarkshire, and swore fealty to King Edward I. of England as overlord of Scotland, and in 1314 kept the Castle of Bothwell, on the Clyde, for the English. His early surrender of this strong fortress, and of the English knights and nobles who had fled to it from the field of Bannockburn, was rewarded by King Robert Bruce by grants of the lands and baronies of Cadzow and Machanshire in Clydesdale, Kinneil and Larbert in West Lothian, Kirkinner and Kirkowen in Galloway, and other lands forfeited by the Comyns and other adherents of England. He attained the rank of knighthood, and married Mary, daughter of Sir Adam of Gordon of Huntly, by whom he left two sons. To a long list of illustrious descendants accrued the titles, emoluments, and territories comprised in the lordships of Abercorn, Bargeny, Belhaven and Stentoun, Hamilton, Pisley, and Strabane; in the viscountships of Boyne, Clanboy, Hamilton, and Strabane; in the earldoms of Arran, Abercorn, Clánbrassil, Haddington, Orkney, Ruglen, and Selkirk; in the marquisates of Abercorn and Hamilton; and in the dukedoms of Abercorn, Brandon, Chatelherault, and Hamilton. The present leading representatives are Alfred, thirteenth Duke of Hamilton and Brandon, surname Douglas-Hamilton, premier peer of Scotland and hereditary keeper of Holyrood Palace, and James, second Duke of Abercorn, surname Hamilton, Groom of the Stole. Consult: Anderson, *Historical and Genealogical Memoirs of the House of Hamilton* (London, 1823); Fraser, *History of the Earls of Haddington* (Edinburgh, 1889).

HAMILTON, ALEXANDER (1757-1804). An eminent American statesman. He was born at Charles Town, in the island of Nevis, West Indies, on January 11, 1757, and appears to have been the natural son of a Scotch trader named James Hamilton, who died on the island of Saint Vincent about 1799, and Rachel Levine, originally named Faucette, and of French-Huguenot descent, who some time previously had separated from her husband. After a brief period of schooling, the future statesman at the age of twelve—his mother having died in the previous year—was placed in a counting-house at Christiansted, on the island of Saint-Croix; but having shown signs of literary ability, especially in a pamphlet describing a West Indian hurricane, he was sent to the English colonies on the continent when sixteen years of age, for the purpose of continuing his education. Arriving in Boston in October, 1772, he proceeded at once to New York, studied for a year in a grammar school at Elizabethtown, N. J., and then entered King's College (now Columbia University). He soon became intensely interested in the controversy then raging between the Colonies and the British Government, and partly as a result of a visit to Boston during the tension consequent upon the passage of the Boston Port Bill (q.v.), became firmly attached to the patriot cause. On July 6, 1774, he attended in New York a great meeting in the 'fields' (now City Hall Park) assembled to take action on the calling of a general congress, and made, extemporaneously, an impassioned but well-reasoned speech, which brought him to the notice of men of prominence and of the people generally. Soon afterwards he published anonymously two remarkable pamphlets—*A Full Vindication of the Measures of Congress from the Calumnies of Their Enemies* (1774) and *The Farmer Refuted* (1775)—in answer to those of a 'Westchester Farmer,' then much read, and in them endeavored to prove that the Colonies owed allegiance directly to the British Crown, were therefore not amenable to Parliament, and were justified in resorting to extreme measures to vindicate their rights. The pamphlets were at first variously attributed to such men as Jay and Livingston, and, their authorship finally becoming known, they added greatly to Hamilton's growing reputation. In 1775 he twice took a stand, as an advocate of order, against mobs bent on chastising Loyalists. Meanwhile, perceiving that an outbreak of hostilities was imminent, he had devoted himself to the study of military science, and, after serving for a time in a volunteer corps, he was appointed on March 14, 1776, to the command of an artillery company, which soon became so conspicuous for the excellence of its drill that Nathanael Greene, under whose notice it fell, introduced Hamilton to General Washington with a recommendation for advancement. During the retreat after the battle of Long Island, Hamilton distinguished himself by the coolness and courage with which he brought up the rear. He also attracted attention by the skillful manner in which he served his battery at White Plains; participated in the retreat through

New Jersey, and in the battles of Trenton and Princeton; and on March 1, 1777, became an aide on the staff of General Washington, with the rank of lieutenant-colonel. In this capacity he acted as Washington's confidential secretary, attending to much of the correspondence from headquarters; and in November, 1777, was sent on a delicate mission to Albany for the purpose of securing reinforcements from General Gates and General Putnam.

In December, 1780, he married Miss Elizabeth Schuyler, the daughter of Gen. Philip Schuyler, thus allying himself with one of the most influential families in New York. In February, 1781, in a fit of resentment, he left the staff of the commander-in-chief because the latter had rebuked him, on the ground of disrespect, for a delay in obeying orders; and, returning to the line, he successfully led one of the attacking columns at Yorktown (q.v.).

Soon after the outbreak of the war he had begun to take a lively interest in the financial and administrative problems that confronted the Confederation, and in 1780 and 1781 wrote able letters to Duane and Morris, respectively, pointing out the defects in the Articles of Confederation, and the necessity of a strong central Government, and proposing an elaborate scheme for the reorganization of the finances, and the establishment of a bank. From May to November, 1782, he acted as receiver of Continental taxes in the State of New York; and was a member of the Continental Congress in 1782-83, during which time he took a conspicuous part in all debates concerning taxation and finances generally; served on various important committees; proposed an elaborate plan for a military establishment in time of peace; and became convinced, even more strongly than before, of the weakness of the existing Government and the need for complete reorganization. Early in the summer of 1782, after a brief course of study, he had been admitted to the bar at Albany, and upon leaving Congress he took up with assiduity the practice of his profession in New York, meeting with immediate success. He attracted particular attention by his advocacy of the liberal treatment of Loyalists, and in the celebrated case of Rutgers *vs.* Waddington braved popular opinion by attacking the 'Trespass Act' of New York, which provided that a Whig dispossessed by the British could collect rent from those who had occupied his property during his absence. Besides practicing his profession, he took part in the discussion of public measures, was one of the founders of a State bank, and was active in the organization of the Society of the Cincinnati. During the most critical period of national history he vigorously aided the movement for a stronger central Government. He, with Egbert Benson, represented New York in the Annapolis Convention of 1786 (q.v.), and it was he who drafted the report which led to the assembling of the Constitutional Convention at Philadelphia in the following year. Upon his return from Annapolis he was elected to the State Legislature, and was there instrumental in securing the appointment of delegates from New York to the approaching convention, he himself being chosen, along with Robert Yates and John Lansing. Though his influence in the convention was to a great extent nullified by the opposition of his strongly Anti-Federalist associates, who finally withdrew altogether, as did Hamilton for a time, he exerted himself, while in attendance, to impress upon the delegates the need of a thorough reorganization of the Government, and in June, 1787, made an elaborate speech in which he expressed a warm admiration of the British Constitution, and proposed a plan which provided for a strong and virtually independent Executive, and the subordination of the individual States to the Central Government—the Executive and Senators to hold office during good behavior, the State Governors to be appointed by the Central Government, and to have a veto on all State legislation, and the Lower House of Congress to be elected directly by the people. He vigorously supported the Constitution as finally adopted, especially by his production, with Madison and Jay, of the *Federalist* (q.v.) which exerted a powerful influence, and remains the best contemporary exposition of that document; and in the New York convention achieved a remarkable triumph by securing ratification in face of an Anti-Federalist majority at the outset of 65 to 19, making numerous speeches and finally winning over Melanchthon Smith, himself, who had led the debate on the opposing side.

In September, 1789, six months after the organization of the General Government under the new Constitution, Congress passed an act establishing a Treasury Department, and President Washington immediately selected Hamilton as first Secretary of the Treasury. In the then unsettled state of the country financially and economically, this was a position of primary importance, and during his term of office Hamilton rendered to the nation services scarcely less invaluable than those of Washington himself. With tireless energy and remarkable ability he applied himself to the various economic problems which then pressed so insistently for solution, and in report after report laid down policies, which, adopted by Congress, reëstablished the public credit, brought prestige to the National Government in spite of the disintegrating tendencies of the time, and formed precedents which for the most part have since been followed, and have thus in some lines determined the whole subsequent history of the nation. His reports dealt, among other things, with the public credit, the raising and collection of the revenue, estimates of income and expenditures, the temporary regulation of the currency, navigation laws, and the coasting trade, the organization of the post-office, the management of the public lands, the purchase of West Point by the National Government, the establishment of a mint, the founding of a national bank, the policy of the Government with regard to manufactures, and the adoption of an excise; and, in addition, when, at the close of 1791, his administration was attacked as corrupt by the opposition under the lead of Madison and Giles, he sent into Congress a succession of detailed reports, setting forth the operations of his department with such comprehensiveness and lucidity as to turn abuse into praise, and utterly to refute the charges of his assailants. His proposals that the National Government should assume the Revolutionary debts of the individual States, that Congress should establish a national bank by virtue of the 'implied powers' granted by the Constitution—the first suggestion of this doctrine—and that Congress should impose an excise—all of which had in view the strengthen-

ing of the Central Government—precipitated successive controversies in which those who favored Hamilton were uniformly successful, though party lines were sharply drawn, and a powerful opposition, strenuously antagonistic to centralization, was created, under the leadership of Hamilton's great rival, Thomas Jefferson (q.v.). Out of these controversies grew the Federalist and Republican (later Democratic or Democratic-Republican) parties. Hamilton also took an active interest in foreign affairs, and, during the Revolutionary turmoil in Europe and the wars between France and England, uniformly advocated a policy of strict neutrality on the part of the American Government; while by his attitude toward Genet (q.v.) and his well-known views concerning the excesses of the French Revolution, as well as by his freely expressed admiration of the British Constitution, he gave color to the charge frequently brought against him by his opponents, that he was the leader of a strongly pro-English and anti-French faction. At the time of the Whisky Insurrection (q.v.), he advocated the adoption of a vigorous repressive policy on the part of the National Government, and accompanied in person the troops which were sent against the insurgents. On January 31, 1795, he resigned from the Cabinet to resume the practice of his profession in New York City, but kept in close touch with political affairs, continued to be consulted by Washington, and maintained unimpaired his commanding influence in the Federalist Party. He vigorously upheld the Jay treaty (q.v.), in support of which he wrote a series of powerful articles, under the signature "Camillus;" assisted Washington materially in the preparation of his Farewell Address; opposed the first drafts of the Alien and Sedition Acts (q.v.); and strongly combated the doctrines of the Virginia and Kentucky Resolutions (q.v.). A coolness which had appeared in the relations between Hamilton and John Adams (q.v.) as early as 1788, owing to the former having exerted his influence to prevent an equal vote being cast for Washington and Adams, gradually became pronounced, and was especially marked after the election of the latter to the Presidency, when Hamilton, though holding no office, exerted perhaps as much influence over the members of the Cabinet as did the President himself. Hamilton, moreover, strongly disapproved of the mildness and apparent indecision of President Adams's policy toward France. (See X Y Z Correspondence.) At Washington's request, however, he was placed in 1798 at the virtual head of the army when hostilities with France appeared imminent, and while acting in this capacity, with the rank of major-general and the position of inspector-general (from July 19, 1798, to June 15, 1800) he devoted himself with energy and ability to the task of organization and preparation, effecting various much-needed reforms, and perfecting plans for the invasion of Louisiana and the Floridas. In the Presidential election of 1800 Hamilton showed a preference for Pinckney over Adams for the Presidency, and by publishing an ill-advised pamphlet sharply criticising Adams and advocating the casting of an equal vote by the Federalists for their two candidates, he greatly weakened his party, and deeply offended Adams and his immediate following. When, after the election, the famous contest for the Presidency arose in Congress, he suppressed his strong dislike for Jefferson, and by the use of his powerful influence was instrumental in securing the defeat of Burr. With the fall of the Federalists Hamilton's political career virtually ended. In 1804 Burr, who had at various times been balked in his political schemes by Hamilton, challenged the latter to a duel, on the ground of an alleged insult, and Hamilton, feeling that by refusing to acknowledge the accepted code, of which he strongly disapproved, he would lose his influence, and anticipating a crisis in the affairs of the nation with which he would probably be called upon to deal, consented to a meeting. The duel occurred at Weehawken, N. J., on July 11, and Hamilton fell, mortally wounded, at the first fire —having, it is said, discharged his own weapon into the air. He died the following day.

Hamilton's services to the nation can scarcely be overestimated. At a time when disintegrating tendencies were pronounced; when, British rule having been overthrown, the mass of the people were restive under any restraint; and when financial and economic ruin threatened the very existence of the nation, he contended steadily for the establishment of a strong Central Government, initiated various measures which were influential in bringing about such a result, and did more than any other man to put the nation on a firm financial footing, to restore the public credit, and to inculcate in the minds of the people sounder views than were then current with regard to political economy and finance. Judged by modern economic standards, some of his opinions show confusion of thought with regard to capital and wealth, but for the most part he undoubtedly saw further and clearer in his own special field than any of his contemporaries. He was not, however, like Jefferson, a great political leader, and, frankly distrusting the people, a large element of whom distrusted him in return, he never had a large personal following.

The best edition of Hamilton's *Works* is that by H. C. Lodge (9 vols., New York, 1885-86). Consult: J. C. Hamilton, *History of the Republic of the United States as Traced in the Writings of Alexander Hamilton and His Contemporaries* (7 vols., New York, 1857-64; 4th ed., 7 vols., Boston, 1879); J. C. Hamilton, *Life of Alexander Hamilton* (unfinished) (2 vols., New York, 1834-40); Morse, *Life of Alexander Hamilton* (2 vols., Boston, 1876); Shea, *Life and Epoch of Alexander Hamilton* (New York, 1879); Lodge, *Alexander Hamilton* (Boston, 1882), in the "American Statesmen Series;" Sumner, *Alexander Hamilton* (New York, 1890), in the "Makers of America Series;" and a brief sketch by Conant, *Alexander Hamilton* (Boston, 1901), in the "Riverside Biographical Series." A list of books concerning Hamilton, and of Hamilton's writings, is given in Ford, *Bibliotheca Hamiltonia* (New York, 1886).

HAMILTON, Andrew (?-1703). A Colonial Governor of New Jersey. He was of Scottish birth, and before emigrating to East Jersey had been a merchant in Edinburgh. In 1686 he was appointed a member of Governor Lord Neill Campbell's council, and a year and a half later, December 10, 1687, on the latter's return to Europe, was appointed his substitute. While on a visit to London in 1692 he was regularly commissioned Governor of East Jersey, and soon afterwards received the appointment to the same office in West Jersey. In 1697 the proprietors

deposed him because of his Scottish birth, in accordance with an act of Parliament passed shortly after Sir George Barclay's attempt to assassinate King William; but in 1699 he was reappointed. In 1701 William Penn appointed him Deputy Governor of Pennsylvania. He was for some time Postmaster-General in America, and either he or his son, Col. John Hamilton, established the first colonial postal service under a patent dated 1694.

HAMILTON, ANDREW (c.1676-1741). An American lawyer, born in Scotland. Of his early history nothing is known, nor is it certain that Hamilton was his real name, as he was for some time called Trent. About 1697 he came to Virginia, and afterwards removed to Philadelphia, where he was made Attorney-General (1717) and a member of the Provincial Council (1721). He was prothonotary of the Supreme Court and recorder of Philadelphia, a member of Assembly (1727) and its Speaker in 1729. He and his son-in-law built as a private property the State House, which later became Independence Hall. Hamilton is best known for his defense (1735) of John Peter Zenger (q.v.) on the charge of libel. He advanced as defense the truth of the publication, and gained a verdict of 'not guilty,' which did much for the freedom of political discussion, so that Gouverneur Morris styled him 'the dog-star of the American Revolution.' He was trustee of the General Loan Office and (1737) judge of the Vice-Admiralty Court of the Province of Pennsylvania.

HAMILTON, ANTHONY (1646-1720). An English courtier and French author of fables and of the scandalous *Mémoires du Chevalier de Gramont*, otherwise known as the *Histoire amoureuse de la cour d'Angleterre* (1713). He was born at Roscrea, Ireland, the third son of Sir George Hamilton, a son of the first Earl of Abercorn, and was brought up in France and as a Roman Catholic. This prevented his promotion by Charles II., at whose Court he was very popular, but furthered it under James II., who made him colonel of an Irish regiment and Governor of Limerick. After the fall of James he went back to France, where he found a patroness in the Duchess Ludovise of Maine. At her country-seat at Sceaux he wrote the famous *Mémoires*. His last public enterprise was a share in the fiasco of the Old Pretender in 1708. Hamilton's *Contes de féerie* aimed at once to rival and to ridicule the *Arabian Nights* of Galland (q.v.). They err through artificiality, and the intrusion of personal and local allusions. The *Mémoires de Gramont*, on the other hand, will always remain one of the most remarkable pictures that we possess of the noble younger son, the cadet of the *grand siècle*—light yet hard-hearted, keenly witty, profoundly skeptical, chivalrously brave when in view, capable of dastardly meanness behind the scenes. The *Mémoires* were printed in English in 1714. There is an illustrated translation with notes by Walter Scott (1811), and many editions in both languages. The *Fables* were first printed in 1730, and Hamilton's *Works* in six volumes in 1749. Editions after 1812 are more complete. Consult: Sainte-Beuve, *Causeries du Lundi*, vol. i. (Paris, 1857-62).

HAMILTON, ELIZABETH (1758-1816). An author, of Scotch parentage, born in Belfast. She was educated by relatives in Stirlingshire, and began to write at an early age. *Hindoo Rajah* (1796), containing Eastern impressions of England; *Memoirs of Modern Philosophers* (1800); *Letters on Education* (1801-02); *Memoirs of Agrippina, the Wife of Germanicus* (3 vols., 1804); *Letters on the Formation of the Religious and the Moral Principle to the Daughter of a Nobleman* (1806), are her more serious works; but she is best known by her Scottish tale, *The Cottagers of Glenburnie* (1808), and the ballad "My ain Fireside." She was unmarried, but called herself Mrs. Hamilton, and was personally revered as a philanthropist.

HAMILTON, EMMA, Lady (1761?-1815). Mistress of Horatio Nelson, the famous English admiral. She was a daughter of Henry Lyon, a man in very humble circumstances. Her career was for a long time an obscure one, and she gave birth to several illegitimate children. In 1784 she fell in with Sir William Hamilton, Ambassador at Naples, and he was captivated by her great beauty. She became his mistress, but he married her in May, 1791. At Naples she played a great social and political rôle, being an intimate of Queen Maria Carolina. Nelson first met Lady Hamilton at Naples in 1793, again in 1798, and from 1800 onward they lived together. In 1801 Lady Hamilton gave birth to a child, Horatia, by Nelson. After Nelson's death Lady Hamilton's affairs became involved, and in 1813 she was even arrested for debt. She died at Calais, on January 15, 1815. Her child by Nelson lived with the latter's sisters. She died March 6, 1881. Another child by Nelson died in infancy. See NELSON, HORATIO.

HAMILTON, FRANK HASTINGS (1813-86). An American surgeon, educated at Union College and in the medical department of the University of Pennsylvania. In 1861 he became professor in the Bellevue Hospital Medical College. He was a military surgeon for two years in the Civil War, and was appointed medical inspector with the rank of lieutenant-colonel in 1863. Among the many positions of honor and trust which he held was the presidency of the New York Society of Medical Jurisprudence. His services as consulting surgeon to various hospitals and asylums were highly prized, and he became widely known as an authority on surgery, his three large works having a recognized place in the literature of medical science. They are: *Treatise on Fractures and Dislocations* (1860); *Practical Treatise on Military Surgery* (1861); and *The Principles and Practice of Surgery* (1872).

HAMILTON, GAIL. The pseudonym of Mary Abigail Dodge (q.v.).

HAMILTON, GAVIN (1730-97). A Scotch painter and antiquary. He was born at Lanark. At an early age he was sent to Rome, where he studied painting under Massuchi. His best pieces were designed from the *Iliad*, such as "Achilles Beside the Dead Body of Patroclus," "Andromache Bewailing the Death of Hector," and "Helen and Paris." Hamilton, however, rendered greater service to art by his discoveries of precious fragments of ancient monuments than by his direct contributions to it. The latter part of his life was devoted to excavations in various parts of the Roman States, but especially at Civita Vecchia, Velletri, Ostia, and above all at Hadrian's villa at Tivoli. The statues, busts,

and bas-reliefs found by him form the most interesting portion of the Museo Pio-Clementino in the Vatican, after the treasures of the Belvedere. Many collections in England, Germany, and Russia are deeply indebted to his labors. To one of the best of these—the Townley Gallery—Hamilton contributed a large number of valuable marbles. In 1773 he published at Rome *Schola Italica picturæ*, illustrated after his own drawings of the great Italian masters.

HAMILTON, Lord GEORGE FRANCIS (1845—). He was born in Brighton, England, and is the third son of the first Duke of Abercorn. He was educated at Harrow, entered the Rifle Brigade as ensign in 1864, and in 1868 was transferred to the Coldstream Guards, with a lieutenant's commission. In 1868 he entered Parliament as a Conservative from the county of Middlesex, and continued to serve from 1874 to 1880. From 1874 to 1878 he was Under-Secretary of State for India. With the return to power of the Conservative Party in 1885 he became First Lord of the Admiralty, an office which he occupied until 1892. During Lord Salisbury's third Administration he was Secretary of State for India. His naval reconstruction scheme of 1889 was the most extensive one ever adopted. Great credit is due him for ability and judgment displayed in dealing with the troubles in India. He was appointed provisional Grand Master of Middlesex County in 1892, served as chairman of the London School Board for the year of 1894, and was appointed Captain of Deal Castle in 1899.

HAMILTON, JAMES (c.1710-83). A Colonial Governor of Pennsylvania, son of Andrew Hamilton (q.v.), the lawyer, and born probably in Accomac County, Va. He was prothonotary of the Supreme Court of Pennsylvania after his father's resignation, was six times a member of the Provincial Assembly, was elected Mayor of Philadelphia (1745), and a member of the Provincial Council (1746). Two years later he became Lieutenant-Governor, which office he resigned in 1754. He was prominent in the defense of the Colonies against the Indians in 1755, and was Deputy Governor (1759-63, 1771, and 1773). While the British held Philadelphia he was a prisoner on parole. He was prominent in educational and scientific circles after the war, acting as president of the Board of Trustees of Philadelphia College and head of the Philosophical Society.

HAMILTON, JAMES (1769-1829). A British teacher of languages. Hamilton went to school for four years only, to two Jesuits in Dublin. As a business man he lived in France and Hamburg, where he learned German from an émigré, D'Angeli, who used no grammar, but taught by literal translation. On the rupture of the Peace of Amiens, Hamilton was 'detained' in France, and his Continental business was ruined. In 1815 he came to New York, intending to manufacture potash. Instead, he became a teacher of languages, combining the methods of his Jesuit teachers and of D'Angeli. This analytic method met with almost incredible success in New York City and in Philadelphia, where he published English interlinear translations of works in Greek, Latin, French, Italian, and German. Opposition to his methods in Baltimore College roused him to a defense which resulted in the total desertion by the students of the college to the Hamiltonian Institute. After teaching in many college towns of the United States and in Canada, he went to London (1823). Throughout England and Scotland he was again marvelously successful. Hamilton's great work was *History, Principles, Practice, and Results of the Hamiltonian System* (last ed. 1831).

HAMILTON, JAMES (1786-1857). An American politician, born in Charleston, S. C. He received a good education in his native city, studied law, and soon attained a high position at the South Carolina bar. In 1812 he was appointed a captain in the army, and served in the campaigns on the Canadian frontier. He was Mayor of Charleston for several terms, and in 1822 while serving in that capacity he detected, and by his measures suppressed, a well-planned negro conspiracy. After serving in the State Legislature, he was in 1822 elected a member of Congress as a States Rights Democrat, to fill a vacancy, and was twice reëlected, serving until 1829. He was an ardent supporter of Andrew Jackson, both in 1824 and 1828, and after Jackson's election in the latter year he was offered the position of Secretary of War or of Minister to Mexico, both of which he declined. Returning to South Carolina, he was in 1830 elected Governor of the State on an extreme States Rights platform, and immediately recommended to the Legislature that it authorize armed resistance to the enforcement of the provisions of the tariff of 1828. He advised the passage of the Nullification Act, which brought affairs to a crisis, and in 1832 was appointed by Gov. Robert Y. Hayne, who in that year succeeded him in the Governorship, to the chief command of the State troops recruited to resist the National Government. He never acquiesced in the settlement of the trouble, and soon thereafter removed to Texas, where he became interested in some colonization schemes. In 1841 he was the accredited representative of Texas in Europe, and it was due to his efforts that the independence of the republic was recognized by England and France in that year. He next bent all his energies to securing the admission of Texas into the Union. In 1857 he was elected United States Senator from Texas, but was drowned in a steamship collision off the Texas coast before he took his seat.

HAMILTON, JAMES (1814-67). A Presbyterian divine. He was born in Paisley, Scotland, November 27, 1814; educated at Glasgow and Edinburgh; entered the ministry, and from 1841 till his death, November 24, 1867, was minister of the National Scotch Church, Regent Square, London. His literary activity was very great, as aside from editorial labor he produced numerous volumes, and contributed the articles upon botany in Fairbairn's *Imperial Bible Dictionary* (London, 1867). His *Collected Works* were published in six volumes (London, 1869-73).

HAMILTON, JAMES CLELAND (1836—). A Canadian barrister and author. He was born at Belfast, Ireland, but was educated in America, and graduated at Toronto University. He published some travel sketches; but his more important work is contained in the papers upon literary and scientific subjects written for the Canadian Institute, of which he was elected vice-president, and printed in its *Proceedings*—such as *The Great Centre, an Astronomical Study;* and *The Panis, an Historical Outline of Ca-*

nadian Indian Slavery in the Eighteenth Century.

HAMILTON, MOUNT. See LICK OBSERVATORY.

HAMILTON, PATRICK (c.1504-28). A precursor of the Scottish Reformation. He was born probably in the year 1504, either at Stanehouse or Kincavel. He was educated at the University of Paris, where he took his degree of A.M. in 1520, after which he probably proceeded to Louvain and Basel. In 1523 he was back in Scotland, and was admitted to Saint Andrews University. While abroad he had formed new tastes and interests, but for some time his opinions attracted no attention. Gradually, however, his convictions matured. From agreeing with Erasmus he came to agree with Luther, and about 1526 he appears to have announced his new views in such a manner as to draw the notice of Archbishop Beaton. Early in 1527 Beaton made 'inquisition' into the grounds of the rumor against him, and Hamilton fled to Wittenberg, where he became familiar with Luther and Melanchthon, and then passed on to Marburg, where the university was just opened. After six months he returned to his native country, in the autumn of 1527. He repaired to the family mansion at Kincavel, and there, in the neighborhood of Linlithgow, preached openly. In some way he was induced to go to Saint Andrews in January, 1528, and took up his abode in a lodging provided for him by the Archbishop. A conference was held, in which his opponents showed a conciliatory spirit, and even to some extent expressed concurrence in his views. He was allowed to depart in peace, and for some time to promulgate his sentiments in the city and University of Saint Andrews. After a month or so he was summoned to answer before Beaton to a charge of heresy. He was condemned for divers heresies and 'detestable opinions,' deprived of all dignities and benefices in the Church, and delivered over to the secular power to be punished. The sentence was carried out without delay. On the very same day on the morning of which he was tried (February 29, 1528), Hamilton was consigned to the stake in the front of the gate of Saint Salvador's College. His only publication is known as *Patrick's Places*, and is an evangelical treatise, written in Latin; it was translated by Frith (London, 1807). For his life, consult Lorimer (London, 1857).

HAMILTON, ROBERT (1743-1829). A Scottish writer on finance, born in Edinburgh, educated at the University of Edinburgh. He entered a banking house, but at the age of twenty-six left mercantile pursuits, and became successively rector of Perth Academy, professor of natural philosophy in Aberdeen University (1779), and professor of mathematics (1817). In 1777 he wrote an *Introduction to Merchandise;* in 1790, three essays on *Peace and War;* in 1822, *Management of the Poor*, a work displaying enlightened views on economics. His most important work is the *Essay on the National Debt*, which appeared in 1813. A posthumous volume published in 1830, *The Progress of Society*, is also of great ability, treating of economical principles by tracing their natural origin and position in the development of social life.

HAMILTON, SCHUYLER (1822—). An American soldier, a grandson of Alexander Hamilton. He was born in New York, graduated at West Point in 1841, served with great gallantry in the Mexican War, and was brevetted first lieutenant in 1846 and captain in 1847. From the latter year until 1854 he was aide-de-camp to Gen. Winfield Scott. He then resigned from the army, but upon the outbreak of the Civil War volunteered as a private in the Seventh Regiment, New York National Guard. He was rapidly promoted, becoming a brigadier-general of volunteers in 1861, and a major-general of volunteers in 1862. He was actively engaged in the operations against New Madrid, Mo., and Island No. 10, in the Mississippi River, and in the campaigns in Tennessee and Mississippi. Sickness compelled him to resign in 1863. He was hydrographic engineer in the Department of Docks, New York City, in 1871-73, and superintendent of yards in 1873-75, and subsequently, owing to ill health, lived in retirement. He wrote *A History of Our National Flag* (1852).

HAMILTON, THOMAS (1789-1842). An English prose writer, of Scottish descent, born in Glasgow. He was educated at Glasgow University, and became the friend of Wordsworth and Scott. His novel *Cyril Thornton* (1827) was popular in its day, while in *Men and Manners in America* (1833) he showed himself a kindly critic, shrewd and humorous.

HAMILTON, WALTER (1844-99). An English writer, born in London, and educated at the Collège de Dieppe. He was a fellow of the Royal Historical Society, vice-president of the Société Française des Collectionneurs d'Ex Libris, and vice-president of the Ex Libris Society. His published works include: *A Memoir of George Cruikshank* (1878); *The Origin of the Office of Poet Laureate* (1879); *The Poet Laureates of England* (1879); *The Æsthetic Movement in England* (1882); *Parodies of the Works of English and American Authors, Collected and Annotated* (5 vols., 1884-88); *French Book Plates for Ex Libris Collectors* (1892); *Dated Book Plates* (2 parts, 1894-95).

HAMILTON, WILLIAM (1704-54). A Scottish poet, born at Bangour, Linlithgowshire. Between 1724 and 1727 he contributed lyrics to Allan Ramsay's *Tea Table Miscellany.* In 1745 he joined the cause of Prince Charles, and celebrated the battle of Prestonpans in an ode beginning, "As over Gladsmuir's blood-stained field." After the disaster of Culloden he lurked for several months in the Highlands, and at length escaped to France; but the influence of his friends at home procured him permission to return to Scotland. Broken in health, he went back to France, where he died. Though Hamilton wrote much graceful verse, his fame rests upon what Wordsworth called 'the exquisite ballad,' "The Braes of Yarrow."

HAMILTON, Sir WILLIAM (1730-1803). Grandson of William Douglas, third Duke of Hamilton, born in Scotland. In 1764 he was appointed English Envoy Extraordinary and Plenipotentiary to the Court of Naples. During his residence there he devoted much time to a study of Vesuvius and other volcanoes, and embodied his results in *Campi Phlegræi* (2 vols. and suppl., Naples, 1776-79), and shorter papers. He was also an enthusiastic collector, particularly of ancient vases, which he seems to have been one of the first Englishmen to appreciate

for their artistic merit. His first collection was sold in 1772 to the British Museum for £8400, and formed the nucleus of the present department of Greek and Roman antiquities. This collection was described by D'Hancarville, in *Antiquités étrusques, grecques et romaines* (4 vols., Naples, 1766-67; and 2d ed., Florence, 1801-08). In 1787 he resumed collecting, and in 1798 sent a second collection to England for sale, but the vessel was wrecked, and only about two-thirds of the cases were recovered. The whole of the collection was drawn by Tischbein in his *Collection of Engravings from Greek Vases . . . in the Possession of Sir W. Hamilton* (Naples, 1791 et seq.). From 1793 to 1800 Hamilton took an active part in the diplomacy of the Court of Naples, but his health failed, and in 1800 he was recalled. A claim upon the British Government for special services was not allowed, but he was granted a pension of £1200. Hamilton's first wife was Miss Barlow, who died in 1782. In 1791 he married his mistress, Emma Lyon, who as Lady Hamilton is prominent in the life of Lord Nelson.

HAMILTON, Sir WILLIAM (1788-1856). An eminent philosopher of the Scottish school. He was born March 8, 1788, at Glasgow, where his father, Dr. William Hamilton, and his grandfather, Dr. Thomas Hamilton, held in succession the chairs of anatomy and botany. After gaining distinction, especially in the philosophical classes, at Glasgow, he went in 1807 to Balliol College, Oxford, as a Snell exhibitioner, and made a brilliant record for himself as a student of literature. He left Oxford in 1810, and instead of going into the practice of medicine, which he had studied, he became a member of the Scotch bar in 1813, but seems never to have had any practice in his profession except what became incumbent on him afterwards, on being appointed Crown solicitor of the Court of Teinds. In 1820, on the death of Dr. Brown, he was an unsuccessful competitor for the chair of moral philosophy in Edinburgh. In the following year, however, Hamilton was appointed to the professorship of history in that university. He took part in 1827 in the discussion of the scientific value of phrenology, and made careful investigations for himself of the brains of various animals in order to become acquainted at first hand with the facts of the case. In 1829 there appeared in the *Edinburgh Review* a critique of Cousin's *Cours de Philosophie* of the previous year, in which was developed Hamilton's famous doctrine of the infinite. The critique, which was entitled "The Philosophy of the Unconditioned," immediately drew attention to him from philosophers both in Great Britain and on the Continent. For some years after this Hamilton was a regular contributor to the *Edinburgh Review*, writing articles on philosophy, literature, medicine, education, and university reform. Many of these contributions were translated into German, French, and Italian. In 1852 they were all edited by Hamilton himself, with large notes and appendices, under the title of *Discussions in Philosophy and Literature, Education, and University Reform*. In 1836, after a severe contest, Hamilton was elected to the chair of logic and metaphysics in Edinburgh. In 1846 he published in two volumes *The Works of Thomas Reid*, carefully edited with notes and supplementary descriptions, which give fairly satisfactory views of his own philosophy. Extensive notes of his university lectures were taken by his students; numerous copies of them, transcribed from shorthand reports, were in circulation during the later years of his life, and formed the basis of Mansel and Veitch's edition. In 1844 he had a stroke of paralysis. He was, however, able, with an assistant, to perform the duties of his class till the close of session 1855-56, when his health suddenly became worse. He died May 6th. In logic Hamilton proposed the so-called doctrine of 'the quantification of the predicate' in affirmative propositions. In his view the predicate of every proposition has a definite logical quantity assigned to it in thought, and an explicit statement of this quantity simplifies logical operations. In this contention, Hamilton may properly be regarded as the forerunner of the algebraic school of logicians. (See LOGIC.) His psychology was a cumbersome analysis of psychic operations that perhaps went to the extreme length of 'faculty psychology' (q.v.). In philosophy he was an exponent of the common sense Scottish school, but in some respects he went beyond the tradition of the school. Agreeing with Reid that 'the root of our nature cannot be a lie,' and that the deliverance of consciousness must be trusted, he accepted a naïve sort of natural realism, maintaining that we are directly conscious of the existence of external objects and of ourselves. And yet knowledge is often all relative. "To think is to condition." In this doctrine of the relativity of knowledge consists his departure from Scottish traditions, and it led him to maintain in the spirit of Kant that the unconditioned cannot be known. God is an object of faith, not of knowledge.

Philosophy, according to Hamilton, cannot say whether God is absolutely limited or absolutely unlimited. One or the other He must be, for between contradictions there is no compromise; but either characteristic is inconceivable. Again, our conception of causality is nothing positive. It is nothing but the *inability* of the mind to conceive an absolute beginning. So the infinity of space and time is the inability of the mind to conceive a point when space comes to an end or a moment after which time shall be no more. But this inability to think is no test of unreality. Thus philosophy is only a learned ignorance (*docta ignorantia*), or a well-assured conviction of the limits of our knowledge. In many ways this reminds one of Kant, from whom Hamilton indeed learned much. Some historians have characterized his philosophy as a hopeless attempt to unite the 'common sense' of Reid with the criticism of Kant. His philosophy of relativity changed in the hands of Herbert Spencer, who gave up 'common sense,' into agnosticism. Consult: Veitch, *Memoir of Sir William Hamilton* (London, 1869); id., *Hamilton*, in Blackwood's Philosophical Classics (Edinburgh, 1879); and *Hamilton, the Man and His Philosophy* (ib., 1883); J. S. Mill, *Examination of Sir William Hamilton's Philosophy* (London, 1878); Martineau, *Reviews and Addresses*, vol. iii. (London, 1891); A. Seth, *Scottish Philosophy* (Edinburgh, 1890); Stirling, *Sir William Hamilton* (London, 1865); Monck, *Sir William Hamilton* (New York, 1881). His principal writings are accessible in the four volumes of lectures edited by Mansel and Veitch, reprinted in two volumes

(Boston, 1859-60). A college edition of his writings was published in 1855, by O. W. Wight.

HAMILTON, WILLIAM GERARD (1729-96). An English statesman, Chancellor of the Exchequer in Ireland. Of Scotch family, but born in London, he passed through Winchester College to Oriel, Oxford, though he did not graduate. He entered himself as a student at Lincoln's Inn (1744), but left the law for political life, and was a member of Parliament for both English and Irish boroughs. 'Single Speech Hamilton' was a misnomer, since Horace Walpole remarks upon the brilliance of his oratory on more than one occasion. Boswell mentions that he also charmed Dr. Johnson by his personality and conversation. He went to Ireland in 1761, as chief secretary to the Lord Lieutenant, and his own secretary was Edmund Burke. Hamilton was Chancellor of the Irish Exchequer (1763-84), and retired to England with a pension of £2000 a year. He was so notable a figure in his time that the *Letters of Junius* were ascribed to him, but he was more of a politician than a statesman. His published writings were collected by Malone under the title of *Parliamentary Logick* (1808).

HAMILTON, Sir WILLIAM ROWAN (1805-65). A Scotch-Irish mathematician, born at Dublin. His father, a solicitor, went to Dublin as a boy. William was remarkable as a child, having a good knowledge of Hebrew at the age of seven, and at twelve having studied not only Latin, Greek, and the leading modern languages of Europe, but also Syriac, Persian, Arabic, Sanskrit, Hindustani, and Malay. This devotion to languages was encouraged by his father because of the opportunities for service in the East India Company. During this same period his mathematical powers began to be manifest, and in his tenth year he entered a contest with the young American calculator (see CALCULATORS, REMARKABLE) Zerah Colburn, who was then visiting Dublin, and, although defeated, made a creditable record. Before he went to Trinity College, Dublin (1823), in his eighteenth year, he had not only mastered Euclid, Newton's *Arithmetica Universalis* and the *Principia*, and Laplace's *Mécanique céleste*, but he had discovered an important error in the last-named work, and had written an original memoir on osculation of certain curves of double curvature. His career at Trinity was one of remarkable brilliancy. While only a second-year student he read before the Royal Irish Academy a "Memoir on Caustics," which attracted wide attention, and led Airy to assert that "it had made a new science of optics." While still an undergraduate (1827), Hamilton was appointed Andrews professor of astronomy and superintendent of the observatory, and soon after became Astronomer Royal for Ireland. He was twice honored with the gold medal of the Royal Society, first for his work on optics, and again for his contributions to dynamics. He was knighted in 1835, and was subsequently made president of the Royal Irish Academy, and corresponding member of the Academy of Saint Petersburg and of the *Académie des Sciences* of Paris.

Hamilton is chiefly known for his discovery of quaternions (q.v.). He announced the theory in 1844, and in 1848 began to lecture upon it at Trinity. His *Lectures on Quaternions* (1853) and *Elements of Quaternions* (posthumous, 1866; 2d ed. 1899) were not, however, written in a style to appeal to a large circle of mathematical readers, and it is owing chiefly to the work of Professors Tait and Kelland that the theory has attracted the attention that it merits. Consult Graves, *Life of Sir William Rowan Hamilton* (Dublin, 1882-89).

HAMILTON COLLEGE. An institution of higher education, situated at Clinton, N. Y. It was founded in 1793 by the Rev. Samuel Kirkland, a Congregational missionary among the Oneida Indians, for the education of the white and Indian population. The erection of a building, of which the corner-stone was laid by General Steuben in 1793, was brought to a standstill for lack of funds, and was only completed in 1797 through the untiring efforts of the founder. In that year the school was formally opened, and until 1812 was known as Hamilton Oneida Academy, deriving its name from Alexander Hamilton, one of its benefactors and trustees. In 1812, the necessary $50,000 having been collected, the institution was chartered by the University of the State of New York as Hamilton College. It grew steadily for a while, but during President Davis's administration differences arose between him and the students, and the college suffered in consequence. Under President North's administration, however, the institution developed into one of the best-known classical colleges in the United States, and has since maintained a national reputation, especially in the departments of rhetoric and oratory. It has made no effort to give 'university' or specialized training, but has consistently upheld high scholastic standards. The two courses offered are the classical and the Latin-scientific, both offering numerous electives. One fellowship, fifty-five scholarships, and a large number of prizes are available. The attendance in 1902 was 200, and the faculty numbered 20. At the same time the endowment was $500,000, the gross income $400,000, and the value of real estate and collections was estimated at $500,000. The library contains 43,000 volumes. The campus, covering 95 acres, is notable as representing the contributions of a large number of individual graduates and college classes in buildings, grounds, and other college improvements. The presidents of the college have been: Azel Backus (1812-16); Henry Davis (1817-33); Sereno Edwards Dwight (1833-35); Joseph Renney (1835-39); Simeon North (1839-57); Samuel Ware Fisher (1858-66); Samuel Gilman Brown (1866-81); Henry Darling (1881-91); Melancthon Woolsey Stryker (1892—).

HAMILTON INLET. An indentation of the Labrador coast, North America, 150 miles long, with a maximum breadth of 30 miles (Map: Canada, T 6). It forms the estuary of the Grand or Hamilton River (q.v.). From the north it receives the waters of Grand Lake.

HAMILTON RIVER. See GRAND RIVER.

HAMILTON SERIES. See DEVONIAN SYSTEM.

HAMITES, or HAMITIC. Designations applied to peoples and languages of the white or Caucasian branch of mankind settled from remotest times in Northern and Northeastern Africa and the Canary Islands. Both in biological character and in speech, as well as in situation and activities, they are nearest to the Semites.

The Hamites are in touch with African tribes south of the Sahara, and mixture with negroes has influenced the type of the population during thousands of years. On the other hand, Hamite culture has extended far from its original province. The eastern branch of the Hamites includes: (1) The ancient Egyptians, the oldest known people of the white race to develop a high civilization. Their descendants are the Copts, or native Christians, interspersed among the population, and the Fellahin or peasant class, speaking a Semitic language and practicing a Semitic religion.

(2) Farther up the Nile the Nubians, strongly negroid, are mixed with Hamite Bejas.

(3) The aboriginal population on the Abyssinian plateau. Agau Hamites.

(4) Ethiopian Hamites: Somalis, in many tribes; Gallas, one branch of whom, including Shoas and Amharas, extends into Abyssinia; Danakils in Afarland.

(5) Masai, in British East Africa, south of the Equator and east of the Victoria Nyanza. They are Hamites in language, have dark skin and frizzled hair, and are physically among the most magnificent races.

(6) Wahuma or Watusi, the ruling race in Northwestern German Africa, almost identical in speech and biological character with the Gallas. Passing westward from the Egyptian area along the north of Africa, the Berber Hamites, including Tuaregs, Shluhs, and Kabyles, occupy the littoral region and the Sahara. They are the descendants of the oldest known inhabitants of this territory, who were believed to have been the founders of the Mediterranean race.

(7) Tibus or Tubus, Hamites of the Sahara north of Lake Chad, mixed with negroes. Their speech is of doubtful affiliation.

(8) Fulah or Fulbe, in extreme Western Africa, in Futa-tor and Futa Jallon.

(9) Guanches, ancient Hamites of the Canaries.

Each of the separate peoples here named is described in its proper place. Among the Hamites are tribes that show blond characteristics, but it cannot be decided whether this is due to albinism or to invasion of Teutonic nations. The standard color is dark brunette; the hair is black and curly, the body is over medium height, and in some tribes of great stature. The Hamites have, in recent years, come into especial prominence through their connection with the origin of Mediterranean peoples and early culture, some ethnologists tracing their type into the heart of Europe. Hamitic speech in its three varieties, Egyptian, Ethiopian, and Berber, belongs to the inflected class, near to the Semitic, from which it has been separated for millenniums. The oldest writing in the world is the hieroglyphic inscriptions placed on their monuments by the Hamitic Egyptians. They also were the earliest engineers, machinists, and architects in massive stones. Consult: Sergi, *Africa: Anthropologia della stirpe camitica* (Turin, 1897); Stanford, *Africa* (London, 1895); Keane, *Man, Past and Present* (London, 1899).

HAMITIC LANGUAGES. See AFRICAN LANGUAGES.

HAM'LET. See AMLETH.

HAMLET. An opera by Ambroise Thomas (1868), the French libretto being adapted by Barbier and Carré from Shakespeare. An Italian version, *Amleto*, was presented in 1869 in London.

HAMLET. (1) The common spotted moray (q.v.). (2) The Bermuda grouper. See GROUPER.

HAM'LEY, Sir EDWARD BRUCE (1824-93). An English general and author, born at Bodmin, son of Vice-Admiral William Hamley, and educated at Woolwich. In 1854 he was made adjutant, and later became aide, to Richard Dacres, and served through the Crimean War. He was appointed professor of military history at Sandhurst in 1859, and in 1882 he went with Sir Garnet Wolseley to Egypt, fought at Tel-el-Kebir, and was much aggrieved that his division was not recognized, insisting that it had won the day. He was made general in 1890, as a recompense for his ill-treatment. Hamley's best-known works are: *The Story of the Campaign of Sebastopol* (1855); *The Operations of War Explained and Illustrated* (last ed. 1878), an excellent work; *The War in the Crimea* (1891); *Lady Lee's Widowhood* (1854); and reprints from *Blackwood*, with which he was long connected.

HAM'LIN, ALFRED DWIGHT FOSTER (1855—). An American architect, born at Constantinople, Turkey, the son of Cyrus Hamlin, founder of Robert College there. He graduated at Amherst in 1875; subsequently studied at the Massachusetts Institute of Technology and at the Ecole des Beaux-Arts in Paris. In 1883 he became special assistant in Columbia University, He was appointed assistant professor of architecture there in 1889, adjunct professor of architecture in 1891, and afterwards professor of architecture. Among his publications, in addition to many magazine articles, are: *A History of Architecture* (1896), and a *Handbook of the History of Ornament*.

HAMLIN, CYRUS (1811-1900). An American Congregational missionary and educator. He was born at Waterford, Me., and graduated at Bowdoin College in 1834, and at Bangor Theological Seminary in 1837. In the latter year he went to Constantinople, as a missionary under the direction of the American Board. In 1860 he began the work of establishing Robert College at Constantinople, and succeeded in spite of the strong opposition of the Turkish authorities. He acted as its president until 1876, and then became professor of dogmatic theology in Bangor Seminary. In 1880 he was elected president of Middlebury College, Vt., which post he retained till 1885. He published *Among the Turks* (1877), and *My Life and Times* (1893).

HAMLIN, HANNIBAL (1809-91). An American political leader, vice-president of the United States in 1861-65. He was born at Paris Hill, Me., and prepared for college at Hebron Academy, but his father's death prevented his taking a college course. After some years spent in running the home farm and a short period as proprietor of a country weekly at Paris, he studied law, was admitted to the bar, and in 1833 began practice at Hampden, Maine. His long political career of almost a half-century began in 1835 with his election to the lower branch of the Maine Legislature as a Democrat. To this he was a number of times reëlected, and served as its presiding officer in 1837, 1839, and 1840. In the last year he was a Democratic nominee

for Congress, but was defeated in the Whig landslide of that year. Two years later he was elected to the Twenty-eighth Congress, and was reëlected to the Twenty-ninth, serving from 1843 to 1847. Early in his Congressional career he took a pronounced stand as an anti-slavery man, opposed the annexation of Texas, and drew particular attention to himself by introducing the famous Wilmot Proviso (q.v.) during the temporary absence of its author, and securing its acceptance by the House by a vote of 115 to 106. In 1848 he was elected to the United States Senate to fill a vacancy caused by the death of Senator Fairfield. In spite of his action in speaking and voting against Clay's compromise measures, he was reëlected for a full term of six years in 1851. Before the completion of this term, however, he had taken an active part in the founding of the Republican Party, and resigned his seat in the Senate in 1856 upon being elected by that party Governor of his native State. In 1857, however, he resigned from the Governorship to resume his seat in the Senate, to which he had been reëlected, and where he thought he could be of more use to the anti-slavery cause than in the Governor's chair. He remained in the Senate until after his election, in 1860, as Vice-President of the United States on the ticket with Abraham Lincoln. During the Civil War he was a valued adviser of President Lincoln, and the relations between the two were especially intimate. He was again United States Senator, 1869-81, and was Minister to Spain, 1881-83. Consult C. E. Hamlin, *Life and Times of Hannibal Hamlin* (Cambridge, 1899).

HAM'LINE, Leonidas Lent (1797-1865). A Methodist Episcopal bishop, born in Burlington, Conn. He studied for the ministry, but afterwards read law, and practiced in Ohio. In 1830, however, he became a preacher in the Methodist Church, in 1836 was chosen assistant editor of the *Western Christian Advocate*, and four years later chief editor of the *Ladies' Repository*. In 1844, when the Methodist Church divided on slavery, he was a member of the General Conference, and drew up the plan of separation. He was elected bishop at that session, and served until 1852. Hamline University, Minnesota, was named in his honor. A number of his sermons are given in the *Works of L. L. Hamline, D.D.*, edited by Rev. F. G. Hibbard, D.D. (1869). Consult Palmer, *Life and Letters of Leonidas L. Hamline, D.D.* (New York, 1866).

HAMLINE UNIVERSITY. A coeducational Methodist Episcopal college at Hamline, Minn., midway between Saint Paul and Minneapolis. It was situated at Redwing until 1869, when it was closed, and reopened in 1880 at Hamline. It has a preparatory department with about 100 students; a college of liberal arts, with an attendance of 200; and a college of medicine, with 150 students, at Minneapolis. The college faculty in 1902 numbered 20, and the medical faculty 48. At the same time the university library contained 6000 volumes, the buildings and grounds were valued at $150,000, the endowment was $200,000, and the annual income was $24,000.

HAMM, hăm. The capital of a circle in the Prussian Province of Westphalia, situated at the confluence of the Ahse with the Lippe, 23 miles northwest of Arnsberg (Map: Prussia, B 3). It is surrounded by old ramparts and a moat, and contains a Catholic church dating from 1510, and an old gymnasium. It is at the junction of several railroad lines, and produces many varieties of iron articles, gloves, flour, liquors, starch, leather, bricks, etc. In the vicinity are thermal baths. Hamm was formerly the capital of the County of Mark and a member of the Hanseatic League. Population, in 1890, 24,969; in 1900, 31,371.

HAMMACHER, hä'măg-ĕr, Friedrich (1824—). A German politician, born at Essen, and educated at Bonn and Berlin. He had to leave the Government service in 1850 because of his part in the rising of '48, and went into business. He soon became interested in the mining industries of the Rhine District and of Westphalia, and founded at Dortmund a union for mining interests. A member of the Prussian House of Deputies (1864-68), and of the Reichstag from 1869 to 1898, with two interruptions, he was one of the founders and leaders of the National Liberal Party; took an especial interest in economic questions, and drew up the declaration of more than two hundred Deputies, which, in 1878, altered Bismarck's commercial policy. He was one of the promoters of a Government system of railroads in Prussia in the following year, and a founder and director of the German Colonial Union. In 1889 he mediated the disagreements between the Rhenish Westphalian miners and mine-owners in the coal strike of that year.

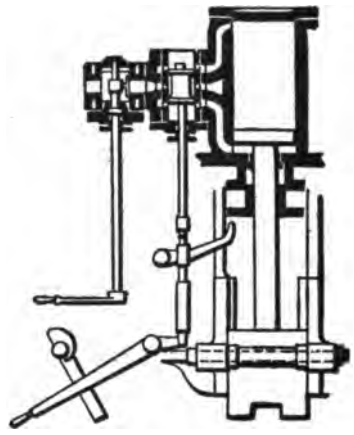
HAMME, hăm'me *or* hăm. A town in the Province of East Flanders, Belgium, situated on the right bank of the Durme, 18 miles east-northeast of Ghent (Map: Belgium, C 3). It contains grain and oil mills, has manufactures of lace, ribbons, and linen, and carries on trade in flax. Population, in 1890, 12,039; in 1900, 13,755.

HAMMER (AS. *hamor*, Icel. *hamarr*, OHG. *hamar*, Ger. *Hammer;* connected with OChurch Slav. *kamy*, Lith. *akmů*, stone, Gk. *ἄκμων*, *akmōn*, anvil, Skt. *aśman*, stone). A tool used for applying the force of impact either for the purpose of beating or forging malleable materials into a specific shape, or for driving nails, spikes, wedges, etc. Hammers may be divided into two general classes, viz. hand hammers and power hammers. Hand hammers are made in a variety of forms to suit the particular purposes for which they are employed. They are all made with a steel or iron head set crosswise of a wooden handle. The part of the hammer which strikes the work is called the face, and the opposite part is called the pane. The pane of the ordinary carpenter's hammer is bent, and has a V-shaped notch to permit its use as a lever for drawing nails; that of a geologist's hammer is wedge-shaped, etc. Many hammers have two faces, either of which may be used indifferently. Hammers of large size requiring the use of both hands to wield them are commonly called sledges, and usually have two faces.

Power hammers are of several forms, the most important of which is the direct-acting steam hammer and its modifications, the drop-press and drop-hammer. One of the oldest forms of power hammer is the tilt-hammer, which consists essentially of a handle working on a horizontal axle at or near one end, and having a head at the other end. The handle and head are usually made of iron, and very heavy. This

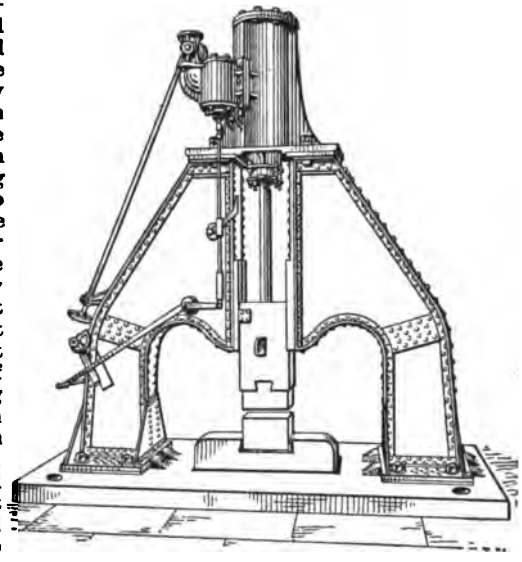
type of hammer is operated by a cam or eccentric (see CAM; ECCENTRIC), which swings up the head end one or two feet and lets it drop. An anvil placed so as to receive the blow is an essential part of the mechanism. Various modifications of this simple device have been devised, but, like the original form, they have become practically obsolete in forging operations, having been replaced by the direct-acting steam hammer. This tool was invented by James Nasmyth, who first conceived the invention in 1839, but did not patent it until 1842. Meanwhile a steam hammer had been actually built at the iron-works of Le Creusot, France, the idea of which, according to English writers, had been obtained from Nasmyth's preliminary sketches, to which the French builders had had access. Be this as it may, the fact is that the first Nasmyth hammer was erected at the Bridgewater Foundry at Patricroft, near Manchester, England, in 1843. This hammer consisted of two vertical uprights or columns surmounted by an entablature, which carried an inverted vertical steam cylinder midway between the two columns. In this cylinder was a piston, with a piston-rod projecting downward between the two columns and carrying at its end a casting which formed the hammer proper. An anvil block occupied the space between the feet of the columns, and received the blow of the hammer. To operate the hammer steam was admitted to the cylinder below the piston, which raised it with its attached piston-rod and hammer to any height desired, limited by the height of the cylinder; when at the desired height the steam was allowed to escape into the air, and the piston and its attachments fell by gravity. The force of the blow depended upon the weight of the hammer and the height of the fall. The hammer was worked by means of an ordinary slide-valve and a long lever, requiring great labor and constant attention in order to give the blow required; so that some contrivance capable of adjustment was necessary in order to have complete command over the power of the blow, and in order that, the instant the blow was struck, the block should rise again, so that not only no loss of time should ensue, but that the heat in the mass of iron on the anvil might not be reduced or carried off by the cold face of the block. The peculiar difficulty of securing a true automatic arrangement will be seen when it is considered that the instant of percussion must vary with almost every blow that is struck; for the piece on the anvil becomes thinner and thinner by each succeeding blow, and in flat bars a blow is first given on the flat side, and then on the edge, the difference in the fall of the hammer in the two cases being oftentimes several inches; and further, that the hammer must be under perfect control at all times.

Nasmyth, after many and protracted trials, failed to produce the motion required, and, as a consequence, the whole hammer scheme was on the point of being abandoned. In this dilemma, and during Nasmyth's absence from the works, his partner, Gaskell, applied to their engineering manager, Robert Wilson, who afterwards became managing partner and successor to Nasmyth, to endeavor to solve the problem which had hitherto baffled the skill of Nasmyth. Wilson took the matter in hand, and in little more than a week a mechanism was invented and attached to a hammer upon which former experiments had been made, and was at once found to answer most admirably every condition required. Under the influence of this very beautiful mechanical device every variety of blow



STEAM HAMMER.
Section showing cylinder and valve mechanism.

could be given—from the gentlest tap to the heaviest blow within the compass of the hammer—and that, too, perfectly self-acting in every respect, the long lever and the hard work before



STEEL-HAMMER.
For forging iron and steel.

referred to being now entirely banished. By simply altering the position of the tappet lever by means of two screws, a blow of the exact force required could be produced and continued so long as steam was supplied. On August 18, 1843, the first hammer was delivered to the Low Moor Iron Works, near Bradford, Yorkshire, and gave such satisfaction that orders for this remarkable tool began to flow in from all parts of the country. The hammer remained in this condition, with the exception of a few minor details, from 1843 to 1853, when Wilson (who had become connected with the Low Moor Iron

Works) invented, patented, and applied to the hammers at Low Moor and elsewhere what is called the 'circular balanced valve.' He later devised for the steam locomotive a balanced slide-valve, in which, by a most ingenious arrangement, the valve is allowed to float, as it were, in an atmosphere of steam pressing equally upon it on every side, entirely doing away with all superincumbent pressure upon the *valve*, no matter what the pressure in the *boiler* may be. The great advantage of this invention will be apparent when it is stated that hammers are now made of such a size that if the value were not balanced a small steam-engine would be required to move it. In June, 1861, Wilson patented and introduced another very important improvement, popularly known as the *double-acting hand-gear motion*. By this arrangement, the steam is admitted as before to *raise* the piston, and when it has attained the required elevation, and at the very moment when about to descend, by slightly increasing the travel of the hand lever (more than when working single-acting), the steam is admitted into the cylinder *above* the piston, which accelerates and increases the intensity of the falling blow and the consequent capacity of the hammer so much that a 5-ton hammer is, by this double-action arrangement, increased to at least a 12½ or 15 ton one.

Since 1861 the chief improvements in steam hammers have been in the nature of mechanical improvements in detail and construction to enable larger hammers to be built. A steam hammer of great size was erected at the Bethlehem Steel Works, South Bethlehem, Pa., in 1889, to be used in forging armor plates and other large steel objects. The steam cylinder is 76 inches in diameter, and has a stroke of 16½ feet, and the weight of the moving parts is 125 tons; the anvil is made up of three 22-inch iron blocks, each weighing 70 tons. This hammer, it is interesting to note, has been put out of commission. At Perm, Russia, there is a 50-ton hammer; at the Terni Steel Works, in Italy, one of 100 tons; at the Krupp Works at Essen, Germany, one of 50 tons; at Woolwich Arsenal, England, one of 25 tons; and at Le Creusot, France, one of 50 tons. Recently steam hammers have been replaced by hydraulic presses for forging armor plate and similar large forgings, and they are now seldom built in the large sizes stated above. In smaller sizes for making drop-forgings (see FORGE, FORGING), and for forging the vast majority of smaller work, they are still extensively used. In some works compressed air is used in place of steam for operating their hammers. For a description of a class of compressed-air operated hammers for light work, such as driving rivets, calking, etc., see PNEUMATIC TOOLS. The steam hammer doubtless ranks as one of the most important economic inventions of all time.

HAMMER, hä'mẽr, JULIUS (1810-62). A German poet, born in Dresden. He studied jurisprudence at Leipzig, but in 1834 made the acquaintance of Tieck and Theodor Hell by his play *Das seltsame Frühstück*, and decided to devote himself to literature. It was largely due to him that the Schiller Society was formed at Dresden in 1855. The early period of his literary activity was taken up with fiction of comparatively small value, only *Einkehr und Umkehr* (1856) deserving mention; and his dramatic attempts met with little success and had not much worth. He is best known for his poetry: the popular collection of proverbs, *Schau um dich und schau in dich* (1851, 33d ed. 1892). A similar didactic tendency is characteristic of his other lyric productions, *Zu allen guten Stunden* (1854); *Fester Grund* (1857); *Auf stillen Wegen* (1859); *Lerne, liebe lebe* (1862), all republished many times. He also published a poetic version of the Psalms, *Die Psalmen der heiligen Schrift* (1861); *Unter dem Halbmond* (1860); and the religious anthology *Leben und Heimat in Gott* (13th ed. 1896). Consult Ende, *Julius Hammer* (Nuremberg, 1872).

HAMMER, THE. A popular name for Judas Maccabæus.

HAMMER AND SCOURGE OF ENGLAND, THE. A popular title for William Wallace.

HAMMER-CLOTH. A cloth which covers the driver's seat in some kinds of carriages, said to be so called from the former custom of using the box as a receptacle for tools. Another explanation of the name is that it is a corruption of hammock-cloth, the seat which the cloth covers being formed of straps or webbing stretched between two crutches, as a sailor's hammock is suspended, to secure ease of motion. A third suggestion has been made that *hammer* is a corruption of the Dutch *hemel*, canopy. Hammer-cloths are usually ornamented with fringes, and bear the arms of the proprietor of the carriage. They are old-fashioned, and now seen only on the ceremonial carriages of royalty.

HAMMERFEST, hä'mẽr-fẽst. A seaport of Norway and the most northern town in the world, situated in latitude 70° 40′ 11″ N., and longitude 23° 30′ E., on the west shore of the island of Kvalö, in a barren, treeless district (Map: Norway, L 1). The town is almost entirely built of wood. The sun is above the horizon from the 13th of May to the 29th of July. Its absence for several months in the winter has led to the extensive introduction of electric lighting, the power being derived from waterfalls. The chief occupations of the people are the production of cod-liver oil and walrus-hunting. There is an active trade with the Russian port of Archangel. Population, in 1891, 2188; in 1901, 2298.

HAMMERHEAD, or **HAMMERFISH.** (1) A shark of the genus Sphyrna, consisting of four or five species, and constituting a family, Sphyrnidæ, distinguished from all other fishes by the extraordinary form of the head, which in the adults resembles a double-headed hammer, with the eyes at the ends of the lateral extensions. The mouth is below the centre of the head. Some of the species attain a length of fifteen feet, and are very voracious. The great hammerhead (*Sphyrna zygæna*) is found in all warm seas, occurring on the coast of the United States and Europe. These sharks are ovoviviparous, and produce about 40 young at a birth. See Plate of GREAT SHARKS. (2) See HAMMERKOP.

HAMMERHEAD BAT. An extraordinary fruit-eating bat (*Hypsignathus monstrosus*), discovered about 1860 by Du Chaillu in the Gabun region of West Africa. It is about five inches long, and has the nose greatly swollen and pro-

longed, as shown in the illustration of its head on the Plate of BATS. Nothing is known of its habits.

HAMMERICH, hä'mēr-ik, MARTIN JOHANNES (1811-91). A Danish linguist and teacher, brother of Peter Frederik Adolf Hammerich, historian and theologian. He studied theology, but early showed interest and marked ability in mythology and philology; received his degree in 1836, was instructor of Sanskrit at Copenhagen from 1841 to 1844, and was head of a gymnasium at Christianshavn. His important works are: a translation of the *Sakuntala* of Kalidasa (last edition, 1879); *Om Ragnaroksmythen* (1836); *Bidrag til en Skildring af Holberg* (1858); *Ewalds Levned* (1860); *Danmark-Norges Litteratur i kort Overblik* (1864); *Thorvaldsen og hans kunst* (1870).

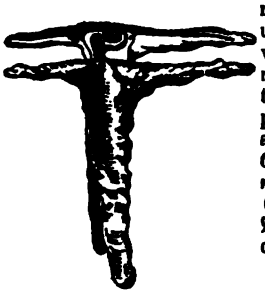
HAMMERKOP. The Dutch name in South Africa for a bird, the umbrette (q.v.), Anglicized as 'hammerhead.'

HAMMER OF HERETICS. A title applied to Saint Augustine; also to Pierre d'Arlly, president of the Council of Constance (1414-18).

HAMMER OF THE SCOTCH, THE. A popular name for Edward I. of England. It appears on his tombstone in Westminster Abbey.

HAMMER-PURGSTALL, häm'mēr pōōrg'stäl, JOSEPH, Baron (1774-1856). An Austrian historian and Orientalist, born at Gratz. He studied in the Oriental Academy of Vienna, took part in the publication of an Arabic-Persian-Turkish lexicon, and was appointed interpreter to the Internuncio at the Porte in 1799, continuing in the Austrian diplomatic service until 1817, when he was made Aulic Counselor. In 1847-49 he was president of the newly established Academy of Sciences of Vienna. Meanwhile he wrote constantly on many subjects connected with the history and literature of the Orient. He translated from the Arabic, Persian, and Turkish works previously unknown in Europe. One of his most important contributions was the *Litteraturgeschichte der Araber* (1850-56), and one of his best known, the *Diwan des Hafiz* (1812). He also wrote the *Geschichte der Assassinen* (1818), and *Geschichte der osmanischen Dichtkunst* (1836-37).

HAMMERSCHMIDT, hä'mer-shmit, ANDREAS (1611-75). A Bohemian musician, born at Brüx. In 1635 he became organist of Saint Peter's, Freiberg, and four years later accepted a like position at Zittau. He remained there for nearly forty years, and upon his death a statue was erected to his memory. His compositions were of great importance at their time, and include: *Weltliche Oden* (1650); *Chormusik fünfter Theil* (1652); *Kirchen- und Tafelmusik* (sacred concertos, 1662).



HAMMER-SHELL.

HAMMER-SHELL. An Oriental bivalve mollusk, of the wing-shell family (Aviculidæ) and genus Malleus, remarkable for the T-shape of its shells, which are expanded along the hinge-margin. It is also called 'hammer-oyster,' and the flesh is eaten.

HAM'MERSMITH. A metropolitan borough of London, Middlesex, England, on the left bank of the Thames, 6 miles west-southwest of Saint Paul's; formerly a suburban village with large nursery and market-gardening interests (Map: London, E 5). It has numerous educational and benevolent institutions and is a populous Roman Catholic centre. It is traversed by several important railways. Population in 1891, 97,283; in 1901, 112,245.

HAMMOCK. The apparatus in which a sailor slings his bed derives its name through the Spanish *hamaca*, from a Peruvian word, the custom of thus suspending a bed having been derived from Peru, where the natives fasten the two ends of a piece of canvas, or of a netting of grass twist, to the branches of a tree. A sailor's hammock consists of a rectangular piece of hempen or cotton canvas, about six feet long and three in width, gathered together at each end by means of cords and a clew, and hung to hooks under the deck. The hammock thus suspended forms a sort of bag capable of containing the sailor's mattress, his blankets, and himself, as soon as he has acquired the far from easy knack of climbing into it. The hammocks are taken below at sunset and hung in rows about two feet apart, in the men's portion of the ship. When done with in the morning the bedding is carefully tied up within each, and the whole stowed in the *hammock-netting*, which is no longer a netting, but is a locker or box-shaped receptacle, and is generally in the bulwarks of the waist.

HAM'MOND. A city in Lake County, Ind., 21 miles south by east of Chicago, Ill.; on the Grand Calumet River, and on the Erie, the Michigan Central, the Baltimore and Ohio, the Wabash, and several other railroads (Map: Indiana, B 1). With its exceptional railroad facilities, the city is of considerable importance as a commercial and manufacturing centre. The industries include extensive steel-spring and chemical works, nail-mills, a slaughtering and meat-packing plant, flour-mills, carriage-works, a distillery, starch-works, a glue-factory, brick-yards, etc. Settled in 1869, Hammond was incorporated in 1883, the charter of that date being still in operation. The government is vested in a mayor, chosen every four years, and a city council, which elects administrative officials. The water-works are owned and operated by the municipality. Population, in 1890, 5428; in 1900, 12,376.

HAMMOND, ANTHONY (1668-1738). An English pamphleteer and poet. He was born in Huntingdonshire, for which he was elected a member of Parliament in 1695. As a fluent and well-informed speaker on financial questions, he soon gained a considerable reputation, but his lack of tact stood in his way. He was twice chosen as member for Cambridge University, and in 1701 was appointed a commissioner for stating the public accounts. The following year he was made a commissioner of the Navy, under Godolphin's Administration. After another term as member of Parliament he went in 1711 to Spain as paymaster of the British forces there, but soon retired and devoted himself to literary pursuits. In 1720 he edited a *New Miscellany of Original Poems, Translations and Imitations*, and he also

published several pamphlets on political and financial subjects.

HAMMOND, EDWARD PAYSON (1831—). An American evangelist. He was born at Ellington, Conn.; graduated at Williams College in 1858, and studied theology at the Union Theological Seminary, New York, and at the Free Church Seminary, Edinburgh. After being ordained to the Presbyterian ministry in 1863, he engaged in evangelistic work in the United States, Canada, and Great Britain, and met with remarkable success. He wrote many tracts and a number of hymns for use in his work. His work is described by Headley, in *The Reaper and the Harvest* (1884).

HAMMOND, HENRY (1605-60). A learned English divine and controversial writer, born at Chertsey, Surrey. He was educated at Magdalen College, Oxford, and in 1629 became rector of Penshurst. His devotion to Charles I. cost him the living; nevertheless he continued to act as chaplain to the King until 1647, when all the royal attendants were dismissed. After that he was subdean of Christ Church, Oxford, but was soon imprisoned, and spent the rest of his life in Worcestershire. His separate works numbered fifty-eight, the most celebrated of which are the *Practical Catechism* (1644), and *Paraphrase and Annotations on the New Testament* (1653). His *Miscellaneous Theological Works* have been published (1847-50). His *Life*, by Fell, Bishop of Oxford (London, 1661), is a charming biography, and has been followed by several modern biographers.

HAMMOND, JABEZ D. (1778-1855). An American author and politician, born in New Bedford, Mass. He practiced medicine in Vermont, but afterwards studied law and followed that profession at Cherry Valley, N. Y. He was a Democratic Congressman from New York in 1815-17, a State Senator in 1817-21, and in 1825 was made a commissioner in the settlement of the claims of New York against the Federal Government. In 1838 he was elected county judge at Albany, where he had lived since 1822, and he was one of the regents of New York University from 1845 until his death. His published works include: *The Political History of New York to December, 1840* (1843); *Life and Opinions of Julius Melbourn* (1847); and *Life of Silas Wright* (1848).

HAMMOND, JAMES HENRY (1807-64). An American politician. He was born in Newberry District, S. C., graduated at South Carolina College in 1825, and was admitted to the bar in 1828. In 1830 he became editor of the *Southern Times*, published at Columbia, S. C. He entered Congress in 1835, was Governor of South Carolina in 1842-44, and was a member of the United States Senate from 1857 to 1860. Both as an editor and as a member of Congress he was a vigorous exponent of nullification and States' rights, and a defender of the institution of slavery. Several letters written by him in defense of slavery, as a reply in part to an anti-slavery circular by Clarkson, were published, with various essays advocating the same view, in a volume entitled *The Pro-Slavery Argument* (1853).

HAMMOND, JOHN HAYS (1855—). An American mining engineer, born at San Francisco. He graduated at the Sheffield Scientific School of Yale University in 1876, and after a mining course at the Bergakademie, Freiberg (Saxony), Germany, he was appointed mining expert on the United States Geological Survey and Mineral Census for the examination of California gold-fields. In 1882 he became superintendent of silver-mines at Sonora, Mexico, and later was consulting engineer to a mining company at Grass Valley, Cal. He then became consulting engineer to an iron company in San Francisco and to the Southern and Union Pacific railway companies. In 1893 he was appointed consulting engineer to the various mining companies operated by a London firm in South Africa, and later to the British South Africa Company, known as the Chartered Company, to the Consolidated Gold Fields Company, and other organizations of promoters acting in that region. While in South Africa he was connected with the Jameson raid, was tried for complicity in the revolt against the South African Republic, and was sentenced to death. This sentence was, however, commuted to fifteen years' imprisonment, and later Hammond was released by the Boer authorities upon the payment of a fine of $125,000. Afterwards he established himself in London, whence he directed mining interests in Mexico and the United States.

HAMMOND, ROBERT (1621-54). A soldier in the English Civil War. He was born in Surrey, was educated at Oxford, and in 1643 was appointed captain in one of the cavalry regiments of the Parliamentary forces which were then being organized. His career in the earlier part of the war was so creditable that he was made colonel of an infantry regiment in 1645. He was present at the battle of Naseby, and at the capture of Bristol and of Dartmouth. In the struggle which soon afterwards began between the army and Parliament, Hammond at first sided with the former, but his scruples finally compelled him to change his mind, and he resigned from military service, accepting the appointment of Governor of the Isle of Wight. King Charles I., having been led to expect that he would be befriended by Hammond, threw himself upon the latter's protection; but Parliament ordered the King to be kept in custody, a duty which the Governor performed, with many misgivings, from November 13, 1647, to November 29, 1648. In 1654 Hammond was appointed by Cromwell a member of the Irish Council, but he died in Dublin shortly after his arrival.

HAMMOND, SAMUEL (1757-1842). An American Revolutionary soldier. He was born in Richmond County, Va., and as a youth took part in Indian warfare. In the Revolution he participated in the battles of King's Mountain, Cowpens, Eutaw Springs, and other engagements. In 1803-05 he was a member of Congress from Georgia; from 1805 to 1824 was military and civil Governor of Upper Louisiana; and from 1831 to 1835 was Secretary of the State of South Carolina.

HAMMOND, WILLIAM ALEXANDER (1828-1900). An American neurologist, born in Annapolis, Md. He graduated in medicine at New York University in 1848; was assistant surgeon in the United States Army from 1848 to 1850, and surgeon from 1850 to 1860; professor of anatomy and physiology in Maryland University from 1860 to 1861; and again surgeon in the United

States Army from the outbreak of the rebellion in 1861. He was Surgeon-General of the Army, with the rank of brigadier-general, from 1862 to 1864, when he was dismissed from the service upon the charge of official corruption after trial by court-martial. In 1878 President Hayes, under authorization of Congress, reviewed the findings of the court-martial, following which action Dr. Hammond was restored to his rank and placed on the retired list as a brigadier-general. He was professor of mental and nervous diseases in Bellevue Hospital Medical College from 1867 to 1873, and occupied the corresponding chair in New York University from 1873 to 1882. In 1882 he became a founder of the New York Postgraduate Medical School, in which he was professor of mental and nervous diseases till his death. He established the *Quarterly Journal of Psychological Medicine and Medical Jurisprudence*, and was a founder of the New York *Medical Journal*. Among his published works are: *Physiological Memoirs* (1863); *Military Hygiene* (1863); *Lectures on Venereal Diseases* (1864); *On Wakefulness* (1866); *Sleep and Its Nervous Derangements* (1869); *Insanity in Its Medico-Legal Relations* (1866); *The Physics and Physiology of Spiritualism* (1871); *Diseases of the Nervous System* (1871); *Insanity in Its Relations to Crime* (1873); *Mental Work and Emotional Disturbances* (1878); *Cerebral Hyperæmia* (1895); *Fasting Girls* (1879); *Sexual Impotence in the Male* (2d ed. 1885); *Treatise on Insanity* (2d ed. 1883).

HAMMURABI, hä'mo͝o-rä'bĭ. King of Babylonia (c.2240-2185 B.C.). The dynasty to which he belonged seems to have been of Canaanitish origin. It began to reign over Babylonia B.C. 2379. Probably in the time of Hammurabi's grandfather, Apil Sin, while Sin-idinnam ruled in Larsam, an invasion of Babylonia by the Elamite Kuturnachunta took place. The date of this event is known from the statement by Asshurbanipal (B.C. 668-626) that he brought back from Susa the statue of Nana which an Elamitish king had captured 1635 years before. The conquest therefore occurred in B.C. 2285. One of Kuturnachunta's successors, Simti-Shilchak, made his son, Kutur-mabuk, lord of Yamutbal. He became a great conqueror, putting an end to Sin-idinnam's power in Larsam and apparently taking possession of Syria. His son, Rim Sin, was made viceroy in Larsam; Sin-muballat, Hammurabi's father, was driven out of Ishin. But Hammurabi himself was finally successful in expelling the Elamites, and, as recently discovered inscriptions show, extending his own power so far as to include Susa itself. He was thus a great conqueror and builder of a large empire. Yet it is as an organizer of this empire that he has become particularly famous. He not only ruled over a realm that seems to have extended from the Mediterranean into the mountains of Susiana, from the foot of the mountains of Kurdistan to the Persian Gulf, but he wisely cared for the inner development of his kingdom and established it by law. In his inscriptions he records especially the building of a large canal to bring the water of the overflow into the land of Shumir and Akkad. He also erected a great granary for the storing of wheat against times of famine. And there are numerous accounts of his building operations in the extension of temples and palaces. The social life of Babylonia in the time of Hammurabi has long been known more intimately than that of any other period of its history, thanks to the great number of contract-tablets, deeds, testaments, bills of sale, and the like that have been found. A discovery recently made by De Morgan throws an interesting light upon the laws which were recognized in the empire. A great stele, giving in 44 columns 280 edicts, was found in Susa. These laws, probably intended to be enforced in the conquered province, deal minutely with the various situations in life that must be considered in the administration of justice, and show Hammurabi to have been a wise legislator, as well as a great conqueror and administrator. This code of Hammurabi was probably followed in Syria, as well as in Susiana and in Babylonia, and it is therefore natural that many of the statutes should remind of those which found embodiment from time to time in the law codes of Israel. Consult: Winckler, *Geschichte Babyloniens und Assyriens* (Leipzig, 1892); Maspéro, *Histoire ancienne: les premières mêlées* (Paris, 1897); Rogers, *A History of Babylonia and Assyria* (New York, 1900); King, *Letters and Inscriptions of Hammurabi* (London, 1898); Winckler, *Der alte Orient*, Heft 4 (Leipzig, 1902).

HAMON, ä'môN', JEAN LOUIS (1821-74). A French genre painter. He was born at Saint Loup, near Plouha, in northern Brittany, March 5, 1821. He was educated for the priesthood, but his artistic temperament carried him to Paris, where he studied painting with Delaroche and Gleyre. He exhibited the "Tomb of Christ" in the Salon of 1848, "Equality in the Harem" in 1849, and a "Roman Poster" in 1850. In 1849 he found employment in the porcelain manufactory at Sèvres, in which work he was very successful. His enameled casket, exhibited at the London Exposition of 1851, took a medal. His "Human Comedy" (1852), and the celebrated "Ma sœur n'y est pas" ("My Sister is Not at Home") made his reputation; the latter was purchased by Napoleon III. At the Paris Exposition of 1855 he received a second-class medal and the ribbon of the Legion of Honor. In 1862 he went to Rome, and in 1865 he established himself at Capri. The last years of his life were spent at Saint Raphael (Provence), on the Mediterranean, where he died May 29, 1874.

Hamon belonged to the 'Neo-grec' or Pompeian School. His art is the logical development of that of Ingres and Gleyre; it represents modern ideas in a classical garb. It is delicate and mythical, and graceful in execution, but without real life. The Luxembourg and the Museum of Marseilles possess examples of his work, and there are several in America. Among his later subjects are: "The Muses at Pompeii" (1866); "The Promenade" (1867); and "Le triste rivage" (the "Sad Shore"), his last work, exhibited in 1873. Consult La Fenestre, "Hamon," in *L'Art*, vol. ii. (1875).

HAMP'DEN, JOHN (1594-1643). An English statesman and patriot. He was born in 1594, the eldest son of William Hampden, of Great Hampden, Buckinghamshire, and Elizabeth, daughter of Sir Henry Cromwell, of Hinchingbrooke, Huntingdonshire, aunt of Oliver Cromwell. In 1610 he was entered a gentleman commoner at Magdalen College, Oxford, and in 1613

was admitted to the Inner Temple, where he made considerable progress in the study of law. On January 30, 1621, he first entered the House of Commons as a member for Grampound. He attached himself to the party of Saint John, Selden, Coke, Pym, and those who opposed the arbitrary encroachments of the Crown; but at first took no very forward part in public business, and spoke but seldom. In the first three Parliaments of Charles I. he sat for Wendover. In 1627, for refusing to pay his proportion of the general loan which the King attempted to raise on his own authority, Hampden was imprisoned in Hampshire for nearly a year. His uncle, Sir Edmund Hampden, with whom he is sometimes confused, was one of the five knights who sued for liberty on a writ of *habeas corpus* in the famous Five Knights case. The prisoners were all set free when Charles found it necessary to summon his third Parliament. Hampden's industry in Parliament now rendered him one of its leading and most useful members; he was on most of its committees; but after the dissolution of the Parliament of 1628-29 he retired to his estate and devoted himself to study, and country sports and occupations. In 1634 Charles had recourse to the impost of ship money, claiming that it was not a tax, but a commutation for the military service, which every one owed. At first limited to London and the maritime towns, and levied only in time of war, it was in 1635 extended to inland counties in time of peace, when Hampden resolutely refused to pay it, and his example was followed by nearly the whole County of Buckingham. In 1637 he was prosecuted before the Court of Exchequer for non-payment, when a majority of the judges gave a verdict against him. The moral victory, however, was clearly with Hampden. In the Short Parliament of 1640 Hampden took a prominent part in the great contest between the Crown and the House of Commons. To the Long Parliament he was returned for both Wendover and the County of Buckingham, and made his election for the latter. For his resistance to the King's proceedings, he was one of the five members whom Charles, on January 4, 1642, rashly attempted in person to seize in the House of Commons. On the breaking out of the Civil War he raised and became colonel of a regiment in the Parliamentary Army under the Earl of Essex. He was also a member of the Committee of Public Safety. He was an excellent soldier, and constantly urged Essex to a more energetic conduct of the campaign. Some of his reputed victories over the Royalists, however, as at Aylesbury and Reading, are unhistorical. Prince Rupert having attacked a Parliamentary force at Chinnor, near Thame, Hampden joined a small body of cavalry that was rallied in haste to oppose him, and in the fight that ensued at Chalgrove Field received in the first charge a wound of which he died six days later, on June 24, 1643.

See Anthony à Wood, *Athenæ Oxonienses*, vol. iii. (Oxford, 1813-20); Clarendon's *History of the Rebellion* (6 vols., Oxford, 1888); Lord Nugent, *Memorials of John Hampden* (2 vols., London, 1832), with letters; Macaulay's essay on *Lord Nugent's Memorials of Hampden* (New York, 1861); John Forster, *Life*, in "Eminent English Statesmen," vol. iii. (London, 1837); id., *Arrest of the Five Members* (London, 1860); id., *Debates on the Grand Remonstrance* (London, 1860); id., *Sir John Eliot* (2 vols., London, 1864); S. R. Gardiner, *History of England, 1603-42* (10 vols., London and New York, 1883-84); and his *Great Civil War* (4 vols., London and New York, 1893).

HAMPDEN, JOHN (c.1656-96). An English politician, grandson and namesake of the famous statesman. By 1679 he represented his native county, Buckingham, in Parliament, but made no great sensation there, and became known more as a partisan than as a debater, while his long sojourns in France developed free-thinking tendencies. On suspicion of being implicated in the Rye House Plot, he was imprisoned in the Tower (1683), tried and condemned to death, but saved himself by appealing to the King's mercy and revealing even more than he knew. He thus lost caste with his own party, and when it gained the ascendency at the accession of William III. Hampden did not receive the honors nor the position he expected. He was defeated when he ran for Parliament, and turning despondent, committed suicide.

HAMPDEN, RENN DICKSON (1793-1868). Bishop of Hereford. He was born in Barbadoes, March 29, 1793, and educated at Oxford. Having left the university in 1816, he held different curacies, and in 1827 published *An Essay on the Philosophical Evidence of Christianity*, followed by a volume of *Parochial Sermons Illustrative of the Importance of the Revelation of God in Jesus Christ*. In 1829 he returned to Oxford and was tutor at Oriel (1832), after having twice acted as public examiner in classics. He was selected to preach the Bampton Lectures in 1832, when he chose for his subject *The Scholastic Philosophy Considered in Its Relation to Christian Theology* (London, 1833). Notwithstanding a charge of Arianism, he became principal of Saint Mary's Hall (1833), and professor of moral philosophy (1834), and in 1836 regius professor of divinity. There resulted a widespread and violent, though ephemeral, controversy, his opponents objecting to certain of his views placing the authority of the Scriptures higher than that of the Church. Later he published a *Lecture on Tradition* (1839; 5th ed. 1842), and a lecture on *The Thirty-nine Articles of the Church of England* (1842). His nomination by Lord John Russell to the vacant See of Hereford, in December, 1847, was again the signal for a violent and organized opposition, and his consecration in March, 1848, took place in spite of a remonstrance by many of the bishops and the resistance of Dr. Merewether, the Dean of Hereford. Among the more important of his later writings were the articles on "Aristotle," "Plato," and "Socrates," contributed to the eighth edition of the *Encyclopædia Britannica*, and afterwards reprinted with additions under the title of *The Fathers of Greek Philosophy* (Edinburgh, 1862). He died in London, April 23, 1868. Consult his life by his daughter (London, 1871).

HAMPDEN, RICHARD (1631-95). An English statesman. He was the second son of the famous John Hampden (q.v.), and at the age of twenty-five entered political life as member for Buckinghamshire. As an ardent supporter of Cromwell Hampden had a seat in Parliament until the end of the Protectorate, and afterwards during a considerable part of the reigns of Charles II. and James II. Inheriting the politi-

cal principles and sterling character of his father, he resisted the Stuart encroachments upon popular rights, and his fear of the religious consequences led him to advocate earnestly the measure for excluding the Duke of York, afterwards James II., from the throne. In the Parliamentary deliberations in 1689, which ended in the call of William, Prince of Orange, to the British throne, Hampden bore an important part, and upon the establishment of the new dynasty was rewarded with responsible appointments. He was made Privy Councilor, a Commissioner of the Treasury, and finally Chancellor of the Exchequer in 1690.

HAMPDEN-SIDNEY COLLEGE. A college situated near Farmville, Prince Edward County, Va.; founded in 1776, and chartered in 1783. It is under Presbyterian auspices, but is nonsectarian. It offers courses leading to the degrees of Bachelor of Arts, Bachelor of Science, and Bachelor of Literature. The attendance averages 100. The college has buildings and grounds valued at $225,000, productive funds amounting to $150,000, and an income of $13,000. The library contains some 16,000 volumes. Among its early trustees were Patrick Henry and James Madison, and among its presidents Rev. John Blair Smith, afterwards first president of Union College, New York, and Rev. Archibald Alexander, afterwards founder of Princeton Theological Seminary.

HAM'POLE, RICHARD, ROLLE OF. See ROLLE, RICHARD.

HAMP'SHIRE, SOUTHAMPTON, or familiarly HANTS. A maritime county in the south of England, bounded on the west by Dorsetshire and Wiltshire, on the north by Berkshire, on the east by Surrey and Sussex, and on the south by the English Channel (Map: England, E 5). Area, including Isle of Wight, 1466 square miles. The surface is irregular, being traversed by the North and South Downs. The principal rivers are the Anton or Test, the Itchen, and the Avon. The climate of the country is in general mild and favorable to vegetation; the climate in the south of the Isle of Wight is milder than that of any other portion of Great Britain. Hops are cultivated, and the bacon cured here is famous. Vegetable gardening is an important pursuit. Southampton and Portsmouth, both termini of important railways, are the chief centres of trade, while Winchester is the capital. The New Forest is an extensive tract in the southwest of the county. Hampshire contains many interesting relics of the early ages of English history. Of these the chief is Porchester Castle, at the head of Portsmouth Harbor. Consult Shore, *History of Hampshire* (Southampton, 1892).

HAMP'STEAD. A metropolitan borough of London, in Middlesex, England, 4 miles northwest of Saint Paul's Cathedral (Map: London, D 6). The borough has an area of 3½ square miles, over 15 per cent. of which is devoted to the finest open public grounds of the metropolis. Hampstead is the seat of several benevolent and other metropolitan institutions, has one of the finest of London town halls, municipal electric lighting, baths, and public library. It is situated on a range of hills that reach their greatest altitude of 443 feet in Hampstead Heath, which commands extensive views. It was formerly a village celebrated for its mineral springs as far back as the Roman period, and many valuable archæological finds have been made here. From early times it has been a favorite residential section, with numerous elegant mansions and villas of Londoners. It has interesting artistic and literary associations of Pope, Addison, Gay, Johnson, Byron, Keats, Leigh Hunt, Joanna Baillie, Constable, Du Maurier, and others. Hampstead Heath, with an area of 240 acres, and Parliament Hill, on the southeast with 265 acres, acquired by the London Board of Works since 1870 as public grounds, are popular and greatly frequented resorts on Sundays and holidays. Population, in 1891, 68,126; in 1901, 81,942. Consult Baines, *Records of Hampstead* (London, 1890); White, *Sweet Hampstead* (London, 1901).

HAMP'TON. A city and the county-seat of Franklin County, Iowa, 59 miles north by west of Marshalltown; on the Iowa Central and the Chicago Great Western railroads (Map: Iowa, D 2). It has a fine court-house and a public park. The city is the centre of an agricultural and stock-raising district, and is an important market for horses. Population, in 1890, 2067; in 1900, 2727.

HAMPTON. A town and the county-seat of Elizabeth City County, Va., on the north side of Hampton Roads, 2½ miles northwest of Fortress Monroe and 16 miles north by west of Norfolk; on the Chesapeake and Ohio Railroad (Map: Virginia, H 4). It is a popular resort, with good bathing facilities; and has considerable trade in agricultural produce, fish, oysters, and canned crabs. The town is the seat of the Hampton Normal and Agricultural Institute, and has the Church of Saint John (Protestant Episcopal), built in 1660, a National Soldiers' Home, with 2000 inmates, and a National Cemetery where 3323 bodies are interred, 600 of unknown dead. The government is administered under a charter of 1887 by a mayor, elected every two years, and a unicameral council. Population, in 1890, 2513; in 1900, 3521. Hampton was settled (before 1610) on the site of an old Indian village, Kiquotan, and for many years was known by that name. It was one of the original boroughs represented in 1619 in the first Virginia Legislature. During the Revolution and the War of 1812 it suffered by fire at the hands of the English, and again in August, 1861, it was burned by a Confederate force under General Magruder.

HAMPTON, JOHN SOMERSET PAKINGTON, Baron (1799-1880). An English statesman, born in Worcestershire. His father was William Russell, but he adopted his mother's name, Pakington, upon inheriting estates from her family. He received his education at Eton and Oxford, but took no degrees, and entered Parliament in 1837. In 1852 he was Colonial and War Secretary under Lord Derby, First Lord of the Admiralty in 1859, and was again appointed to the same position in 1866, when his party returned to power. He was War Secretary under Disraeli, and was made a baron in 1875. His Parliamentary labors tended toward advancement in education and freedom in religion.

HAMPTON, WADE (1754-1835). An American soldier and planter, grandfather of Gen. Wade Hampton (1818-1902). He served with distinction under Marion and Sumter in the Revolutionary War, but, as McMaster says in his *History of the People of the United States*

(vol. iv., p. 49), he "was another of that small class of officers who, after serving with credit in the War for Independence, fought with discredit in the War of 1812." Not only did he show no ability during the disastrous campaign in which he took part as major-general in Wilkinson's army, but he helped to render abortive the projected invasion of Canada in 1813 by the enmity which he displayed toward his superior. The next year he resigned his commission, and returned to South Carolina, where he became one of the wealthiest planters in the State. He was twice elected to Congress, once in 1794 and again in 1802.

HAMPTON, WADE (1818-1902). An American soldier and politician, the third of that name, born at Columbia, S. C., the son of one of the wealthiest planters in the South. He studied law at the University of South Carolina, but instead of practicing gave all his time to the management of his extensive estates. Although a Democrat in politics, he belonged to the Union rather than the States Rights wing of the party, a fact which shut him out from political preferment in a State where radicalism was so rife as it was in South Carolina. With the secession of his State from the Union, however, he entered enthusiastically into the movement for the establishment of the Confederacy, and early raised and equipped from his private means the command which, under the name of 'Hampton's Legion,' did good service for the Confederate cause throughout the war. At the head of these troops Hampton participated in the first battle of Bull Run and in the Peninsular campaign, was wounded at Fair Oaks, and soon afterwards was commissioned brigadier-general of cavalry. He took part in Lee's northward advance in 1863, was thrice wounded at Gettysburg, and was promoted major-general on August 3d following. He was engaged in opposing the advance of Sheridan in the Shenandoah Valley in 1864, where he showed such high qualities as a cavalry commander that he was in August of that year commissioned lieutenant-general and placed in command of all Lee's cavalry. Later he commanded the cavalry in Johnston's army, which opposed Sherman's advance from Savannah in 1865. After the war he entered enthusiastically into the work of building up the South and reconciling its citizens to the outcome of the struggle. In 1876 he was nominated by the Democrats for Governor, and after successfully contesting the election with his Republican opponent, Daniel H. Chamberlain, he served until 1878, when he was elected to the United States Senate. There he served by reëlection until 1891, when his opposition to the Populistic tendencies of the Tillman Democracy in his native State led to his retirement. From 1893 to 1897 he was United States Commissioner of Railroads, to which office he was appointed by President Cleveland.

HAMPTON COURT. An English royal palace, situated amid extensive pleasure grounds, on the north bank of the Thames, one mile from the village of Hampton and about 15 miles west-southwest of London. It dates from 1515, when it was built for Cardinal Wolsey, who presented it to Henry VIII. The palace is built of red brick with stone facings, and consists of three quadrangles, with some smaller courts. The great eastern and southern fronts were built from designs by Sir Christopher Wren, for William III. In the palace Edward VI. was born, Queen Jane Seymour died, and Charles I. was imprisoned. It was the occasional residence of Cromwell, and was a favorite periodical residence of the sovereigns until the reign of George II. It contains one thousand rooms, eight hundred of which in suites are now occupied by needy persons of rank in favor with the King. There is a famous picture gallery, with a valuable collection of old masters. The gardens cover 44 acres of land; one of the most notable features is the labyrinthine maze. The palace and grounds are opened daily to the public, free of charge, and constitute a popular holiday resort of the Londoners. Consult Law, *Hampton Court in Tudor, Stuart, Orange, and Guelph Times* (3 vols., London, 1885-91).

HAMPTON COURT CONFERENCE. A conference at Hampton Court, shortly after the accession of James I. to the throne of England, for the discussion of religious differences. The King presided, and was supported by Archbishop Whitgift, with eight bishops, seven deans, and two other clergymen. The Puritan party, whose demands were under consideration, were represented by four eminent clergymen of moderate views. These demands had been presented to the King in the previous year in what is known as the Millenary Petition, because it was intended to be signed by one thousand Puritan clergymen, though in fact it seems not to have been done, about seven hundred and fifty clergymen having probably signified their adherence by letter. It disclaimed schism, and, unlike former demands of the Puritan party, carefully refrained from attacking episcopacy, restricting its prayers to a purification of the ritual and the encouragement of preaching as an essential part of the service, together with greater latitude of belief for those clergymen who objected to subscribing to the whole of the Prayer-Book; and, lastly, to the reform of a few enumerated abuses, principally in matters of discipline.

There were three sessions of the Conference—on January 14th, 16th, and 18th. The petitioners were admitted to the second, in which James preserved an appearance of impartiality until the unfortunate use of the word 'presbyter' threw him into a passion, and he left the room with the declaration: "I shall make them conform themselves, or I will harry them out of the land, or else do worse." On the third day the King's decision, save for a few points entirely adverse to the petitioners, was announced in indecorously harsh language. This marks the beginning of the close connection between the bishops and the House of Stuart, and the alienation of the Puritan party.

The Millenary Petition is printed in Prothero, *Statutes and Constitutional Documents, 1559-1625*, p. 413 (Oxford, 1894), together with a few documents bearing upon the Conference. The Petition and James's proclamation for the use of the Prayer-Book are also to be found in Gee and Hardy, *Documents Illustrative of English Church History* (London, 1896). See also Gardiner, *History of England, 1603-42* (London and New York, 1883-84), i. 146.

HAMPTON NORMAL AND AGRICULTURAL INSTITUTE. An institution for the education of negroes and Indians, situated on

a plantation of 185 acres on the Hampton River, Virginia, two miles from Old Point Comfort. The school was opened in 1868 under the auspices of the American Missionary Association, with Gen. S. C. Armstrong in charge. In 1870 it received a charter from the State. It is a private corporation, administered by a board of 17 trustees of different denominations. The school has 55 buildings, including, besides dormitories and recitation-halls, a library with 11,000 volumes, a church, a hospital, gymnasium, sawmill, planing-mill, various shops, a well-equipped trade school, and a large building for domestic science and agriculture. The instruction comprises academic, trade, agricultural, domestic science, and normal courses. The Armstrong and Slater Memorial Trade School, opened in 1896, gives training in the theory and practice of carpentry, painting, blacksmithing, tailoring, and other handicrafts. The girls are instructed in housework, laundry-work, cooking, sewing, upholstery, and other home and farm occupations. A farm with barn and stock, greenhouses, and experiment station furnishes work and instruction for agricultural students. Five miles from the school is another farm of 600 acres, largely for stock, also worked by students. The expenses of tuition are met by contributions; but in pursuance of the school's policy to foster independence in the students, those who are unable to pay their board are required to make a return in labor. The young men are under military discipline, and are organized in a battalion of six companies. The school publishes a monthly paper, the *Southern Workman*, devoted to matters relating to the two races, and printed, as is all other school literature, by the students' printing department. In 1902 the school had 80 instructors and an attendance of 1079, of whom about 110 were Indians. The day school is closed from June to October, but the industrial departments continue through the summer. A normal institute is carried on during six weeks in the summer for the colored teachers of the South. Between four and five hundred attend. The institute has graduated over 1100 students, of whom 60 per cent. are engaged in teaching. At least 6000 undergraduates have gone out from the school. Of the colored students who have finished their trade studies since 1885, about 80 per cent. are either teaching trades or working at them. Many former students of both races are successful farmers or engaged in various business enterprises, while a limited number have fitted themselves for professional careers. The most noted graduate is Booker T. Washington (q.v.), of the class of 1875. The endowment of Hampton is nearly $1,100,000, and the annual income of about $165,000 is received from endowments, from the State land scrip and agricultural funds, from the Government Indian funds, from the Slater and Peabody funds, and from private benefactions, mostly in the form of scholarships.

HAMPTON ROADS. The lower part of the estuary of the James River, Virginia, where it falls into Chesapeake Bay (Map: Virginia, H 5). It is an important military point, and is defended by Forts Wool and Monroe. Its channel is broad and deep, and the harbors along its shores, especially that of Norfolk, are excellent. This fact, together with the number of railroad lines which terminate at Norfolk and other points on its shores, gives it a considerable commercial importance. During the Civil War there were two naval engagements in and near Hampton Roads. On March 8, 1862, the frigate *Congress*, the sloop-of-war *Cumberland*, the steam frigates *Minnesota* and *Roanoke*, and the ship *Saint Lawrence* were in the roadstead, when the *Virginia*, an iron-clad Confederate craft, formerly the United States steam frigate *Merrimac*, which had been seized the year before, attended by two small steamers, came from Norfolk, passed rapidly by the *Congress*, exchanging broadsides, and ran directly into the *Cumberland*, which sank in less than three-quarters of an hour. The *Congress* was disabled and set on fire, and eight hours later her magazine exploded. The other Union vessels escaped. The Union loss was 286; that of the Confederates only about a dozen. On the following day the famous contest occurred in the Roads between the Federal *Monitor* and the *Virginia*. See MONITOR.

HAMPTON ROADS CONFERENCE. In American history, an informal conference, with reference to the arrangement of a peace between the North and South, held on a vessel, the *River Queen*, near Fort Monroe, February 3, 1865, toward the close of the Civil War, between President Lincoln and Secretary of State Seward, representing the United States Government, and Vice-President Alexander H. Stephens, Senator Robert M. T. Hunter, and Assistant Secretary of War John A. Campbell, representing the Confederate States. The conference was brought about primarily by Francis P. Blair (q.v.), who conceived that the war might be closed and the two sections of the country reunited by arranging for joint action on the part of the Federal and Confederate armies against Maximilian in Mexico, with a view to the enforcement of the Monroe Doctrine and the possible absorption of Mexico by the United States, the Southern States to agree, however, to the complete abolition of slavery within their boundaries. President Lincoln refused to consent to such a conference except on the basis of union, and the Southern commissioners somewhat equivocally acceded to his terms. During the conference, which lasted for four hours, President Lincoln expressed himself in favor of the admission of the Southern States, after their surrender, to immediate representation in Congress, and stated that in regard to the confiscation acts he should "exercise the power of the executive with the utmost liberality," but that he would never modify to the slightest extent the Emancipation Proclamation, though "if the war should then cease, with the voluntary abolition of slavery by the States," he should, personally, favor the payment by the Federal Government of a fair indemnity to the former slave-owners. He disapproved, however, of the project for a joint attack upon the French in Mexico, and refused to consent to any treaty with the Confederate Government as such, or to consider any proposition for peace which did not provide for the complete restoration of the Union. The conference broke up without any agreement having been reached, and the Confederate commissioners immediately returned to Richmond. Consult: Nicolay and Hay, *Abraham Lincoln: A History*, vol. x. (New York, 1890); A. H. Stephens, *The War Between the States*, vol. ii. (Philadelphia, c.1868-70); and

Davis, *Rise and Fall of the Confederate Government*, vol. ii. (New York, 1881).

HAM'STER (Ger., from OHG. *hamstero*, weevil; possibly borrowed from Lith. *staras*, hamster). A burrowing gregarious rodent of the Old World, representing a subfamily (Cricetinæ) of the mice (Muridæ), and having the troublesome habits of the North American gophers. The group is characterized by the tuberculous crowns of the molar teeth, by the extensive cheek-pouches, and by the short, hairy tail. The hamster (*Cricetus vulgaris*) is a native of the north of Europe and of Asia, and is abundant in many parts of Germany and Poland, but rare west of the Rhine. It is of variable color, usually reddish-gray above, the belly black, the feet white, and large white spots on the sides, throat, and breast. It is larger and of stouter form than the common rat, with the tail only about three inches long. It burrows in dry soils, each individual making a burrow for itself, to which there are more entrances than one, and which also contains several holes or compartments, one of them lined with straw or hay, in which the animal sleeps. Some of the chambers are capacious enough for the storing of large quantities of seeds or other provisions, even to the amount of 60 or 100 pounds of grain or beans, which the animal carries thither in its cheek-pouches, and on which it feeds during the milder parts of winter, spending the most severe part of that season in a state of torpid hibernation. It is a great pest to the farmers, and the object of their unceasing hostility; but it is very prolific, and produces two or three broods in the year, 16 to 18 at a birth. This leads, occasionally, to their appearing in countless swarms, overrunning the fields in migrating hordes which form a devastating plague until gathering enemies and disease kill them off. The hamster feeds generally on vegetable food, as leaves, seeds, and the like, and is said also to devour small quadrupeds, birds, frogs, etc. It is a fierce and pugnacious animal, and exhibits more than the pertinacity of the bulldog. The skins of hamsters are of some value. There are several other smaller species of the genus, mostly Asiatic, and two other genera in the subfamily, both African.

HAN. A Chinese dynasty. It was founded by one Liu Pang, a soldier of fortune (born B.C. 247, died B.C. 195), who rebelled, took to soldiering, became Duke of P'ei, later Prince of Han, and after much fighting and many adventures became the acknowledged Emperor of the country, and mounted the throne about B.C. 206. The capital was at Chang-an (now Si-ngan-fu in Shen-si); but later, in the reign of the fifteenth Emperor (A.D. 25), it was changed to Lo-yang in Ho-nan. Hence the division of the dynasty into Western or Former, and Eastern or Later Han. It came to an end in A.D. 220, when the Empire became divided into 'Three Kingdoms,' one of which is known as the Minor Han (A.D. 221-264). In all fourteen emperors ruled during the Former Han, twelve during the Later, and two during the Minor Han.

One of the first acts of Kao-ti, its founder, was to abolish the tyrannical laws of his predecessors, and to establish a new code characterized by moderation and justice, and in the reign of his successors literature began to revive. In B.C. 91 appeared the first general history of the country, from the pen of Sze-ma Ts'ien, the Herodotus of China, whose works covered the period from 2697 to B.C. 104. Two hundred and twelve years later appeared the great dictionary of Hiu Shin, in which all the words in Chinese literature—about ten thousand in all—are defined and explained. Early in the dynasty the Jews entered China and established a colony in Hon-nan (see KAI-PUNG-FU), and in B.C. 121 silk was introduced into Europe. In A.D. 67 Buddhism entered China under Imperial auspices, and Taoism, under the influence of the new cult, began to take on its present forms. The practice of burying slaves with the dead was abolished and clay figures used instead, and it would appear that marionettes were invented during this dynasty. Though not without internal troubles at times, and a usurpation that threatened the continuity of succession, the Han period was one of increasing prosperity and advancing civilization and culture. Consult: Williams, *Middle Kingdom* (New York, 1883); and Giles, *Historic China* (London, 1882). See CHINESE EMPIRE.

HAN'AFORD, PHEBE ANNE (COFFIN) (1829—). A Universalist minister and author, born on the island of Nantucket. She was brought up a Quaker. She was married in 1849; was ordained a minister in 1868, and has preached with success in Massachusetts, at New Haven, and at Jersey City, and on several occasions has performed the duties of chaplain to the Legislature of Connecticut. She has also been conspicuous in temperance work. She has been a voluminous writer, having published poems, essays, addresses, stories, and lives of *Abraham Lincoln* (1865), of *George Peabody* (1870), and of *Charles Dickens* (1870). Other works include *Leonette, or Truth Sought and Found* (1857); *The Soldier's Daughter* (1866); *The Young Captain* (1868); and *From Shore to Shore, and Other Poems* (1870).

HANAU, hä'nou. The capital of a circle in Hesse-Nassau, Prussia, situated at the junction of the Kinzig with the Main, 12 miles east of Frankfort (Map: Prussia, C 3). The newer portion of Hanau was founded in 1597 by Walloons and Protestants from the Netherlands, and with this date begins the town's industrial development. The most notable buildings are the castle, formerly the residence of the counts of Hesse-Philippsthal and now owned by the city; the old Church of Saint Mary, mentioned at the beginning of the fourteenth century; the seventeenth-century Church of Saint John; the two ancient town halls, dating from the fifteenth and sixteenth centuries respectively; the seventeenth-century town hall, the theatre, and the house formerly occupied by the brothers Grimm, natives of Hanau. Hanau is an important industrial centre, and is noted for its gold and silver ware. There are also manufactures of tobacco, cigars, gloves, carpets, paper, knit ware, machinery, and chemicals. Hanau has, near by, one of the largest powder-factories in the world. There is a considerable trade in local manufactures, agricultural products, and lumber. The town possesses canal communication, and is well equipped with advanced schools and the most modern improvements. In the vicinity are situated the fine palace of Philippsruhe and the bathing resort of Wilhelmsbad, with its iron springs. Population, in 1890, 25,029; in 1900, 29,846, mostly Protestants.

Hanau is believed to have had its origin in a Roman settlement. It was raised to the rank of a city early in the fourteenth century, and was fortified in 1528. During the Thirty Years' War it was occupied repeatedly by the Swedes and the Imperial troops, and it was the scene of the last battle fought by Napoleon on German soil. This conflict, which took place on the 30th and 31st of October, 1813, resulted in the severe defeat of the allied armies under Wrede.

HAN'BURY, BENJAMIN (1778-1864). An English Nonconformist historian, born at Wolverhampton. He was employed in the Bank of England from 1803 to 1859. He devoted himself to collecting documents bearing on all Nonconformist matters, and took the most lively interest in the promotion of the cause. His works include: *An Historical Research Concerning the Most Ancient Congregational Church in England . . .* (1820); *Historical Memorials Relating to the Independents . . .* (1839); and *A Life of Calvin* (1831).

HAN'COCK. A village in Houghton County, Mich., opposite Houghton; on Lake Portage and on the Duluth, South Shore and Atlantic Railroad (Map: Michigan, E 1). A ship canal to Lake Superior affords transportation facilities also by water. Hancock is in the centre of the Lake Superior copper region, and besides several highly productive copper-mines has smelting-works, foundries and machine-shops, and other industrial establishments. Montezuma Park and a Finnish college are among the features of the village. It was settled in 1859, and in 1863 was incorporated. Under a charter of 1895 the government is vested in a president, chosen annually, and a village council, elected on a general ticket. The water-works are owned and operated by the municipality. Population, in 1890, 1772; in 1900, 4050.

HANCOCK, JOHN (1737-93). An American patriot of the Revolutionary period, president of the Continental Congress, a signer of the Declaration of Independence, and the first Governor of the State of Massachusetts. He was born at Braintree, Mass., January 23, 1737, graduated at Harvard in 1754, and was adopted by an uncle, Thomas Hancock, who in 1764 left him a fortune of about £80,000, and to whose large mercantile business he succeeded. After his graduation he spent some time in England. He was for several years one of the selectmen of Boston, and after 1766 was repeatedly elected to the Massachusetts General Court, where he steadily resisted the encroachments of the British Ministry. After the 'Boston Massacre' (q.v.) in 1770, Hancock was a member of the committee which was appointed by the people of Boston to demand of Governor Hutchinson the removal of the British troops from Boston, and on the fourth anniversary of the 'massacre' he delivered the customary commemorative oration, and by his boldness and eloquence attracted attention to himself anew as one of the leaders of the Patriot or Whig Party. In June, 1774, he was appointed by the General Court, of which he was a member, one of the representatives of Massachusetts in the first Continental Congress, and in October he was appointed chairman (later president) of the first Provincial Congress of Massachusetts, which adjourned on December 10th. He was likewise president of the second Provincial Congress, which assembled at Cambridge in February of the following year, and by his activity in this and other extra-legal proceedings incurred, with Samuel Adams, the bitter hostility of Governor Gage, whose expedition to Lexington and Concord on April 18th-19th (see LEXINGTON) was sent out in part to secure the capture of these two leaders, and who, when issuing his proclamation of pardon on June 12th, expressly excepted Hancock and Adams, "whose offenses," he said, "are of too flagitious a nature to admit of any other consideration than that of condign punishment." In defiance of the known hostility toward Hancock of the British Ministry, and partly, no doubt, with a view to winning over members of the wealthier and more aristocratic families in New England, who as a class were inclined to conservatism, and were disposed to remain loyal to the home Government, Hancock was elected president of the Continental Congress in May, 1775. Though he resigned this position in October, 1777, he remained a member of the Congress until 1780, and served again in that body in 1785-86. In 1778, as major-general of Massachusetts militia, he commanded the State troops in the Rhode Island expedition. In 1780 he was a member of the Constitutional Convention of Massachusetts, and upon the adoption of the Constitution there framed was elected first Governor of the State, in which position he was retained by annual reëlections until 1785. After an intermission of two years he was again Governor from 1787 until his death. Though at first thought to be opposed to the Federal Constitution as drawn up by the convention at Philadelphia in 1787, he presided over the Massachusetts convention which ratified that document in 1788, and used his influence to win over those who favored rejection. Concerning Hancock's character and the extent of his influence there has been much difference of opinion among historical writers; but he is now generally considered to have been a man of undoubted patriotism and of considerable ability, whose usefulness at times was impaired by his vanity and his jealous disposition. There is no adequate biography of Hancock, but considerable material bearing upon his life may be found in Abraham E. Brown, *John Hancock, His Book* (Boston, 1898).

HANCOCK, WINFIELD SCOTT (1824-86). A distinguished American soldier, born February 14, 1824, at Montgomery Square, Montgomery County, Pa. He graduated at West Point, June 30, 1844, number eighteen in a class of twenty-five, and was assigned, July 1, 1844, as a brevet second lieutenant to the Sixth Infantry, with which he served for two years in the Indian country. He was appointed second lieutenant in the same regiment in June, 1846. In the Mexican War he commanded a company at the National Bridge (August 12, 1847), and subsequently earned the brevet of first lieutenant "for gallant and meritorious conduct at Contreras and Churubusco." From 1848 to 1855 he served successively as regimental adjutant and quartermaster, and for a short time as assistant adjutant-general, Department of the West. Having shown great aptitude in all staff details, he was appointed captain and assistant quartermaster in November, 1855, and was assigned to duty in Florida. He accompanied General Harney to Kansas, serving during the

border troubles there, and in 1855 was ordered to proceed to Utah, arriving at Fort Bridger with his wagon-train after a march of 700 miles in 26 days. At this point he found his old regiment under orders to march overland to California. He was directed to accompany it, in charge of the transportation. Organizing and equipping a train of 128 wagons, from inferior materials, he conducted it safely over a rough trail of 1100 miles to its destination, at Benicia. From May, 1859, to August, 1861, he was chief quartermaster on the Pacific Coast, with headquarters at Los Angeles.

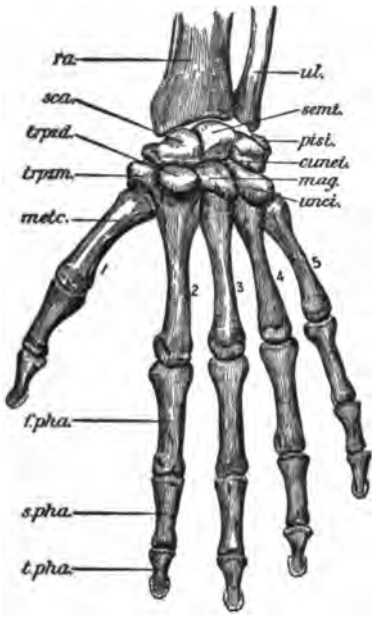
At the outbreak of the Civil War Captain Hancock was among the first to be appointed to the grade of brigadier-general of United States Volunteers, his commission being dated September 23, 1861. Assigned to command a brigade in Smith's Division, Fourth Corps, Army of the Potomac, he first led it in action at Williamsburg, Va. (May 5, 1862), where he earned the mention, in General McClellan's dispatches, that "Hancock was superb." At Antietam, upon the death of General Richardson, he was placed in command of the First Division, Second Corps. In November, 1862, he was promoted to be major-general United States Volunteers. At Fredericksburg, Va., December 13, 1862, his new command suffered a loss of 40 per cent., including 150 officers killed and wounded. The battle of Chancellorsville (May 2-4, 1863) was to a great extent prevented from becoming a total rout of the Federal forces by the steadiness of Hancock's division. Soon afterwards the command of the Second Corps was given to him. On the morning of July 1, 1863, the advance of Lee's army, having encountered the left wing of the Army of the Potomac in front of Gettysburg, was steadily pressing it back, with the loss of its commander, Reynolds. General Meade ordered Hancock to proceed to the battlefield, assume command there, and virtually to decide at his discretion whether the Army of the Potomac should meet the Army of Northern Virginia at that time and place. Hancock arrived on the field at 3.30 P.M., to find the Confederates massing their forces for a farther advance while confronted by the depleted lines of the Federal Army. He quickly infused confidence among the troops, reformed the Federal lines, and in various ways so strengthened his position as to deter General Lee from making his contemplated attack. On the following day, during the nearly successful attempt of Lee to turn the flanks of the Federal Army, Hancock was placed in command of the left wing, and, by judicious handling of his men and gallant personal effort, stemmed the tide of battle. On the third day a Confederate charge was directed against Hancock's command, the Federal centre, and succeeded in penetrating the first line, but was finally repulsed. Each side suffered terrible losses, and Hancock received a wound from which he never entirely recovered. In March, 1864, he resumed command of his corps, which, in the reorganization of the army under Grant, was reënforced by the transfer of two divisions from the Third Corps, making an aggregate strength of 43,055. Hancock was distinguished by the energy, good judgment, and tactical skill displayed in the Wilderness campaign. The unfortunate engagements in front of Petersburg and at Ream's Station were the first occasions in which his command met with reverses. On August 12, 1864, he was promoted to be brigadier-general in the Regular Army, and in November he was placed in command of the Middle Military Division. He received his commission as major-general in the Regular Army on July 26, 1866. He was then sent to command the Department of Missouri, with headquarters at Fort Leavenworth, and during the year 1867 personally led an expedition against the Indians. In August of that year he was sent to New Orleans to supervise the rehabilitation of the States of Louisiana and Texas. In a general order he defined his duty, stating that "crimes and offenses committed in this district must be left to the consideration and judgment of the regular civil tribunals," but added that "armed insurrection or forcible resistance to the law will be instantly suppressed by arms." His conservative course not meeting with the support from the Washington authorities which he expected, he was at his own request relieved, and assigned to command the Military Division of the Atlantic, with headquarters at Governor's Island, where he remained until March, 1869, when he assumed charge of the Department of Dakota. In 1872 he was reassigned to the Division of the Atlantic. While acting in this capacity, General Hancock was in 1880 made the Democratic nominee for President of the United States, but was defeated by his Republican opponent, Garfield. General Hancock died at Governor's Island after a brief illness, on February 9, 1886. In 1850 he married Miss Almira Russell, of Saint Louis, by whom he had two children. Consult: Walker, *General Hancock* (New York, 1894), in the "Great Commander Series;" and id., *History of the Second Corps* (1886).

HANCOCK HOUSE. The former residence in Boston of Governor John Hancock. It was erected in 1737 and taken down in 1863.

HAND (AS., Icel. *hond*, Goth. *handus*, OHG. *hant*, Ger. *Hand;* perhaps connected with Goth. *hinpan*, AS. *hentan*, to seize). The terminal portion of the superior limb of man. It is almost invariably distinguished by name from the same organ in other vertebrate animals; but actually there is little essential difference, and it is legitimate and proper, therefore, to speak of the terminal part of the fore limb of any quadruped as the 'hand' or *manus*, in distinction from the 'foot' or *pes*. We will first consider the human hand, and afterwards its homologue in the lower animals.

"That," says Cuvier, "which constitutes the *hand*, properly so called, is the faculty of opposing the thumb to the other fingers, so as to seize upon the most minute objects—a faculty which is carried to its highest degree of perfection in man, in whom the whole anterior extremity is free, and can be employed in prehension." The peculiar prehensile power of the human hand is chiefly dependent upon the length, power, and mobility of the thumb, which can be brought into exact opposition to the extremities of all the fingers, whether separately or grouped together. The general arrangement of the bones of the arm is similar to that of the leg. The *humerus* or arm-bone corresponds to the *femur* or thigh-bone; the lower end of the humerus is connected with the two bones of the forearm, the *radius* and the *ulna*, which correspond with the two bones of

the leg. Then come the *carpal* bones, the *metacarpal* bones, and the *phalanges*, as we have *tarsal* bones, *metatarsal* bones, and *phalanges* in the foot. We have a diagram showing the way in which the bones of the hand are arranged. The carpal bones are eight in number, and are arranged in the wrist in two rows. The first or upper row consists practically of three bones, the scaphoid, semilunar, and unciform, the fourth, the pisiform, being regarded as belonging to the class of *sesamoid bones* (q.v.), and the second row of four bones, trapezium, trapezoid, os magnum, and unciform; so that, excluding the pisiform bone, the carpal and the tarsal bones correspond in number. As we commonly term the palm the *front* of the hand, the thumb becomes conventionally the *outer*, and the little finger the *inner*, digit; but according to the rules of comparative anatomy, and in order to compare the hand and foot, we ought to reverse these terms. The outer of the carpal bones of the first row supports the bones of the thumb and forefinger, and constitutes with them the *outer* division of the hand. The inner of the carpal bones bears the little and the next (the ring) finger, and constitutes with them the *inner* division of the hand; while the middle one bears the middle finger, and belongs to the *middle* division of the hand. The two outer bones are connected with the radius, while the inner bone is connected (indirectly by a thick ligament) with the ulna.



LEFT HAND (dorsal surface).

ra., radius; *ul.*, ulna; *sca.*, scaphoid; *semi.*, semilunar; *pisi.*, pisiform; *cunei.*, cuneiform; *trpzm.*, trapezium; *trpzd.*, trapezoid; *mag.*, magnum; *unci.*, unciform; *metc.*, metacarpal; *f.pha.*, first phalange; *s.pha.*, second phalange; *t.pha.*, third phalange.

Collectively, the carpal bones are so arranged that the carpus presents a dorsal convex surface, upon which the tendons of the extensor muscles of the fingers play, and a palmar concave surface, on which the tendons of the flexor muscles lie. The several bones are joined to one another—each bone being united to three or more others—by a large extent of surface, and are girded together by strong ligamentous bands. The wrist is thus as strong as if it had been constructed of one solid piece of bone, while the slight gliding movements which occur between the several bones give it an elasticity which serves to break the shocks that result from falls upon the hand. The uppermost surface of the first row of carpal bones is convex, and this convex surface is received into a wide cup or socket, formed by the lower articular surface of the radius, and by a ligament passing from that bone to the ulna. The metacarpal bones and the phalanges require no special description. Like the great toe, the thumb has only two phalanges, while each of the other digits has three.

We shall now notice the various movements of which the hand is capable. They may be divided into (1) the different directions in which the hand collectively can be moved, and (2) the movements of which the hand itself, without reference to the arm, is capable. The *scapula* or shoulder-blade, with which the principal arm bone articulates, is itself movable to a very considerable extent on the surface of the ribs on which it rests. Again, the socket in which the nearly spherical head of the *humerus* or arm-bone lies is very shallow—not unlike the cup in the well-known toy *cup-and-ball*—and the arrangements of the shoulder-joint generally are such as to permit so great a variety and so extensive a range of movements that we are able to apply the hand to every part of the body. This freedom of motion is due in a great degree to the clavicles or collar-bones, which, by steadying the shoulder-blades and keeping the shoulders apart, afford a fixed point for the various muscles which we employ in raising the arms, in folding them over the chest, in the act of hugging, etc. The movement at the next junction of bones, the elbow-joint, is very different from that at the shoulder. The latter is termed, from its construction, a ball-and-socket joint, and admits of motion in all directions within definite limits; while the elbow is a hinge joint, and merely admits of bending and straightening, or, in other words, of motion in one plane. We have next to consider a class of movements of the forearm and hand, to which there is nothing analogous (at least to any material extent) in the leg. The movements in question are called 'pronation and supination.' In *pronation* (from Latin *pronus*, with the face downward), we turn the palm of the hand downward, as in picking up any substance from the table; in *supination* (from Latin *supinus*, with the face upward), we turn the palm upward, as for the purpose of receiving anything that may be placed in it.

These movements of pronation and supination are so important to the usefulness of the hand that we must notice the three muscles by which they are chiefly effected. One of the three muscles passes from a projecting process on the inner side of the arm-bone, at its lower end, to the outer edge of the middle of the radius. Its contraction causes the radius to roll over, or in front of, the ulna. It thus pronates the hand, and is called a *pronator* muscle. Another muscle passes from a projecting process on the other side of the arm-bone to the inner edge of the radius near its upper part. It runs, therefore, in an opposite direction to the former muscle, and

produces an opposite effect, rolling the radius and the hand back into the position of supination. Hence it is called a *supinator* muscle. The third is a very powerful muscle, termed the *biceps* (q.v.), which not only bends the elbow, but, from the mode in which its tendon is inserted into the inner side of the radius, "also rotates the radius so as to supinate the hand; and it gives great power to that movement. When we turn a screw, or drive a gimlet, or draw a cork, we always employ the *supinating* movement of the hand for the purpose; and all screws, gimlets, and implements of the like kind are made to turn in a manner suited to that movement of the right hand, because mechanicians have observed that we have more power to supinate the hand than to pronate it." Supination can only be performed to its full extent by man, and even in man it is not the natural or habitual position; monkeys can partially effect the movement, and in most of the lower animals the part corresponding anatomically to the hand is constantly in a state of pronation.

The movements of which the hand itself, without reference to the arm, is capable, are very numerous, and in this respect differ considerably from the corresponding movements of the foot. Thus we can bend the fingers down upon the palm, or we can extend them beyond the straight line; we can separate them from one another to a considerable extent, and we can close them with considerable force. The wrist and hand are bent forward or flexed upon the forearm by three muscles, which pass downward from the inner condyle or expanded end of the humerus, and are termed the *radial flexor*, the *ulnar flexor*, and the *long palmar* muscles. The first two of these muscles are inserted into wrist-bones on the radial and ulnar sides respectively, while the third expands into a fan-like *fascia* or membrane in the palm of the hand, and thus serves both to support the skin of the palm and to protect the nerves and vessels which lie below it. Beneath the palmar fascia lie two sets of *flexor* muscles of the fingers, and they present so beautiful a mechanical arrangement as to merit special notice.

The *superficial* or *perforated flexor* muscle passes down the front of the forearm and divides into four tendons, which become apparent after the removal of the palmar fascia, and are inserted into the second phalanges of the fingers, each tendon splitting at its termination, to give passage to the similar tendons of the *deep* or *perforating flexor* muscle, which passes from the upper part of the ulna to be inserted into the last phalanx of each finger. These *flexor* muscles are antagonized by the *common extensor* muscle of the fingers, which, like the flexors, divides into four tendons, one for each finger. Besides these, there are a special *extensor* of the index-finger, a series of muscles forming the ball of the thumb, which move that organ in almost every direction, and various small slips giving lateral and other movements to the fingers.

The hand possesses marvelous adaptability to a great variety of uses. The fingers are fitted for grasping small objects, or for suspending the body from a horizontal bar. The hand may be made into a cup for conveying fluid to the mouth, or extended rigidly, as when swimming. A small needle may be used with great precision and delicacy in the same hand that wields a heavy sledge-hammer or holds a taut rein over the back of a turbulent horse. The great flexibility of the fingers and their capacity for training in accurate work is seen in their use in playing upon the violin or the piano. Some of the commonest daily uses of the hand consist of very intricate and complex working of groups of muscles in which coördination is exact. Controlling the pencil in drawing or writing, and rolling a cigarette may be cited as examples. It is not strange, in view of its adaptability and capacity for such accurate adjustment, that the hand was thought in old times to be a reservoir of special force which passed out of it upon occasion. The 'laying on of hands' for the cure of the sick, or for the transmission of a beneficent influence, is as old as the Scriptures; and the touch of royalty was supposed to possess special virtue in healing scrofula, or 'king's evil.'

The markings in the palm of the hand are supposed to be indications of the character and temperament, and disciples of palmistry (q.v.) believe they can read the secrets of the future in the records of palmar lines and folds. The papillæ on the skin of the finger-tips are arranged in concentric or ovoid lines. Probably these lines are never identical in different individuals. It is said that the Chinese use an impression of the papillary lines on the pulp of the thumb-tips as a means of identification; and it was seriously proposed in this country to add to the measurements of criminals by the Bertillon method impressions of their thumbs as an additional standard of comparison and identification. The investigations of Francis Galton (q.v.) in this respect were noteworthy. Fingers differ much in their size and model, and give hands different expressions. From the natural position of the hand at rest may be inferred much concerning the temperament, genius, and mentality of its owner. This fact is well stated in Warner's *Physical Expression* (New York, 1886), from which we reproduce several types of hands. Right-handedness is a natural condition, for which several causes have been assigned, no one of them being convincing. It has been considered due to a larger arterial supply to the right side; to "an innate tendency to a predominance of nutrition on the right side in fœtal life" (Breschet); to the position of the fœtus *in utero;* and to the assumed fact that the centre of gravity of the body lies on the right side. Left-handedness occurs in about 9 per cent. of human beings.

There are many congenital and developmental anomalies encountered in a study of hands. In some rare cases the hand is wanting altogether. This condition is termed 'acheiria.' If one or more fingers be missing, the condition is termed 'ectrodactylism.' 'Hypophalangism' is the name given to the condition in which the number of phalanges in a finger is less than normal. 'Polycheiria' denotes a supernumerary hand; 'polydactylism,' a supernumerary finger; 'polyphalangism,' the condition in which the number of phalanges in a finger is greater than normal. The union of fingers together, web fingers, or 'syndactylism,' also occurs; as well as cleft-hand, club-hand, and other deformities. In the disease acromegaly (q.v.) an enlargement of the hands takes place. Changes in the fingers and hands occur in many other diseases, as in myxœdema and syringomyelia (qq.v.). In pulmonary tuber-

culosis the extremities of the fingers are bulbous, or clubbed, from change in the condition of the peripheral circulation.

Consult Gray, *Anatomy, Descriptive and Surgical* (London, 1897).

HAND, Comparative Anatomy of the. In birds the hand has been so profoundly modified for flight that it is considered as a distinct sort of organ—the 'wing.' Among Amphibia we find the tailed forms have the hand constructed on the same general plan as the foot; it thus consists of digits, palm, and wrist; or, in terms of the skeleton, phalanges, metacarpals, and carpals, the latter the equivalent of the tarsals of the foot; in all amphibians there are four digits on the hand, except in three genera which have only two or three, but the number of phalanges differs considerably. The Urodela have a carpus of nine bones, a centrale, radiale, ulnare, intermedium, and five carpales; but in the Anura the intermedium is wanting. Among reptiles we find a general resemblance in the hand to that of the Urodela, though the digits bear claws or nails, which are always wanting in the Amphibia; crocodiles have no intermedium, and the carpales are only partially developed.

Among mammals we find a very great variety in the form and uses of the hand, the number of functional digits varying from one to five, though the number of phalanges is remarkably constant, for except in Cetacea there are two in the first and three in each of the others. In monotremes and marsupials the hand possesses no peculiar features worthy of special note, though in Echidna it is very stout and powerful, while among kangaroos it is rather small and comparatively feeble. The hands of the Edentata are remarkable for the reduction in the number of digits to four, three, or even two, and the long and very strong claws which they bear. In the Ungulata we find an even stronger tendency toward suppression of digits, for there are never more than four, and usually there are only two, sometimes only one, functional. In this order the hand resembles the foot (q.v.) so closely that it is not necessary to repeat here the various modifications; suffice it to say that the tapirs have four digits on the hand and only three on the foot, and that the metacarpals of the camel are separated by a deep cleft. In the Sirenia there are only four digits, and these are united by the integument to form paddles and bear only rudimentary nails. The Cetacea also have the hands transformed into paddles; but the carpus is made up of polygonal bones, the phalanges are numerous, and there are no nails. The hand of the Carnivora has never less than four digits, and they always bear claws, usually sharp and curved, and in cats retractile. The hand of the elephant is remarkable for being larger than the foot, and for its very short and thick carpal, metacarpal, and phalangeal bones. Hyrax has four toes on the hand, but only three on the foot, and the nails are nearly flat. The Rodentia have rather small, often weak hands, with five clawed digits, while the Insectivora have rather stout hands, especially the moles. Of all mammals, bats have the most profoundly modified hands, since with them, as with birds, flight is the object in view. There is only one bone in the proximal series of the carpus, and the metacarpal bones and phalanges are greatly elongated to form the framework for the wing, which consists of a delicate membrane stretched between the digits and the foot. There are five digits, but only the first two (sometimes only the first) are provided with claws. Among the Primates we find a hand more nearly like that of man, the digits being provided with flat nails, and the first digit being opposable to the others and thus forming a true thumb. The marmosets, however, have sharp curved claws, and the thumb is not opposable. Of all mammals, the gorilla has a hand most like that of man.

Consult: Wiedersheim, *Comparative Anatomy of Vertebrates* (New York, 1886); Huxley, *Anatomy of Vertebrated Animals* (New York, 1886).

HAND, Edward (1744-1802). An American soldier of the Revolution, born at Clyduff, Kings Co., Ireland. He came to America in 1774, and practiced medicine in Pennsylvania until the outbreak of the Revolution, when he served at the siege of Boston as lieutenant-colonel in William Thompson's brigade. In 1776 he was appointed colonel. He served in the battles of Long Island and Trenton in 1777; was promoted to brigadier-general; succeeded John Stark at Albany (1778); and took part in Sullivan's campaign against the Six Nations. He was in command of a brigade of light infantry (1780), and soon after succeeded Scammell as adjutant-general; in 1798 Washington recommended him to a like post for the war with France. He was elected to Congress (1784), and was a signer of the Pennsylvania Constitution (1790).

HANDBALL. A variety of 'Fives' practiced in the United States chiefly on account of its physical benefits in training for contests of endurance, though it is also one of the sports under the regulations of the Amateur Athletic Union. In its simplest form it consists of scoring the ball against a single back wall, with a lined-out space in front; but in its home, Ireland, the court or 'alley' on which it is played has also side walls extending the length of the court (60 feet). The floor is 60 × 28 feet, and about the centre of it, parallel with the end wall, a line is drawn called the 'short line.' Sixty feet from the end wall another line is drawn, called the 'over line,' and every service coming off the wall must fall between these two lines to be in play. The game is started by one player 'tossing' out the ball on to the ground and hitting it on the rebound, with his hand, against the end wall. If it falls inside the short line, and the other player fails to return it, it counts an 'ace' to the server. Should it be returned and the original server fail to return it, it is a 'hand out.' Then the service changes, and the game goes on alternately. The game is won by the player who first gets 15 or 20 aces, as agreed.

HAN'DEL, George Frederick, Ger. Georg Friedrich Händel, hĕn'del (1685-1759). A famous German musical composer, chiefly renowned for *The Messiah*, still the most popular of oratorios. He was born at Halle an der Saale, February 23, 1685. His father, a barber, and afterwards a surgeon, at Halle, so opposed the development of his son's musical proclivities that the lad was obliged to practice at night upon a small clavichord secretly placed in the attic, when the rest of the family were asleep. A visit paid with his father in 1692 to a stepson in the service of the Duke of Saxe-Weissenfels

had important results. Whenever, during this visit, young Handel found opportunity, he stole into the ducal chapel and played upon the organ. The Duke, chancing to hear him, questioned him, and learning of his father's opposition, persuaded the latter to abandon his intention of making a lawyer of the boy. As a result, on returning to Halle, Handel began a thorough study of music under Zachau. Going to Berlin in 1696 to pursue his studies further, he became acquainted with Ariosti and Buononcini.

In 1703 he took a modest position in the orchestra of the Hamburg Opera House, but soon astonished the public by the skill with which he presided at the harpsichord during the temporary absence of the renowned Keiser. At this time he also applied for the post of organist at Lübeck; but learning that one of the stipulations in the competition was that the successful candidate should marry the daughter of the retiring organist, he withdrew. At Hamburg he formed a friendship with Mattheson, and when, in 1705, Handel produced his first opera, *Almira*, Mattheson took the chief rôle.

Visiting Italy, Handel produced in Florence the opera *Roderigo*, and in Venice *Agrippina*, which he composed in three weeks, and which was received with enthusiasm. He met Scarlatti, who so greatly influenced Handel's subsequent works, Gasparini, and Lotti, and in Rome became the intimate of Cardinal Ottoboni. In 1709 he took service with the Elector George of Hanover (afterwards George I. of England).

In 1710 Handel went to England, where he spent practically the rest of his life. There the taste for Italian music was on the increase, and his *Rinaldo* achieved great success. The opera was patched together from his earlier works in fourteen days, and would have been finished sooner had the translator of the libretto been able to keep pace with him. The score contains the familiar "Lascia che io pianga," still a very popular concert number. The year 1713 saw the production of his "Te Deum" and "Jubilate," in celebration of the Peace of Utrecht. They brought him a life pension of £200. When George I. ascended the English throne, Handel, though previously in his service, avoided him. He feared his Utrecht music might have offended the former Elector, as the German Protestant princes had not regarded the treaty with favor. But his "Water Music," performed during the Thames fête, led to a second annuity of £200. For three years, beginning 1718, Handel was musical director to the Duke of Chandos, and during that time composed, among other pieces, the two Chandos "Te Deums" and the twelve Chandos anthems. From this time also dates "The Harmonious Blacksmith," which he is said to have written after having taken refuge in a smithy during a storm. During the perjod from 1720 to 1740, Handel, spurred on by the rivalry of Ariosti and Buononcini, produced over a score of excellent operas. The fact that their instrumentation was not fully written out, and the change in the style of opera demanded in England, has prevented these works from receiving their just appreciation; but it is beyond cavil that they were superior to the compositions of his contemporaries, and were scarcely inferior to his oratorios.

Handel's career in England should have been uninterruptedly prosperous, but he ruined himself financially by undertaking, in rivalry with Buononcini, whom he finally vanquished, the responsibilities of operatic management as well as of composition. He, however, retrieved his fortunes by his oratorios. In January, 1739, he produced *Saul*, followed in April by *Israel in Egypt*, but although both oratorios were highly praised they met with no popular favor at the time. The latter is considered by many even superior to his famous *Messiah*. *The Messiah* was produced in the autumn of 1741 in Dublin. At the first London performance, March 23, 1743, in Covent Garden, when the "Hallelujah Chorus" was reached, the King and the whole audience rose, and thus established a custom which continues to this day. George II.'s victory at Dettingen was celebrated by Handel with the "Dettingen Te Deum and Anthem." In 1752 his eyesight began to fail, and he became totally blind. He, however, continued to accompany his oratorios on the organ, and did so at a *Messiah* performance only eight days before his death, which occurred April 14, 1759. He is buried in Westminster Abbey.

Though of liberal disposition and much interested in charity, Handel was at times choleric. Quarrels with his singers had much to do with his failure as a manager.

Handel's service to music lies largely in the grace and freedom with which he handled the musical forms of his day, especially as compared with the severer Bach, of whom he was a contemporary. Though Bach is now acknowledged to be far the greater, the fact that their immediate successors took them both for models gave greater variety and plasticity to the development of music. Handel founded no school; he lacked the genius for creating new forms, or for revolutionizing existing musical conditions. His choral work, especially in *Israel in Egypt*, *The Messiah*, and *Solomon*, is great because of the massive effects he obtains by apparently simple means, though in reality many of the choruses are worked out with infinite detail. Greater musicians have superseded him in the fields of operatic and instrumental composition, but in oratorio he is still supreme. It has been shown that on occasion he helped himself to the music of other composers, but he was original enough to borrow without losing esteem. Beethoven greatly admired his music, and during his last illness found enjoyment in looking over a new edition of Handel's works. See ACCOMPANIMENT.

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HANDEL AND HAYDN (hĭ'd'n) **SOCIETY.** See CHORAL SOCIETIES.

HANDELMANN, hän'del-mân, GOTTFRIED HEINRICH (1827-91). A German historian and antiquary, born at Altona, and educated at Kiel, Heidelberg, Berlin, and Göttingen. His first historical work was *Die letzten Zeiten hanischer Uebermacht im skandinavischen Norden* (1853).

With his friend Theodor Lehmann he edited *Jahrbücher für die Landeskunde der Herzogtümer Schleswig-Holstein und Lauenburg* (1858-63). After several years devoted to American history, he turned his attention again to German antiquities, especially in his own province. In 1866 he was made professor at Kiel and conservator of the antiquities of Schleswig-Holstein. Handelmann's other historical works include: *Geschichte der Vereinigten Staaten* (2d ed. 1860); *Geschichte der Insel Haiti* (2d ed. 1860); *Geschichte von Brasilien* (1860); *Die dänische Réunionspolitik um die Zeit des Siebenjährigen Kriegs* (1866, 1870).

HAN'DEL SOCIETY. (1) A society formed in England in 1843 for the purpose of publishing Handel's works. Its object was accomplished between 1843 and 1858. The society, however, was dissolved in 1848. (2) A German society formed at Leipzig in 1856, which under the editorship of Chrysander has issued Handel's works in 100 folio volumes (1856-94).

HANDFASTING (AS. *handfæstnung*, a clasping of the hand, from *hand*, hand + *fæstnung*, fastening, from *fæstnian*, to fasten, from *fæst*, OHG. *fasti*, Ger. *fest*, fast, firm). An ancient ceremonial of betrothal, which prevailed extensively in Western Europe during the early Middle Ages, and which consisted in the plighting of troth and the clasping of hands in the presence of witnesses. It belonged to the class of betrothals known as *sponsalia per verba de presenti*. In Scotland the practice of handfasting developed into an irregular form of marriage of a temporary character, good for a year and a day. At the end of that time the relation came to an end or was made permanent by a ceremonial marriage. See BETROTHAL; MARRIAGE.

HAND GRENADE. A shell designed for throwing with the hand. In various forms they were used for many hundred years; at first, as mere envelopes containing incendiary composition, and afterwards as explosive shells. The invention of the shell-gun caused them to fall into disuse, and upon the advent of the modern high-powered fast-firing gun, which stopped hand-to-hand fighting, they disappeared entirely. See GRENADE.

HANDICAPPING (from *handicap*, apparently *hand i' cap*, in allusion to the drawing of lots from a cap). In all contests dependent upon strength and skill there will be some so superior that if they start under equal conditions with the other contestants they must always win. The consequence of this, if unrestricted, would be to deter other contestants; whereby not only would the sport be limited to these few, but the second class of players would lose the benefit of playing with them, and learning from them the highest class in form. To remedy both these evils recourse is had to handicapping, i.e. an extra burden is placed upon, or a special requirement made of, a superior competitor, in favor of an inferior, in order to make their chances of winning equal.

In all sports wherein the competitors are to meet as members of the same association, careful note is taken of the performances of every man, as they occur, i.e. the number of times he competes against other members of it, against whom it is and by what margins he wins.

In speed foot-races, in swimming, and in similar point to point contests, the slower performer in a handicap race has so much start ahead of the man whose past performances have put him in the first class, and therefore has a shorter distance to travel than his expert rival. In lawn tennis the players are handicapped by giving or owing strokes, or by giving *bisques*. In cricket handicapping is usually accomplished by allowing a large number of players to the inferior team, 11 men playing against 18 or 22. In horse-racing on the flat, the horse which has proved himself in the past by his performances, or who by age or size or sex is naturally superior, is, where handicapping is resorted to, required to carry a heavier jockey, or to have weights placed on the saddle which, with the jockey's weight, will effect the same object. In polo, as practiced in America, the different players are handicapped by an allowance or penalty of so many goals, i.e. in matches the teams whose aggregate handicaps are less than those of their opponents are allowed the number of goals which is the difference between them and their opponents. In yachting, the boats and their sails are measured, and the boats whose hull and sails are the largest have to make an allowance which is deducted at the end of the race from the actual time which it has taken to sail over a given course. In chess and draughts certain 'men' are allowed to the inferior player, and in billiards the better of two players allows a certain number of 'points' so as to equalize the game. These are the principles of handicapping; their application is an inexhaustible subject.

HAND LEAD. A small lead, weighing from 5 to 15 pounds, used for sounding in shallow water. Since the general adoption of the Thomson sounding-machine leads weighing more than 15 pounds are seldom used. See LEAD.

HAND ORGAN. See BARREL ORGAN.

HANDS, IMPOSITION OF. The ceremony employed in religious use, both ancient and modern, to symbolize the conferring of certain inward spiritual gifts. Aaron and his sons were directed to lay their hands upon the heads of the victims which were to be offered in sacrifice (Ex. xxix. 10, 15, 19). By a similar ceremony Moses set Joshua apart as the leader of the people (Num. xxvii. 23). Christ was entreated to heal the ruler's daughter (Matt. ix. 18) by the same action, and He Himself adopted it in blessing children (Matt. xix. 15). It is apparent from the New Testament that it was considered from the beginning of the Christian Church to convey spiritual grace, specifically the gift of the Holy Ghost (Acts viii. 17; I. Tim. iv. 14). It was accordingly employed in confirmation, ordination, and the reconciliation of penitents. The name *chirothesia* was used for the actual laying on of hands, while that of *chirotonia* designated the mere symbolic extension of the hand where the recipients of the grace were more than one. The imposition of hands is retained in the Roman Catholic and Anglican communions in confirmation and ordination, for the latter purpose among the Presbyterians also; while in the modern Roman Catholic Church the mere authoritative lifting of the priest's hand has taken the place of the former actual contact in absolution.

HANDSAW-FISH. A name in California, translating the Spanish *serra*, for the local lancet-

fishes, in reference to their rows of sharp teeth. See LANCET-FISH.

HANDSEL (AS. *handselen*, Icel. *handsal*, delivery into the hand, from *hand*, hand + AS. *selen, sylen*, Icel. *sal*, Eng. *sale*, a giving, from *sellan, syllan*, to give, OHG. *sellan*, Eng. *sell*). A transaction of sale or barter of chattels or the striking of a bargain, evidenced by the shaking of hands—an ancient ceremonial which can be traced in many systems of primitive law. Its modern form is the giving of earnest (q.v.). The term is also sometimes used to denote earnest-money, or part payment, by way of binding a bargain. In Scotland it popularly signifies a first transaction in trade, as, for example, the first sale effected in the day or week; and is likewise employed to signify a present in the nature of a New Year's gift on the first Monday in the year —hence called Handsel Monday.

HANDSOME SWORDSMAN, THE. See BEAU SABREUR.

HANDSWORTH. A suburban municipality of Sheffield, in Yorkshire, England, three miles east-southeast of that town (Map: England, E 3). It is noted for its extensive manufacturing industries. Population, in 1891, 10,300; in 1901, 14,150.

HANDSWORTH. A manufacturing town of Staffordshire, England, a suburb of Birmingham (Map: England, E 4). It has undergone extensive improvements, and has a number of public works. Population, in 1891, 32,750; in 1901, 53,000.

HANDWRITING. The authentic signature or other writing of a person by his own hand. Modern law, which makes the validity of many legal acts depend upon their being committed to writing and subscribed by the party to be charged thereon, has conferred great importance upon the handwriting of the signature of legal instruments, and where such handwriting is in dispute, it must often be proved by the evidence of third persons. This is effected by calling a witness who either saw the individual write the identical words, or who by correspondence, or by having previously at other times seen the same person write other papers, can swear that the paper is the handwriting of the individual to whom it is attributed. It will be noticed, however, that unless the making of the writing in question was actually observed by the witness, his testimony will belong to the class of opinion evidence, the probative force of which is very different from that of direct evidence. Sometimes, where no direct evidence can be had, bank tellers and others accustomed to compare the niceties of handwriting are allowed to give their evidence, or rather state their belief as to the writing; but this kind of evidence is looked upon with great suspicion, and is much discountenanced. The great and growing importance of handwriting evidence in recent times has produced a class of professional experts, who have given a new value to evidence of this character by the profound and scientific character of their study of handwriting. But their evidence remains mere opinion and continues to share in the discredit which has usually attached to evidence of this character. See EXPERT EVIDENCE; FORGERY.

In cases where a jury are called upon to determine a disputed question of handwriting, they are now allowed to form their own opinion by comparing the disputed writing with other writings admitted to be by the same party. In England this could not be done before 1854, but it is now permitted in both civil and criminal cases. In Scotland, a jury may also be allowed to judge of the handwriting in this way in any case. In some countries—as, for example, in Scotland—a will, if written in the testator's handwriting, is admitted to be genuine without the attestation of witnesses, being then called a holograph (q.v.) instrument; but there is no such privilege in England or Ireland, as all wills, by whomsoever written, must be attested by witnesses. Consult: W. Anderson Smith, *Progress of Handwriting* (1887); Frazier, *Manual of the Study of Documents* (1894).

HANDY ANDY. A humorous Irish story by Samuel Lover (1842), notable for its Irish wit.

HÄNEL, hā'nel, ALBERT (1833—). A German jurist and politician, born in Leipzig. He studied at Vienna, Leipzig, and Heidelberg, in 1860 became a professor at Königsberg, and in 1863 at Kiel. One of the founders of the Liberal Party in Schleswig-Holstein after the annexation of the duchies to Prussia in 1866, he was elected to the Prussian Chamber of Deputies and the Reichstag of the North German Confederation, and subsequently to the Imperial Reichstag. He became known as a leader of the so-called 'Fortschrittspartei,' or Progressists, which, after the fusion with the Secessionists in 1884, was styled the 'Deutschfreisinnige Partei.' Upon the break-up of the party in 1893, he represented the 'Freisinnige Vereinigung' (Liberal Union), but in the elections of the same year to the Reichstag he was defeated by the Social-Democratic candidate. In 1898 he was reëlected. His writings include: *Studien zum deutschen Staatsrecht* (1873-88), and *Die Gesetzgebung des deutschen Reichs über Konsularwesen und Seeschiffahrt* (1875).

HANFSTÄNGL, hänf'stĕng'l, FRANZ (1804-77). A German lithographer and photographer, born in Bayernrain. He studied lithography under Mitterer at Munich, and spent six years in the Munich Academy (1819-25). He went to Dresden in the following year and began his great work, completed in 1852, of copying in lithograph the canvases of the Dresden Gallery. In 1844 he returned to Munich, leaving his establishment at Dresden to his brothers Max and Hans. From 1848 to 1853 he gave up lithography for galvanography, and then devoted himself almost entirely to photography and later to photogravure and heliogravure. His son EDGAR HANFSTÄNGL (1842—) succeeded to the business in 1868. The most important publications of the house are the periodical *Die Kunst unserer Zeit*, first published in 1890, and fine collections of carbon-print reproductions, including the contents of the principal European galleries, and the *Galerie moderner Meister*.

HANG-CHOW, häng'chou'. A foo or departmental city of China, and capital of the Province of Che-kiang, the smallest of the 18 provinces (Map: China, E 5). It is situated near the southern end of the Grand Canal, within two miles of the left bank of the Ts'ien- (or Ch'ien-) tang River. Its walls have a circuit of 12 miles, are 30 to 40 feet high, 20 to 30 feet thick, and are pierced with 10 large gates, controlled by the Tatar general, who has a force of 7000

Tatars under his command. The streets are tolerably wide and clean, and there are many good shops. The principal street which runs from north to south is four miles long. The western wall is washed by the famous Hsi-hu or West Lake, the chief attraction of the city. It is a beautiful sheet of water about eight miles in circumference, dotted with islands on which are built monasteries, memorial halls, and shrines. On its western side is an abrupt but magnificent range of hills. A little farther to the west are numerous finely situated Buddhist temples to which tens of thousands of pilgrims repair daily. Hang-chow has long been noted for its magnificence, its wealth, and its luxury. Marco Polo visited it several times toward the close of the thirteenth century, and describes it as 100 miles in circuit, and gives the number of its bridges as 12,000, all of them of stone. The name he gives it is *Kinsay*, a corruption of Chinese Kingsze, meaning 'capital' or 'metropolis,' Hang-chow having become in 1127 the capital of the Sung dynasty when the Kin Tatars conquered the northern provinces.

In December, 1896, Hang-chow was opened to foreign residence and trade in accordance with a treaty made at Shimonoseki between the Chinese and Japanese in the spring of the preceding year. A foreign settlement containing 1809 *mou* or Chinese acres, or about 300 English acres, has been laid off on the east bank of the Grand Canal about 10 *li* (3⅓ English miles) from the Wun-li Gate. It is described as low and marshy, and infested with mosquitoes. Communication with the city can be maintained by small canals leading from the Grand Canal. Hang-chow is noted for its silk. Here is the Imperial silk-factory in which are woven the beautiful silk fabrics for the use of the Imperial household, and there are about 7000 private looms giving employment to about 30,000 persons. There is also a cotton-spinning mill with 15,000 spindles. Hang-chow is noted for its fans, and fan-making is an important industry. It has no direct foreign trade, all produce of native origin finding its way to Shanghai by the canal or coastwise, and foreign goods come in in the same way. The exports consist chiefly of silk, paper fans, lotus-nuts, and tea; and the imports of copper and spelter from Japan for use in the mint, and of native produce, of brass buttons, leather, and tobacco. In 1899 the gross trade of the city passing through the custom-house amounted to 12,000,000 taels. The Ts'ien-tang River and the Grand Canal are the chief arteries of inland trade. The former is navigable at all seasons, but unfortunately is tortuous and shallow, and at certain seasons of the year is subject to an 'eagre' or 'bore' which rises to a height of 15 feet, and has a velocity of 15 miles an hour. Further it is not connected with the Grand Canal, some miles distant, and the transfer of goods and passengers is very slow, troublesome, and expensive. There are 400 houses engaged in the steam-launch transportation business on the canal, and the journey to Shanghai may be made in from 20 to 24 hours. The seaport of Hang-chow is Chapu, 20 miles lower down the river. The population of the city proper is estimated at 500,000, but the suburbs, which are properly included in the name Hang-chow, are densely populated, and the whole may be set down as 800,000. On December 29, 1861, Hang-chow was captured by the Tai-ping rebels after a protracted siege in which it suffered much.

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HANGER, GEORGE (c.1751-1824). An English soldier and military writer, fourth Baron Coleraine. After completing his education at Eton and Göttingen, he entered the army as a guardsman, but was afterwards captain in the Hessian force sent to America during the Revolutionary War. By 1782 he was major of a British dragoon regiment which was disbanded at the peace, and as Hanger found he could not live upon half pay, he spent nearly a year in a debtors' prison until his retiring allowance was doubled. He set himself up as a prophet, foretold the Civil War in America, and was a well-known man about town in London, intimate with the Prince Regent, and noted for his eccentric vulgarity even more than for his published works: *An Address to the Army in Reply to Strictures by Roderick McKenzie on Tarleton's History of the Campaigns of 1780 and 1781* (1789); *Anticipation of the Freedom of Brabant* (1792); *Military Reflections on the Attack and Defense of the City of London* (1795); and *The Life, Adventures, and Opinions of Colonel George Hanger* (2 vols., 1801).

HANG FIRE. When the powder-charge of a gun fails to explode promptly upon being ignited it is said to *hang fire*. It is due to a variety of causes, such as moisture, insufficient priming charge, etc., and is a prolific cause of accidents with modern breech-loading guns. Smokeless gunpowder is not easy to ignite, and the small priming charge of black powder sometimes fails to give out a sufficient burst of flame, in which case only a small portion of the charge takes fire, and the burning may last several seconds before the charge explodes. When several guns are being fired the man who operates the breech may think his own has gone off and open the breech while the powder is still burning. If the gun is of large size premature opening of the breech may cause the death or serious injury of every one in the vicinity. See GUNS, NAVAL.

HANGING. The common-law mode of inflicting capital punishment. The sentence pronounced by the court indicates the method of execution, viz. that the convict "be hanged by the neck until he is dead." The time and place of the execution are also, within statutory limits, fixed by the sentence. In England, formerly, in atrocious cases, it was usual for the court to direct a murderer to be hung upon a gibbet in chains near the place where the crime was committed—also at a later period to order the body to be dissected—and the execution to take place on the next day but one after the sentence was passed. But these useless severities were abolished by the statute 6 and 7 Will. IV., c. 30.

The mode of punishment by hanging was first adopted in England in 1241, when Maurice, a nobleman's son, was hanged for piracy. Other more barbarous modes of inflicting death were long in use, but have been abolished, and hanging has long been the ordinary, because the most humane, mode of executing capital punishment, in the United States as well as Great Britain.

In a few of the United States electrocution (q.v.) has been substituted for hanging as a less repulsive and more humane method of capital punishment. The publicity which formerly attended the hanging of criminals has, in most civilized communities, been done away with. In treason, hanging is part of the statutory punishment, coupled with mangling the body, though the Crown may change the sentence into simple beheading, except in the case of women, who are, in deference to their sex, legally exempt from the latter form of execution.

The cause of death in hanging is complex. The compression of the windpipe by the cord, the obstruction of the return of venous blood from the head, and of the flow of arterial blood to the brain, the stretching or tearing of the nervous structures of the neck, and, in some instances, dislocation or fracture of the vertebræ, may concur in the production of the fatal effect, which, though attended with violent struggles in some cases, is probably as nearly instantaneous as possible. See STRANGULATION; EXECUTION; CAPITAL PUNISHMENT.

HANGING, DRAWING, AND QUARTERING was, in English criminal jurisprudence, a mode of executing the sentence of capital punishment on a traitor. It consisted in drawing the criminal to the place of execution on a hurdle, and, after hanging him, dividing the body into quarters. This form of executing the sentence was substituted by statute (54 Geo. III., c. 146) for the more ancient and barbarous practice (to which the word 'drawing' originally referred) of disemboweling the criminal. The more humane and decent method of execution by hanging, without the spectacular concomitants of drawing and quartering, is now employed in Great Britain as well as in the United States.

HANGING GARDENS OF BABYLON. The name commonly given to a structure of ancient Babylon, famed as one of the seven wonders of the world. It appears to have been a sort of tower or pyramid, rising in terraces, planted with trees, flowers, and shrubs, and is said to have been constructed by Nebuchadnezzar for the gratification of his Median Queen, because the Babylonian plain seemed dreary to her in comparison with the mountain scenery of her native land. Strabo says the structure was a square, four plethra in area; it rested on arches supported by hollow pillars of burnt brick, filled with earth, in which the roots of the trees were planted; the top consisted of terraces, and a force of men was constantly employed pumping up water from the Euphrates for irrigation. The account that ascribes the gardens to the mythical Semiramis has no historical value. It is thought that the northern portion of the mound Amran ibn Ali which forms part of the ruins of Babylon occupies the site of the gardens.

HANGING ROCK, BATTLE OF. A battle fought on the western bank of Hanging Rock Creek, S. C., on August 6, 1780, during the Revolutionary War, between about 800 American militia under Colonel Sumter, and an equal number of Loyalists under Major Carden. The Americans in an impetuous charge at first drove the Loyalists back from their camp, but delaying to plunder, fell into disorder, and, in consequence, were themselves driven back and forced to retreat. The Loyalists lost 269 in killed, wounded, and missing. The loss of the Americans was not recorded. Consult: Dawson, *Battles of the United States* (2 vols., New York, 1858); and Lossing, *Field Book of the American Revolution* (2d ed., New York, 1855).

HANGINGS. Pieces of textile fabrics, used to cover the walls of rooms, especially of churches, during the early Christian and Romanesque epochs. They were often of high artistic value. See TAPESTRY.

HANGING WALL. A term used to designate the upper or covering wall of an inclined ore body, mineral vein, or stratum. If the mineral deposit be flat the term *roof* is used. In mining it is usually necessary to support the hanging wall either by pillars of ore or masonry, or by props of wood. See FOOT-WALL.

HANGNEST. A name often used in books, for the birds of the American family Icteridæ, sometimes called 'troupials,' but more usually orioles, all of which build pensile nests. (See NIDIFICATION; ORIOLE.) The Baltimore oriole is the most familiar North American representative of the family, and is commonly known as 'hang-bird' in certain localities.

HANGUL, hŭn'gōōl (native name). The Kashmir stag (*Cervus Kashmirianus*), which closely resembles the red deer (see DEER) of Europe, of which it may probably be only a local race. The antlers differ from those of the European stag in not forming a cup at the crown, which is simply forked. It is a forest-haunting animal, and in summer remains at elevations between 9000 and 12,000 feet, but in winter is driven down into the valleys by snow. The proper shooting season is in October and November, when the stags are full-antlered and seeking the does. They roam widely.

HANIFAH, hä-nē'fä, or **ABU-HANIFAH** (702-72). One of the four great Mohammedan Imams or Church fathers. He was born at Kufa on the Euphrates, and became founder of the Hanifites, the oldest of the sects of Mohammedans considered orthodox. His teachings were subsequently formulated into a code of Mohammedan law, which is still in force in many parts of the Ottoman Empire. He died in prison at Bagdad, where he had been placed for contumacy in refusing the office of Kadi, offered him by the Caliph, and declined because he thought himself unworthy of it.

HANKEL, häŋ'kel, HERMANN (1839-73). A German mathematician, son of Wilhelm Gottlieb Hankel, born at Halle. He studied at Leipzig and at Göttingen under Riemann and Möbius, became privat-docent in mathematics at Leipzig in 1863, and professor extraordinary in 1867, and in the same year was called to Erlangen in the same capacity. His chief works were: *Zur allgemeinen Theorie der Bewegung der Flüssigkeiten* (1861); *Vorlesungen über die komplexen Zahlen und ihre Funktionen* (1867); *Die Entwickelung der Mathematik in den letzten Jahrhunderten* (1869; 2d ed. 1884); *Zur Geschichte der Mathematik im Altertum und Mittelalter* (published posthumously, 1874); *Die Elemente der projektivischen Geometrie in synthetischer Behandlung* (also posthumous, 1875). For his biography and an estimate of his works, consult Zahn, "Einige Worte zum Anden-

ken an Hermann Hankel," in the *Mathematische Annalen* (Leipzig, 1874).

HANKEL, WILHELM GOTTLIEB (1814-99). A German physicist. He was born at Ermsleben, and studied physics and chemistry at the University of Halle, where he later was appointed professor. In 1849 he became professor of physics at Leipzig, and served there until 1887, when he was forced to give up active duties. He devoted himself to the study of thermo-electric properties of crystals, and made many interesting discoveries in this field. Hankel's researches are published for the most part in Poggendorff's *Annalen* (Leipzig), and the *Berichte* and *Abhandlungen* of the Saxon Academy of Sciences. He also prepared a German edition of Arago's works, which was published at Leipzig (1854-60).

HAN-KIANG, hän'kyäng'. The name of several rivers of China, the most important of which is that which flows into the Yang-tse at Hankow (q.v.). It rises in the mountains in Shen-si, known as Ta-pa-ling (sometimes also called Kiu Tiao Shan, the 'mountain of nine ridges'), and flows east and south through the provinces of Shen-si and Hu-peh for a distance of about 1300 miles, for 1260 of which it is navigable in some degree. Its upper courses are through a mountainous region, and rapids are both numerous and dangerous. In certain seasons floods are common, the water rising in the narrower parts with great suddenness, sometimes to a height of 24 feet in as many hours. On such occasions the rapids are wiped out, and the river becomes a raging torrent. From Sin-pu-wan, the limit of navigation, to Tsze-yang Hien (400 miles), only small boats can be used. At the latter place goods and passengers are transshipped to larger craft, subject to a second transshipment at Lao-ho-k'ow (400 miles) or Fan-cheng (450 miles) to the ordinary river junk of the Han. At Lao-ho-k'ow the country opens out, and for the remaining 460 miles to Hankow navigation is easy, though shallows and shifting banks abound. The traffic on the river is considerable, and with a little dredging it is capable of being used by steamers of light draught as far as Fan-cheng or Lao-ho-k'ow, the two most important trading centres on the river. Other cities besides those already mentioned are Hing-an-fu, a large walled city on the right bank, with a great military depot in the vicinity, and Siang-yang-fu (also on the right bank), a quiet walled city opposite Fan-cheng, both of which are noted for the long and stubborn resistance (1268-73) which they offered to the Mongol armies of Kublai Khan. (Consult Yule, *Marco Polo*, vol. ii., London, 1871.) Prior to 1470 the river branched off from its present course about three miles above its present mouth and flowed through the plain behind what is now the foreign settlement of Hankow, and entered the Yang-tse some miles lower down. In that year it suddenly changed its course and poured its waters into the Yang-tse through its present channel.

HANKOW, hän'kou' (Chin., Han-mouth). An important river-port and commercial centre of China, situated in the very heart of the country, 600 miles from the sea, on the left bank of the Yang-tse, at the point where it is joined by the river Han in latitude 30° 32' N., longitude 114° 19' E. (Map: China, D 5). It occupies the angle formed by the junction of these two rivers, stretching along the east or left bank of the Han for over two and one-half miles, and eastward along the left or north bank of the Yang-tse for one mile. Its streets are narrow, crooked, and dirty, and usually much crowded with the screeching, heavily laden wheelbarrows used in the conveyance of the enormous quantities of goods which here find their point of transshipment. Adjoining the native town on the east is the foreign settlement, originally a British concession, but thrown open to all foreigners by the British Government shortly after the opening of the port in 1861. It extends along the Yang-tse for a distance of about 800 yards, a wide 'bund' or esplanade running along its entire length. It has fine streets, kept in splendid condition by a municipal council elected by the land-renters. Ground-rent is paid to the Chinese authorities through the British consul. The houses and business buildings are substantial, and are in marked contrast with those of the native town.

To the east of this lie the 'concessions' more recently acquired by the French, Russians, and Germans, and the foreign water-front has now a length of nearly three miles. Another new 'concession' has recently been opened by the Chinese authorities on the south or Wu-chang side of the Yang-tse, where foreigners may build business places and residences on certain conditions.

West of the native town, and across the Han, is the departmental city of Han-yang, to which Hankow (which is not a city) is subordinate, and directly across the Yang-tse from Han-yang stands the large and imposing city of Wu-chang-fu, capital of the Province of Hu-peh, and the seat of the Governor-General (or viceroy) of the two provinces of Hu-nan and Hu-peh, unitedly known as Hu-kwang, or Liang Hu—that is, 'the two Hu.' These three centres of population are included in the port and customs district of Hankow, and situated as they are in the centre of an unsurpassed network of rivers and lakes, they form the most important commercial centre of the country. Their total population is estimated at 1,500,000, of which Hankow has 800,000, or more than half.

Hankow is the first of the 'Five Chin' or great commercial emporia of the country. Its trade is chiefly distributive, but it has some industries, including a cotton-mill, a hemp-factory, a mint, and an ore-crushing establishment in Wu-chang, an arsenal and great iron and steel works in Han-yang, and a few miles lower down the river are great tanks for storing oil (capacity 5000 tons) which is tinned on the premises. The mouth of the Han swarms with native shipping, and the scene presented everywhere is one of great commercial activity. Regular steam communication is maintained with Shanghai and the other river and lake ports both above and below Hankow. I-chang, about 500 miles above Hankow, being at present the limit of steam navigation westward. The largest ocean steamers come to Hankow and load at great hulks moored off the river-bank. The Yang-tse, opposite the foreign settlement, is 1400 yards wide from brink to brink. In winter its average low-water depth is 40 feet in mid-channel, but in summer, when the rivers are in flood, the swollen waters frequently rise 50 feet to the brink of the bund, sometimes overflowing it, inundating the town. In flood time the scene off the native town is most exciting; many junks and boats come to

grief, and many lives are lost, notwithstanding the efforts of the stanch, splendidly managed 'Red Boats' of the native Life-Saving Society, whose stations are found throughout the whole course of the Yang-tse.

In 1900 the gross value of the trade of the port, according to the report of the Imperial Maritime Customs, amounted to $56,513,103, against $65,432,903 in 1899, the decrease of nearly $9,000,000 being due to the Boxer movement in the north and the consequent general unrest in the Yang-tse Valley. Of this, foreign imports amounted to $19,595,371, as follows: From Chinese ports, $19,017,810; the Continent of Europe (excluding Russia), $338,702; Japan, $144,975; Hong Kong, $75,488; the United States, $18,409. The chief imports of foreign origin were: Opium, 43,855 pounds; cotton piece-goods, 1,684,237 pieces; cotton yarn, 30,945,595 pounds; woolen goods, 48,886 pieces; metals, 3,563,242 pounds (including 18,201 piculs of lead for lining tea-chests). Among the 'sundries,' kerosene oil figures as 12,854,380 gallons. The chief exports are tea, rice, silk, tobacco, beans, coal, hemp, hides, vegetable wax, medicines, and wood-oil. Tea is always one of the largest items. In 1900, 36,306,654 pounds, value $4,356,624, were exported direct to foreign countries, and 26,441,654 pounds, value $3,176,534, to Chinese ports, whence no doubt much of it was re-exported to foreign countries. These figures include the large quantity sent overland via Kiakhta to Russia, as well as that sent by direct steamer to Odessa—usually the finest black tea which can be produced. One of the items of export to Europe was 4665 tons of crushed antimony ore (obtained from the Province of Kwei-chow), crushed, dried, and packed in bags in Wu-chang.

The shipping engaged in this great commerce is given in the Customs Report for 1900 as follows:

STEAMERS ENTERED INWARD

British	510	carrying	567,747 tons
Chinese	375	"	231,419 "
Japanese	142	"	111,364 "
German	107	"	115,800 "
Russian	8	"	16,024 "
Swedish and Norwegian	6	"	4,459 "

The number of steamers clearing outward was 1162, and the cargo carried, 1,049,704 tons, the different nationalities being represented in about the same proportion.

Hankow is one of the principal stations of the great trunk railway which is to connect Peking in the north with Canton in the south. The Hankow-Peking section (called the Lu-Han Railway) is already well advanced toward Hsin-yang, 346 miles north of Hankow. The Hankow station is a few miles below the foreign settlement, but a branch with the necessary stations runs to the Han behind the foreign settlements. Hankow and the neighboring cities were all but destroyed during the Tai-ping Rebellion. (See HAN-YANG and WU-CHANG.) Consult Scidmore, *China, the Long-lived Empire* (New York, 1900).

HAN'LEY. A manufacturing town and municipal borough in Staffordshire, England, on the North Staffordshire Railway, and on a branch of the Trent and Mersey Canal, two and one-half miles from Newcastle-under-Lyme (Map: England, D 3). It is known as 'The Metropolis of the Potteries,' and is famous for its manufactures of earthenware and fine porcelain. It has coal and iron mines, iron furnaces and foundries, and brick-works. The principal portion of the town is on an elevated site; the streets, wide and regular, are brick-paved, and there are many handsome residences. The chief buildings are the town hall, mechanics' institute, museum, infirmary, national and board schools. There is a fine park. The town owns an electric-light plant, and maintains markets, baths, a cemetery, a free technical museum, and free libraries. It utilizes its sewage for the manufacture of fertilizers. Hanley's rise dates from the inception of the pottery industry. It has absorbed the former township of Shelton, and it received a municipal constitution in 1857. Population, in 1891, 55,000; in 1901, 61,500.

HANLIN YUAN, hän-lēn' yōō-wän' (Chin., College of the Forest of Pencils). The National Academy of China, membership in which is the highest literary honor China has to bestow on her scholars. It was founded by the Emperor Hsüan Tsung in 725, first as a coterie of scholars and poets whose society he courted, then as a learned body of copyists engaged in multiplying books. Lo-yang, in Ho-nan, then the capital, was its home; since then it has shared the fortunes of successive dynasties, and has been in Peking since 1403. During the 'Boxer' trouble of 1900 it was purposely burned down. Its members are the historiographers of the country, the compilers of its great encyclopædias, editors and commentators of its classics, etc., and have charge of literary matters in general, or are drafted off to the provinces as superintendents of education, literary chancellors, etc. Its membership is made up of honor men at the triennial examinations at Peking. See Martin, *Hanlin Papers* (New York, 1880).

HANMER, Sir THOMAS (1677-1746). An English statesman and scholar. He was educated at Westminster and at Christ Church, Oxford; was elected to Parliament for Suffolk (1701), and in 1713 became Speaker of the House of Commons. He retired from politics in 1727 and devoted himself to literature. He published (1744) an edition of Shakespeare, with illustrations by Gravelot, a work of no critical value, but of splendid typography. Pope, in the *Dunciad*, alludes to him under the name *Montalto* (book iv., 105).

HANN, hän, JULIUS (1839—). A German physical geographer and meteorologist, born near Linz (Upper Austria). He was educated at the University of Vienna, became a lecturer there on meteorology in 1868, and in 1873 professor of physical geography. Having held a professorship at Gratz from 1897 to 1900, he returned to Vienna in the latter year to occupy the chair of cosmic physics. In 1866 he established with Jelinek the *Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie*, and in 1877 was appointed director of the Central-Anstalt für Meteorologie und Erdmagnetismus of Vienna, and elected to the Academy of Sciences. His researches dealing with such questions as the theory of storms, the decrease of temperature attendant upon increased elevation, and the violent south wind known to the Swiss as the Föhn, are extensive. His publications include: *Astronomische Geographie und Physik der Erde* for the *Allgemeine Erdkunde* (4th ed. 1886) of Hochstetter

and Pokorny; *Handbuch der Klimatologie* (1883); and *Die Temperaturverhältnisse der oesterreichischen Alpenländer* (1887).

HANNA. The usual name in British Guiana for the hoactzin (q.v.).

HAN'NA, MARCUS ALONZO (1837—). An American manufacturer and politician, born at Lisbon, Columbiana County, Ohio, of Scotch-Irish parentage. In 1852 his father removed with his family to Cleveland, Ohio, where he established himself in a wholesale grocery business that soon became one of the most extensive in northern Ohio. Young Hanna was educated in the Cleveland public schools, and began a course at Western Reserve University, which was interrupted in 1857 by the failing health of his father. His father died in 1862, and he conducted the business with success until 1867, when he formed a partnership with his father-in-law, Daniel P. Rhodes. The firm of Rhodes & Co. dealt in coal, iron ore, and pig iron, and, under the management of the junior partner, its scope was extended, so that in a few years its property included coal and iron mines, and a line of lake steamships constructed in its own shipyards. In 1877 the firm name was changed to M. A. Hanna & Co., and Hanna became the controlling partner; but his activities required new fields, and he became interested in theatrical enterprises, the Cleveland Street Railway, banking, and railroading. At length he turned his attention to politics, gradually extending his influence from his home ward to city, State, and finally to national politics. In 1880 he was an active Republican worker in Cleveland; in 1884 he was a delegate to the Republican National Convention, and in 1888 he was again a delegate to that body, and this time made himself known as one of the managers of John Sherman's canvass for the nomination. In 1896 he suddenly acquired national prominence by the part he took in securing the nomination of William McKinley for the Presidency at the Republican National Convention at Saint Louis. Immediately after the convention he became chairman of the Republican National Committee, and conducting the campaign on the same principles that had won him success in the business world, secured the election of McKinley by the largest popular plurality ever given at a Presidential election. In March, 1897, Governor Bushnell appointed him United States Senator from Ohio to succeed John Sherman, who had resigned to become Secretary of State in President McKinley's Cabinet, and in the following year he was chosen by the Legislature Senator for the full term of six years. In the Senate he did not take a prominent part either as a debater or a legislator; but up to the death of President McKinley he was recognized as one of the most influential advisers of the Administration. He actively interested himself in the problem of the relation between capital and labor, and upon the organization of the National Civic Federation was made its president. In December, 1901, he became a member of a permanent board appointed to settle labor disputes.

HANNA, WILLIAM (1808-82). An English clergyman, author, and editor, born at Belfast. He studied at the universities of Glasgow and Edinburgh, was ordained a minister of the Church of Scotland, was installed as pastor at East Kilbride (Lanarkshire) in 1835, and in 1837 became pastor at Skirling (Peeblesshire). Upon the establishment of the Free Church of Scotland in 1843 he, with his entire congregation, withdrew from the State Church and formed, at Skirling, a Free Church society. From 1850 to 1866 he was the colleague of Thomas Guthrie (q.v.) at Saint John's Free Church, Edinburgh. His pulpit discourses were marked by a quiet yet forceful manner of utterance, clear thought, and much literary excellence. He was appointed editor of the *North British Review* in 1847, but soon resigned, and wrote numerous works, of which the *Last Day of Our Lord's Passion* (1863) had a wide circulation. He is, however, best known for his edition of *The Posthumous Works of Thomas Chalmers* (9 vols., 1847), and his *Memoirs of the Life and Writings of Thomas Chalmers* (4 vols., 1849-52), which two publications won for him from Glasgow the degree of LL.D.

HANNAHILL. A local name for the black sea-bass (*Centropristes striatus*). See SEA-BASS.

HAN'NAY, DAVID (1853—). An English journalist and author, born in London. Besides work on the *Pall Mall Gazette*, the *Saturday Review*, and *Saint James's Gazette*, Hannay wrote several books, mostly connected in some way with the navy: *Short History of the Royal Navy* (1898); *Admiral Blake* (1888); *Rodney* (1891); *Life of Marryat* (1889); *Life of Smollett* (1887). To the "Public Men of To-Day Series" he contributed *Don Emilio Castelar* (1896), and to the *Periods of European Literature*, "The Later Renaissance" (1898), his most elaborate work in literary history.

HANNAY, JAMES (1842—). A Canadian journalist and historian, born at Richibucto, N. B., where his father was settled as Presbyterian minister. Called to the bar in 1867, he was appointed official reporter of the Supreme Court of the province (1867-73), and published two volumes of reports. Resigning his post, he became assistant editor of the Saint John *Daily Telegraph* (1873-83) and of the Montreal *Herald* (1883-84), and after serving on the staff of the Brooklyn *Eagle* (1885-87) he returned to Saint John to take the editorship of the *Gazette* (1888). In 1893 he became chief editor of the Saint John *Telegraph*. As a journalist, Hannay became well known throughout Canada for able editorials, brilliant sketches, stories, and ballads. Among his historical works are: *History of Acadia* (1879); *The Story of the Queen's Rangers in the American Revolution* (1883); *The History of the Loyalists* (1893); and *Life and Times of Sir Leonard Tilley* (1897).

HANNEMAN, hän'ne-män, ADRIAEN (1601-71). A Flemish painter, born at The Hague. He was a pupil of Ravesteyn in his native city, and went to England early in the reign of Charles I. He worked in London under Mytens, in the style of Van Dyck, and produced a number of portraits notable for fine color. On his return to The Hague he became Court painter to Mary of Orange. His works include portraits of Charles I., in the Vienna Museum; Jan de Witt (1652, Rotterdam Museum); and William Frederick of Orange (1661, Weimar Museum).

HAN'NIBAL. A city in Marion County, Mo., 112 miles northwest of Saint Louis, on the Mississippi River, and on several railroads, including the Chicago, Burlington and Quincy, the Wabash, and the Missouri, Kansas and Texas (Map:

Missouri, E 2). It has steamboat communication with various cities on the river; a large trade in lumber, tobacco, flour, and agricultural produce, and manufactures of lumber, stoves, shoes, car-wheels, cigars, cement, and lime. Among the features of the city are the public library building, the United States Government building, the municipal buildings, the city park, and a long iron and steel railroad and wagon bridge across the river. Settled in 1819, Hannibal was incorporated as a town in 1839. The government is conducted under a charter of 1845, revised in 1873. The mayor, annually elected, controls appointments to the administrative departments, those to the library board and finance committee alone being ratified by the council, which is unicameral, and of which the executive is a member. The school board is chosen by the people. The city owns and operates its electric-light plant. Population, in 1890, 12,857; in 1900, 12,780.

HANNIBAL (Phœnician, grace of Baal, Gk. *Ἀννίβας, Annibas*). A common name among the Carthaginians, the list of those famed in history extending to fourteen or fifteen. The greatest of all was the Hannibal of the Second Punic War, the son of Hamilcar Barca. He was born in B.C. 247. When he was nine years old he accompanied his father on his Spanish expedition, and before starting swore an oath of eternal hatred to the Roman name, which he kept throughout his whole life. After the death of Hamilcar he was employed by Hasdrubal, his brother-in-law, in most of the military operations which he undertook. When Hasdrubal was assassinated, the army with one voice elected Hannibal commander-in-chief—an appointment which the authorities at Carthage at once ratified. Hannibal, at this time in his twenty-sixth year, undertook the command, for he longed to strike a death-blow at his country's rival by attacking her on her own soil. Before he entered on a task of such magnitude he deemed it prudent to complete the subjugation of Spain, and accordingly spent two years in contests with some tribes hitherto independent of Carthage. Saguntum, a city in alliance with Rome, was attacked by him on the ground that its inhabitants were making aggressions on the Torboletes, subjects of Carthage. After a siege of eight months the city was taken, and the Romans, after an embassy had unsuccessfully demanded the surrender of the general who had thus violated the treaty, declared war in B.C. 218. Having taken measures for the defense of Africa and Spain during his absence, he started from New Carthage in B.C. 218, with 90,000 foot and 12,000 horse. This force was much thinned by his contests with the tribes between the Iberus and the Pyrenees, by the necessity of leaving Hanno with 11,000 men to keep them in subjection, by desertion in the passage of the Pyrenees, and by his sending home a portion of his Spanish troops. His object in this last act was to inspire the soldiers with thorough confidence in themselves and their general. From the Pyrenees he marched to the Rhône without opposition, since Scipio was at Massilia, four days' march from the point where Hannibal crossed the river in the face of the Celtic hordes who sided with the Romans. His next great difficulty was the passage of the Alps, which he effected in fifteen days, in spite of the attacks of the mountain tribes, the snows, storms, and other difficulties. Much discussion has taken place as to whether Hannibal crossed the Cottian Alps by the pass of Mont Genèvre (or Cenis), or the Graian Alps by the pass of Little Saint Bernard. For the former route, Michelet, Thierry, and most French writers argue; and for the latter, with better reasons, Niebuhr, Arnold, Mommsen, and others.

After allowing his army (now about 26,000 strong) some time to recruit in the rich villages of the friendly Insubrians, he first subdued the Taurini, a tribe hostile to the Insubrians, and took their chief city after a siege of three days, and thus forced into alliance with him all the Ligurian and Celtic tribes on the upper course of the Po. Scipio, having returned from Massilia, took the command of the army in the north of Italy, and met Hannibal on the plain near the river Ticinus. The Romans were entirely routed, and Scipio, who was severely wounded, retreated across the Po. The armies again met at the Trebia, with a like result, though the Romans, who had received reënforcements, were much more numerous. These battles were fought in B.C. 218. Having wintered in the neighborhood of the Po, and levied additional troops among the Gauls, most of whom were now his friends, Hannibal started southward as soon as spring permitted, marching through Liguria and the swamps of the Arno. In this difficult route immense numbers of his beasts of burden and horses perished, and he himself lost the sight of one eye. He next inflicted a severe defeat, near Lake Trasumenus, on the consul Flaminius. After this victory he crossed the Apennines to Picenum and Apulia, and thence recrossed to the fertile Campania, which he ravaged. Thither Fabius was sent with an army to oppose him, but no general engagement took place, the consul endeavoring to lead Hannibal into snares, which he succeeded in doing; but the Carthaginian extricated his army by a stratagem, and returned to Apulia. He wintered at Cannæ, and in June, or, according to others, in August (2d) of B.C. 216, almost annihilated a Roman army of 90,000 men under Terentius Varro and Æmilius Paulus, in the battle which was fought a little below the town. About 50,000 are said to have fallen, including Æmilius Paulus, and a host of Roman knights, senators, and other distinguished persons. Here Hannibal committed, perhaps, the greatest military error of his life, in not marching direct to Rome; but it is supposed that he refrained in order to allow the tribes of Italy to declare in his favor. Many in the south of Italy did attach themselves to his interests, but not in such numbers as he had anticipated. After some delay he marched on Neapolis, which he did not succeed in taking, but the gates of Capua were opened to him, and here he wintered. The enervating effect which the luxury of Capua is said to have had on his army has been greatly overdrawn; but his residence there forms, in one point of view, the turning-point in the war, which from this time became more of a desultory kind. Hannibal's great purpose was to arm the Italian nations against Rome, and so to crush her power by means of her own subjects; the Romans, on the contrary, henceforth avoided coming to a pitched battle with the Carthaginians, but sought rather to keep the tribes in awe and harass Han-

nibal and his lieutenants by small armies in different parts of the country. Hannibal traversed Italy in all directions, surprised the Roman generals, defeated their armies, captured their towns, such as Casilinum, Arpi, Tarentum, Metapontum, Thurii, Locri, and many others; he defeated Sentenius near Capua; Cn. Fulvius at Herdonea; Fulvius Flaccus on the Anio; Crispinus and Marcellus in Lucania; and the besieging army before Locri. In all these cases the armies were almost annihilated. The defeat of Hasdrubal, his brother, at the river Metaurus, and the loss of his army, compelled Hannibal to confine himself to the mountainous peninsula of Bruttii, where for four years he resisted all the efforts of the Romans to dislodge him. At length, after having maintained himself in Italy for upward of fifteen years, he was recalled to Africa, to defend his country against Scipio; but notwithstanding his utmost exertions, and the bravery of his veteran troops, he was defeated by Scipio near Zama, with a loss of 20,000 men (B.C. 202). Peace was concluded in the following year (B.C. 201).

Hannibal's scheme had been baffled, but his hatred of Rome was not diminished, and he set himself to make preparations for a still more deadly struggle. He turned his attention in the first place to political reforms, and made some constitutional changes by which he placed the finances on a better footing. But his enemies accused him to the Romans of stirring up Antiochus the Great of Syria to make war on them, and when ambassadors came to Carthage Hannibal fled to the Court of Antiochus at Ephesus. In the war which followed he took no conspicuous part, but the King bitterly regretted afterwards that he did not take the advice of Hannibal to carry the war into Italy. When peace was concluded, the surrender of Hannibal was one of the conditions; but, foreseeing such a result, he fled to Prusias, King of Bithynia, for whom he gained a naval victory over Eumenes, King of Pergamus. He was at length demanded by the Romans, and, seeing no hope of escape, he took poison, which he always carried with him for such an emergency. The date of his death was probably B.C. 183.

Our information about Hannibal is derived largely from Livy, Polybius, Plutarch, Appian, Cornelius Nepos, and Tonaras. For an estimate of the man, see Morris, *Hannibal* (1897); for an account of his military operations, Dodge, *Hannibal* (1891).

HAN'NINGTON, James (1847-85). An English missionary, first Bishop of Eastern Equatorial Africa, born at Hurstpierpoint, near Brighton. He was educated at Oxford, and entered the ministry of the Established Church. In 1882 the Church Missionary Society sent him out to reënforce the missionaries already in Uganda, but his health gave way, and he was compelled to go back to England. Two years later he was consecrated Bishop of Eastern Equatorial Africa, and started a second time for Africa. After having conquered the many obstacles and perils which he encountered in his attempt to reach the interior, he was murdered by the command of Mwanga, King of Uganda, near Lake Victoria Nyanza. Consult Dawson, *James Hannington, First Bishop of Eastern Equatorial Africa* (London, 1887).

HAN'NO (Phœnician, merciful) (c.755-c.715 B.C.). A King of Gaza. He is called Hanunu in the inscriptions of the Assyrian King Tiglath-pileser III.; and this name is identified with that of the Carthaginian family, who possibly were his descendants. He was situated between Assyria and Egypt, and in 732 rebelled against Tiglath-Pileser, but fled without giving battle. Against Sargon II. he allied himself with Sabaco (biblical So), King of Egypt; was defeated with him at Raphia (720) and carried into captivity.

HANNO. A common name among the Carthaginians. The earliest of note who bore the name was a Carthaginian admiral who was sent on a voyage of discovery and colonization along the west coast of Africa, which he explored as far as the modern Sierra Leone. The date of this expedition is not known, but is supposed to be about B.C. 570. He founded a number of towns, and on his return he deposited an account of his voyage in the Temple of Moloch. This account was translated into Greek; and the translation, known as Ἄννωνος Περίπλους, or *Voyage of Hanno*, is still extant. There is an old English translation by Falconer (London, 1797). Consult Mer, *Mémoire sur le Périple d'Hannon* (Paris, 1888).—Hanno (?-B.C. 264). A Carthaginian admiral in the first Punic War. In command of a Carthaginian fleet, near Messana, Hanno allowed the city to fall into the hands of the Romans. He was recalled and executed.—Hanno (third century B.C.). A Carthaginian general, successor in command to the above. He was the son of a Hannibal; with Hiero II. besieged Messana, but was defeated by the consul Appius Claudius.—Hanno (c.300-c.250 B.C.). A Carthaginian general in the First Punic War. He was defeated near Agrigentum in 262. In 256, with Hamilcar, he was defeated in a naval battle off Ecnomus.—Hanno the Great (c.275-c.195 B.C.). A Carthaginian politician. At the outbreak of the revolt of the Carthaginian mercenaries he was put in command of the army, but was so badly defeated that Hamilcar Barca was sent out to share the command with him. The two agreed so ill that the home Government decided on a single command, but left the choice to the army in the field, which chose Hamilcar. Hanno tried to break down Hamilcar's power, after his death opposed intrusting the chief command to Hannibal, urged the surrender of Saguntum to Rome, and was head of the peace party. At the close of the Second Punic War he became leader of the party which was friendly to Rome.—Hanno (last half of third century B.C.). A Carthaginian lieutenant of Hannibal. He was in command of the left wing at the battle of Cannæ; conquered several towns in Lucania and Bruttium, and was beaten by Tiberius Gracchus (B.C. 214) near Beneventum.

HANOI, hä'nô-ē' (Chin. *Ho-nei*, within the river). One of the most important cities of Annam, capital of the Province of Tongking, and the seat of the government of French Indo-China (Map: French Indo-China, E 2). It is picturesquely situated in a region of lakes and trees, on the right bank of the Songkoi or 'Red River,' which rises in the Chinese Province of Yun-nan, and enters the China Sea 110 miles below Hanoi. The native town lies between the citadel and the river. The streets are fairly wide

and the houses good, many of them being of brick and well built. Since coming under French control the part nearest the water-front has been much improved; new wide streets lined with trees have been opened, lighted with electricity. They have been given French names, and in this part the principal shops and hotels are found. French missionaries have long resided here, and a two-towered cathedral is a conspicuous feature of the landscape. In the middle of this newer part of the city is a small island, with some quaint pagodas; and on the shore of Grand Lake, in the neighborhood of the city, is a Buddhist temple with a colossal bronze figure of Buddha. In the space near the water-front is a bronze statue of Paul Bert, unveiled July 14, 1900. Hanoi was fortified by French officers at the beginning of the nineteenth century, but the defenses are now of little importance. The citadel, which stands on higher ground than the rest of the city, is a quadrilateral of 3600 feet to a side, and is surrounded by a wall and a deep moat. Within this inclosure are the palace, the royal pagoda, public offices and official residences, the treasury, court of justice, barracks, arsenals, magazines, etc. The principal trade is in silk and rice, and is largely in the hands of the Chinese, and embroidery and pearl-work form important industries. The Songkoi is navigable at all seasons as far as Hanoi by vessels drawing eight or nine feet. Above that point the river is shallow, and there are many rapids, but flat-bottomed vessels drawing not more than three and one-half feet can ascend quite a distance. Haiphong (q.v.) is the port of Hanoi, which is connected with it by rail as well as with Langson on the Chinese frontier. Several French newspapers are published in Hanoi, and a new race-course was opened there in 1890. The population in 1897 was 102,000, of whom 950 were Europeans and 1697 Chinese.

HANOTAUX, ȧ'nō'tō', Gabriel (1853—). A French historian and politician, born at Beaurevoir, Aisne. From being a specialist in paleography and modern history, he passed into the civil service (1879), as director of the historical department in the national archives, and became in 1881 sub-chief of Gambetta's Cabinet, and later chief of that of Jules Ferry. In 1885 he was Counselor of Legation at Constantinople, and the following year he was elected Deputy for Aisne. He served in the Chamber till 1887, and was mainly conspicuous for his opposition to Boulanger. He was appointed Director in the Ministry of Foreign Affairs in 1892, and in May, 1894, became Minister of Foreign Affairs in the Dupuy Cabinet, remaining in office through several changes of Premiership, till October, 1895. In the Méline Ministry (1896-98) he again held the portfolio of Foreign Affairs. In 1897 he was elected to the Academy. Among his published works are: *Les villes retrouvées: Thèbes, Ninive, Babylone, Troie, Carthage, Pompéi, Herculanum* (1880); *Origines de l'institution des intendants des provinces* (1884); *Henri Martin, sa vie, ses œuvres, son temps* (1885); *Etudes historiques sur le XVIème et le XVIIème siècle en France* (1886); *Le recueil des instructions données aux ambassadeurs à Rome* (1888); *Histoire du cardinal de Richelieu* (1893-96); *La France et la royauté avant Richelieu* (1898); and *La Seine et les quais Promenades d'un bibliophile* (1901).

HANOTEAU, ȧ'nō'tō', Hector (1823-90). A French landscape painter, born at Decize (Nièvre). He was a pupil of Gigoux, and constantly exhibited at the Salon. His works are characterized by sturdy realism and skillful color. They include "The Village Pond," "The Frogs," and "The Water Lilies," all in the Luxembourg. He also painted portraits. He was awarded medals at the Salons of 1864, 1868, and 1869, a first-class medal at the Paris Exposition of 1889, and the Legion of Honor in 1870.

HAN'OVER, Ger. **HANNOVER**, hȧ-nō'vēr. A former kingdom of Germany, constituting since 1866 the most northwestern province of Prussia (Map: Prussia, C 2). The North Sea and the Elbe River border the region on the north and northeast, the Prussian Province of Saxony and Brunswick on the east, the Prussian provinces of Hesse-Nassau and Westphalia on the south and southwest, and Holland lies on the west. Hanover nearly surrounds the Grand Duchy of Oldenburg. It embraces the old Brunswick-Lüneburg possessions, together with the principalities of Hildesheim, East Friesland, Göttingen, Osnabrück, etc. Area, 14,869 square miles.

Geographical Features. The general physical character of Hanover is that of an extended alluvial plain with slight undulations—the western continuation of the great low plain of Northern Germany. In the south, however, the country is mountainous, embracing a considerable part of the western Harz (reaching a height of about 3350 feet), together with the lesser heights of the Eichsfeld, and other mountain ranges. The mountains are covered with dense woods. The valleys between the mountains are fertile, with a good clayey loam, and well adapted to agriculture. Beyond the valleys, toward the north, the country is traversed from northwest to southeast by a sandy tract from 50 to 80 miles in width known as the Lüneberger Heide, which is almost wholly unfit for agricultural purposes. Toward the northwest from the mountain region extend elevated levels, characterized by heaths and other dry areas. Great marshes, peat-moors, 'floating-fields,' cover the northwestern and extreme northern districts of the province. These sections have in some parts been successfully drained and fertilized and furnish good pasture, but a large portion is still unreclaimed, and is regarded as one of the least productive parts of Germany. The morass of Bourtange, on the borders of Holland, alone covers 500 square miles. The coast, partaking of the nature of the Holland coast, is low, and requires protection from the overflowing of the 'German Friesland,' the land being in many localities below the level of the sea. Along the banks of the rivers and adjoining the dike-protected coast are very fertile and highly cultivated districts. The principal rivers are the Elbe, which receives several affluents from the southwest: the Weser, on whose affluent, the Leine, is situated the capital, Hanover, and among whose other tributaries are the Aue, the Emmer, and the Aller; the Ems; and the Vechte—all falling into the North Sea. There are only two considerable lakes, the Dümmersee and the Steinhuder Meer.

Climate and Mineral Resources. The climate is damp near the ocean, where fogs and heavy winds are frequent; in the south it is drier and colder, being bleak in the Harz in

winter. In the vicinity of the moors fevers are prevalent, and the mortality is high. The mean annual temperature is about 47° F. The mining industry is important, and is carried on mostly in the Harz region. The chief minerals are coal and iron, of which about 650,000 tons each are mined annually. Silver, lead, and copper are also mined, while salt products are prominent. Turf and peat are large and important outputs, being shipped up the streams and canals toward the interior for use as fuel. Some mineral oil is found.

AGRICULTURE. About one-third of the total area of the province is under tillage—farm and garden—a little over one-fifth is under pasture, and nearly one-sixth under forest. According to the census of 1895, there were 345,159 land holdings, with a total area of 7,192,500 acres. Of these, 200,870 holdings covered less than 5 acres each; 66,240, from 5 to 12½ acres each; 55,869, from 12½ to 50 acres each; and 22,180, over 50 acres each. In the drier regions of the country rye is the prominent crop; in the marsh and moor districts, wheat, oats, barley, buckwheat, rape, and potatoes are grown. Cattle-raising is an important industry. For wheat and oats Hanover is one of the leading regions in Germany. In the mountain valleys the farming is intensive, and fruit is the leading product. The sugar-beet industry is rapidly growing; the number of factories was 43 in 1900. Clover, hops, flax, and tobacco are raised. The number of head of stock in the province generally increased about 10 per cent. during the decade from 1890 to 1900, the sheep holdings alone having fallen off.

MANUFACTURES AND COMMERCE. The manufacturing industries are prosperous and growing, especially in the southern part of the province. The industrial census of 1895 gives the number of industrial establishments as 158,756, employing 418,837 persons, or about 16 per cent. of the population. In that number were included 67,058 establishments without any help and 1181 establishments employing 150,487 hands. Among the chief manufactured products are cotton and woolen textiles, machinery, wagons, leather, glassware, cigars and tobacco, paper, chemicals, and spirits. Shipbuilding is a prominent industry. There are several Chambers of Commerce that actively further the interests of manufacturing and agriculture. The commerce is extensive, Hanover ranking among the thirteen leading commercial towns of Prussia. Trade is greatly facilitated by the numerous splendid waterways of the province, as well as by its ample roads and railways, the last exceeding 1500 miles in length and belonging for the most part to the State. The Province of Hanover has about 40 ports, of which six are important shipping centres, including Harburg and Geestemünde. The Hanoverian shipping trade owned in 1900 about 850 boats, which had, however, a light tonnage—56,000.

GOVERNMENT AND INSTRUCTION. For purposes of administration Hanover is divided into the six counties of Hanover, Hildesheim, Lüneburg, Stade, Osnabrück, and Aurich, which are divided into 78 circles. The province is represented by 36 members in the Prussian Chamber of Deputies and by 10 in the Upper House. It sends 19 members to the German Reichstag. In educational matters Hanover holds high rank. Education is free, compulsory, and thoroughly diffused. There are over 100 secondary schools and other schools of advanced instruction. There is also the famous university at Göttingen (q.v.). Among the practical schools are the royal mining academy in Clausthal, the building school in Nienburg, and the forestry school in Münden. There are a technical high school (in the capital), five navigation schools, several agricultural institutions, a school for the cultivation of meadows, a veterinary high school, and several unions for the diffusion of practical knowledge, as well as various associations fostering the interests of science, art, history, natural philosophy, engineering, and architecture. There are two large libraries: that of Göttingen University, and the Royal Library in the capital. The Royal Theatre of Hanover holds a creditable rank in Germany.

POPULATION. The population of the province was 2,422,020 in 1890; in 1900, 2,590,336, of whom 2,227,816 were Protestants. The population per square mile was 174.2 in 1900. There were 1784 emigrants in 1900, nearly all to the United States.

HISTORY.

The early history of Hanover is that of Brunswick. In 1235 Otho, the grandson of Henry the Lion, of the famous House of Guelf (Welf) was recognized as Duke of Brunswick by the Emperor Frederick II. On the death of Ernest the Confessor, Duke of Lüneburg, in 1546, his dominions were divided between his sons, Henry, who became the founder of the Brunswick-Wolfenbüttel line, and William, who founded the new line of Brunswick-Lüneburg. (See BRUNSWICK, HOUSE OF.) Several divisions were made among the members of this family, the most important of which occurred in 1635, when George, the son of William, received the principalities of Calenberg and Göttingen, and took up his residence in the city of Hanover. Duke George died in 1641, and was succeeded by his son, Christian Louis, who in 1648 succeeded to the possession of Lüneburg, transferring Calenberg to his brother George William. In 1665 George William in turn secured Lüneburg, and Calenberg fell to the possession of his younger brother John Frederick, who was succeeded by still another brother, Ernest Augustus, in 1679. This prince introduced the law of primogeniture into the succession of the principality in 1683, and in 1692 secured the electoral dignity for his house from the Emperor Leopold I., becoming Elector of Hanover. He married Sophia, the daughter of Elizabeth, wife of the Elector Palatine, Frederick V., and the granddaughter of James I. of England, thus connecting the Hanoverian house with that of England and Scotland. Their son, George Louis, succeeded his father in the Duchy of Calenberg and in the electoral dignity in 1698, and, by marrying his cousin Sophia Dorothea, he united the two duchies of Calenberg and Lüneburg, on the death, in 1705, of George William. In 1714, on the death of Queen Anne, George Louis, Elector of Hanover, ascended the throne of Great Britain as George I. (q.v.), being the nearest Protestant heir, through his mother, the Electress Sophia. With George, a brighter epoch opened for the inhabitants of Hanover, who were relieved from the burden of maintaining the court and ducal household, while the revenues of the Crown were thenceforth appropriated solely to

the general purposes of the State. The secularized sees of Bremen and Verden were obtained in 1715 by purchase from Denmark. George II., who succeeded in 1727, participated in the War of the Austrian Succession as an ally of Austria. In the Seven Years' War, however, during which Hanover suffered materially at the hands of the French, who were the allies of Austria, he sided with Prussia. This King founded the University of Göttingen in 1734. The first thirty years of the reign of George III. (q.v.) of England, who succeeded to the Electorate of Hanover on the death of his grandfather in 1760, contributed largely toward the prosperity of the electorate. Like the other States of Northern Germany, Hanover profited by the increased English and American trade, for which the Hanoverian ports and rivers formed the regular channels of communication with the rest of Germany. In 1793-95 Hanoverian troops took part in the wars against the French Republic, but the expense of their maintenance was defrayed by England, and it was not till 1801, when Prussia, refusing to acknowledge the neutrality of Hanover, threw troops into the electorate, that Hanover suffered from the consequences of the anomalous position in which its relations to England placed it with regard to the other States of Germany. The Prussian troops evacuated Hanover in the following year, in accordance with the treaty entered into between France and England. In 1803, when war was renewed between the two powers, Napoleon threw an army, under the command of Mortier, into Hanover, and the result of this measure was to compel the Hanoverian Government to enter into a convention by which it bound itself to abstain from taking part against France during the pending war; to give up fortresses and munitions; to subsidize French troops; and to participate unconditionally in the general costs of the war. In 1807, Napoleon, after having ceded Hanover to Prussia, and again withdrawn it, appropriated a portion of the electorate to complete the newly formed kingdom of Westphalia, which in 1810 received the whole of the Hanoverian territory. Later in 1810 a portion of Hanover was united with France, and divided into the departments of Bouches de l'Elbe, Bouches du Weser, and Leine. After the expulsion of the French, Hanover was handed over to George III., November 4, 1813. The Congress of Vienna raised Hanover to the rank of a kingdom and granted it important territorial additions.

In 1816 the Duke of Cambridge, brother of the Prince Regent of England, became Governor-General of Hanover; and in 1819 a new constitution was granted, providing for two representative chambers. The Government remained largely autocratic, however, and the influence of Count Münster was paramount in Hanoverian affairs. Very little was done toward the improvement of the administration, and when William IV. ascended the throne in 1830, the general disaffection and distrust had risen to the highest pitch. The influence of the July Revolution extended to Hanover, and in 1831 disturbances broke out at Osterode and Göttingen. These were speedily put down, but as the national discontent did not abate, Count Münster was dismissed, and the Duke of Cambridge, who had hitherto acted as Governor-General, was invested with the title of Viceroy, and intrusted with very extensive powers. The Duke recommended gradual reforms, but as the popular feeling was decidedly in favor of a thoroughly remodeled constitution, the Estates were convoked, and in September, 1833, a new organic instrument was promulgated. The death of William IV., in 1837, placed Hanover under the rule of the next male heir, Ernest Augustus, Duke of Cumberland, son of George III. One of the first measures of the new King was to abrogate the Constitution of 1833, to which he had from the time of its adoption refused his assent, and to restore that of 1819. In consequence of their refusal to take the oath of allegiance required from all persons holding office under the State, seven of the professors at Göttingen, among them Dahlmann, Ewald, Gervinus, and the brothers Grimm, were expelled from the university. In 1840 a new constitution was promulgated; but its limited concessions failed to satisfy the demands for a thoroughly constitutional government. From this period till 1848, when the success of the French Revolution compelled the German rulers to adopt a more liberal policy toward their subjects, the King showed himself resolutely averse to reform, though the Hanoverian people themselves were strongly in favor of the Constitution of 1833. Only the danger of a revolution in 1848 forced the King to grant a constitution more liberal in nature than even that of 1833. The danger once over, however, he reverted to his former policy and dismissed his liberal Ministry. A revolution was prevented by his death in 1851. Ernest Augustus was succeeded by his son George V., who, though blind, was active and energetic. He cherished high ideas of the royal power and favored the claims of the aristocracy. The early measures of the new King were not calculated to allay the fears entertained of his policy; but the decisive declaration of the Chambers that they were desirous of seeing the reforms completed which had been begun by the late King, and their expression of want of confidence in the new Cabinet, prevented any marked retrogressive movement on the part of the Ministry. In 1854 Hanover joined the German Zollverein. In 1855 the Constitution underwent various modifications in accordance with the demands of the federal Diet, by which it was made to approximate more closely to that granted by Ernest Augustus in 1840. Although the changes were unpopular, they met with no energetic opposition. In the war of 1866 Hanover threw in her lot with Austria, and in June the kingdom was occupied by Prussian troops, and on the 28th of that month the Hanoverian army was forced to capitulate. By the Peace of Prague the incorporation of Hanover with Prussia was recognized. Both George V., who died in 1878, and his son, Ernest Augustus, Duke of Cumberland (q.v.), refused to acknowledge the act of annexation, and went into exile. On this account, their private estates in Hanover were sequestrated by Prussia, the proceeds being denominated the Guelph Fund (q.v.). The Hanoverian Deputies kept up a constant protest in the Reichstag against the annexation, but finally, in 1892, Ernest Augustus renounced any intention of intriguing against Prussia, and the income of the Guelph Fund was handed over to him.

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HANOVER. The capital of the Prussian Province of Hanover (q.v.), formerly the capital of the Hanoverian kingdom, situated in a low, level region, on both sides of the Leine, which here becomes navigable, in latitude 52° 22′ N., and longitude 9° 45′ E. (Map: Prussia, C 2). Its area is over 16 square miles. The mean annual temperature is 48.5° F.—January 34.2°, July 65.4°; average rainfall 22.61 inches.

Hanover is composed of the Altstadt (old town), the Aegidien-Neustadt, the Calenberger-Neustadt (dating from the thirteenth century), inclosed by the Leine and its little tributary the Ihme, and a number of suburbs. The town of Linden lies beyond the Ihme. Fifteen river bridges facilitate the communication between the various sections of the city. The environs abound with spacious parks and promenades which ennoble the city and justify its fame for dignified beauty. The Eilenriede—the city forest (about 1650 acres)—adjoins the town on the east, and contains the zoölogical gardens. The magnificent wide Lindenallee, about one and one-half miles long, is celebrated, as well as the Grosse Garten, laid out by Le Nôtre and richly adorned with statues, etc. The Herrenhausen Castle, with its parks, its great fountain, and its rare collection of palms, is visited by all tourists, as is also the fine adjacent mausoleum containing monuments to Ernest Augustus and his Queen, by Rauch. In the oldest portion of Hanover are found many houses dating from the fifteenth and sixteenth centuries, with stucco facades. The newer parts of the city are generally modern in appearance, being handsomely built of stone and brick, and profusely adorned with monuments, fountains, etc. Among the conspicuous recent edifices are the magnificent municipal buildings, such as the railway station and the new Rathaus. The most venerable church in Hanover is the fourteenth-century brick Marktkirche, situated in the centre of the old town. It has a tower 300 feet high, and contains some fine stained glass and a carved altar. The Gothic Ægidienkirche, dating also from the fourteenth century, with a Renaissance tower, the modern Christuskirche with its fine stained glass, the Roman Catholic Marienkirche, and the old Nikolaikapelle, are the other noteworthy ecclesiastical edifices. In the churchyard of the Gartenkirche lies buried Goethe's famous Lotte (Charlotte Kestner), whose family has long been identified with Hanover.

Among the secular buildings the most prominent are the Royal Palace, originally constructed in the seventeenth century, and rebuilt in 1817, with its majestic colonnade, its fine chapel containing a beautiful altarpiece by Cranach, and interesting frescoes; two other royal palaces associated with the history of the reigning families of Hanover and England, among them the old palace of George V., which was the favorite palace of George I. and George II. of England, and now used as a town hall; the splendid old late-Gothic Rathaus, built in 1439-55 and recently restored, with a frescoed Ratskeller by Schaper, and a bronze Gothic fountain in front; the Royal Theatre, completed in 1853, with an attractive façade decorated with statues of famous dramatists and composers, and, in the foreground, a statue of Marschner, formerly conductor of the Hanoverian Royal Orchestra; the provincial museum; the Kestner museum; and the barracks, situated on the Waterlooplatz. This square is adorned by the Waterloo Column, surmounted by a figure of Victory, erected in 1826-32 in honor of the Hanoverians who fell at La Haye Sainte. Among the numerous monuments in the city are the fine bronze equestrian statues of King Ernest Augustus, by A. Wolff; the imposing war monument (one of the best in Germany) by Voltz, dating from 1884, with symbolic figures of Germania and Hanover; and Dopmeyers's famous artistic "Goose-girl fountain." Another object of interest is Leibnitz's house, recently restored by Haupt.

The city is a well-known educational centre, and a favorite place of residence for foreign families, who are attracted not only by the pleasant and quiet charm of the capital, but by the purity of the German spoken there. The educational establishments comprise a school of technology (one of the four in Prussia), having various interesting collections, and an attendance of nearly 1500; a veterinary high school (one of the two in Prussia), founded by George III. of England in 1778; several seminaries for teachers; a decorative art high school; and a number of lyceums and military and industrial schools. The Royal Library contains over 200,000 volumes and 3500 manuscripts. The municipal library is also rich in manuscripts. The new provincial museum has among its various treasures an important collection of pre-Christian antiquities, two picture-galleries of minor interest, including both ancient and modern canvases, and some statuary by Canova and Rauch. The Kestner Museum contains Egyptian and Roman antiquities, old manuscripts and incunabula, the famous Eulemann collection, paintings, miniatures, etc. The Royal Theatre, with seats for 1800, is one of the leading theatres of Germany of the second rank. There are two good private theatres. The city has a celebrated military riding-school, and numerous scientific, historical, art, and art-industrial organizations, as well as important hospitals and charity homes.

The city, as the capital of the Province of Hanover, is the seat of the Presidency and the higher courts. The administration of the city is in the hands of a director, a syndic, an executive board of fifteen senators or magistrates, and a municipal council of 24 members. The city is lighted by electricity, has an electric street railway, good water-works, and owns a market and a slaughter-house. Its budget for 1901-02 nearly balanced at about $2,100,000.

The industrial importance of the city has been greatly increased in late years by reason of the

improvement in its railway connections. It is now a railway and a manufacturing centre. Among the larger industrial establishments are an oilcloth factory, a railway repair-shop, a number of machine-shops, iron foundries, iron-bridge works, piano-factories, and chemical works. There are also produced lacquer ware, books, lamps, liquors, and asphalt. Leather is an important output. The trade, which is of considerable magnitude, is actively promoted by a number of prominent commercial, agricultural, and manufacturing associations, banks, and other institutions of credit. The city is the seat of the leading industrial provincial organizations. The population of Hanover proper was 163,593 in 1890, and 235,649 in 1900—an increase of 12 per cent. It is the tenth city in size in Germany and the fifth in Prussia. The population of greater Hanover (including several adjacent towns not officially incorporated, but closely allied with the city) was 302,054 in 1900. Nearly all the population is Protestant. Consult: Hoppe, *Geschichte der Stadt Hannover* (Hanover, 1845); Hartmann, *Geschichte der Residenzstadt Hannover* (Hildesheim, 1886) Hirschfeld, *Hannover's Grossindustrie und Grosshandel* (Leipzig, 1891).

HISTORY. Hanover originally was a little fishing town, and nothing is known of it worth recording until 1203, at which time Henry, the son of Henry the Lion, Duke of Saxony, received it with his share of lands left by his father. He soon handed it over to his nephew Otho, the founder of the House of Brunswick. From Duke Otho, Hanover received in 1241 a municipal charter, and soon after it joined the Hanseatic League, in which, however, it played only a minor rôle. Its importance rose after 1636, when it became the residence of one line of Brunswick dukes. (See HANOVER, Province.) In 1714, however, the Elector of Hanover became King of England, and until 1837 the city was a monotonous provincial town. Upon the death of William IV. of England, Ernest Augustus, Duke of Cumberland, the new King of Hanover, took up his residence here. In 1866 the Kingdom of Hanover was annexed to Prussia, and since then the city has been the capital of the Prussian province of the same name. Hanover has grown rapidly in recent years, and is more prosperous under Prussian rule than it ever was as the capital of an independent kingdom.

HANOVER. A town in Grafton County, N. H., 55 miles northwest of Concord, on the Connecticut River, opposite Norwich, Vt., with which it is connected by a bridge (Map: New Hampshire, F 7). It is the seat of Dartmouth College (q.v.), and has the Mary Hitchcock Memorial Hospital. There are minor manufactures, but the town is interested mainly in agriculture, dairying, and lumbering. Population, in 1890, 1817; in 1900, 1884.

HANOVER. A borough in York County, Pa., 42 miles north by west from Baltimore, Md., on the Pennsylvania and the Western Maryland railroads (Map: Pennsylvania, E 4). It is in a productive agricultural region which also has iron-ore deposits, and is of considerable commercial and industrial importance, its manufactures including cigars, gloves, shoes, machine-shop products, and carriages. Settled about 1730, Hanover was incorporated in 1813. It is governed by a burgess, elected triennially, and a borough council. Population, in 1890, 3746; in 1900, 5302.

HANOVER COLLEGE. An educational institution situated at Hanover, Ind.; chartered as an academy in 1828, and as a college in 1833. It is under Presbyterian control, and since 1880 has admitted women. The number of students was, in 1902, 100 in the academic department, and 50 in the preparatory and musical departments. At the same time the college had a library of 17,000 volumes, an endowment of $200,000, grounds and buildings valued at $175,000, and an annual income of $14,000. No tuition fee is charged. The college provides a course for teachers and offers degrees in arts, science, letters, philosophy, divinity, and law.

HANOVER COURTHOUSE, BATTLE OF. An engagement fought at Hanover Courthouse, 17 miles north of Richmond, Va., on May 27, 1862, between a part of the Federal Army of the Potomac under General Fitz-John Porter and a Confederate brigade under General Branch, the latter, after offering a stubborn resistance, being driven from the field. The Federals lost 355 in killed, wounded, and missing; the Confederates 265.

HANOVER SQUARE. A London square, laid out in 1731. Near it stands Saint George's Church, the scene of the most fashionable London weddings.

HANSA, THE. See HANSEATIC LEAGUE.

HAN'SARD. A well-known name in connection with the printing of the British Parliamentary records. The first of the family was Luke Hansard, who was born in 1752 at Norwich, and coming to London, worked for some years as compositor in the office of Hughes, the printer to the House of Commons, and in 1800 succeeded Hughes as sole proprietor of the business, which is still carried on by his family. Competition and other causes have led to a division of the Parliamentary printing, but the Messrs. Hansard still print the bills before Parliament, the reports of committees, and some of the accounts.

The name of Hansard is connected with an important question of Parliamentary privilege. The case was briefly as follows: A bookseller named Stockdale brought an action for libel against the Hansards, the libel consisting of statements in the Parliamentary reports which the latter had printed, and Lord Chief Justice Denman decided in favor of Stockdale. This decision seemed to violate the clause in the Bill of Rights that "debates and proceedings in Parliament ought not to be impeached or questioned in any court or place out of Parliament." A committee of the Commons reported that Parliament, and each House, had a right to authorize the publication of such matter as it believed to be for the public good, and further that to call this right in question was contrary to law and a breach of privilege of the House. The right to publish must necessarily carry with it the right to protect the publishers. So the struggle began, and, before it ended, the Sheriff who served the decrees of the courts, the attorneys of Stockdale, as well as Stockdale himself, and many others, were imprisoned by the authority of the Commons. On the other hand, the property of the Hansards was seized under the decrees of the

court. After three years of strife and debate Parliament ended the anomaly of a conflict between the two departments of Government, and also did away with the antiquated methods of Parliamentary redress, by enacting a law that any proceedings against persons for publication of papers printed by order of either House of Parliament are to be stayed by the courts of law, upon delivery of a certificate and affidavit that such publication is by order of either House.

The Hansards are, however, most widely known by the reports of the debates in Parliament, which are published by them and bear their name. The accuracy of these reports is rarely questioned. They are not, however, prepared by shorthand reporters employed by the Hansards, but are compiled from the reports in the London newspapers, and then submitted to the speakers for correction. The speeches as they appear in Hansard are not, therefore, in all cases the spoken words, but frequently are the product of the closet, the reviser inserting in many cases what he intended to say, or wished he had said, and omitting the heated passages which he regretted to have uttered. Cobbett's—often called Hansard's—*Parliamentary History* (1066-1803) in 36 volumes furnishes the most complete available record of its proceedings during these centuries. Since 1803 the Hansards have published the debates of Parliament in four series: (1) 1803-20, in 41 volumes; (2) 1820-30, in 25 volumes—an index of the whole forming an extra volume; (3) 1830-91, in 356 volumes; (4) the present series: begun in 1892, by 1900 76 volumes had been published. The executive Government takes a certain number of copies of *Hansard* for distribution among the public offices and departments. Many peers and members of Parliament, foreign governments, and public libraries, also subscribe to this work, which is issued at a certain fixed price, which the Messrs. Hansard guarantee, at the commencement of each session, shall not be exceeded.

HANSCH, hänsh, ANTON (1813-76). An Austrian painter, born in Vienna. He was a pupil of Mössmer at the Academy of Vienna, and afterwards traveled and studied in Germany, Belgium, Switzerland, and Italy. His works consist of landscapes remarkable for composition and careful detail. Notable pictures are: "Region Bordering on the Königsee" (1849); "The Jungfrau in Switzerland" (1853); "Under the Linden Trees on the Shore of Chiem Lake" (1858), all in the Vienna Museum; "The Lake of Constance," "Firwood in the Salzkammergut" (Vienna Academy); "From the Wilderness of Styria," "At Bernina Pass," "After the Storm," and "The Wetterhorn."

HAN'SEAT'IC LEAGUE, or **HAN'SA**, THE (from OHG. *hansa* [*hanse*], Goth. *hansa*, AS. *hōs*, league). A union established in the thirteenth century by some of the cities of Northern Germany for their mutual safety and for the protection of their trade. This union grew out of associations of German merchants organized abroad. In order to travel and trade with greater security, these had long been accustomed to band themselves together into companies; and through such associations had secured privileges in certain cities, notably in London, Novgorod, Bergen, in Norway, Bruges, and Wisby, in Gothland, off the coast of Sweden. In London the merchants of Cologne had obtained a letter of protection as early as 1157, and other German merchants who resorted to London joined the Cologne Hanse. When Lübeck, in the thirteenth century, began to threaten the supremacy of Cologne, the merchants of the latter city endeavored to exclude the men of Lübeck from trading in England. Possibly this opposition was influential in causing Lübeck to seek allies to strengthen its position. Between 1241 and 1255 she entered into a treaty with Hamburg for the mutual protection of the commercial highway between the two cities. This alliance, which is often regarded as the origin of the Hanseatic League, resulted in putting the control of commerce in the Baltic and the North Seas into the hands of the merchants of Hamburg and Lübeck. In 1259 Lübeck, Rostock, and Wismar formed an alliance against pirates on the sea and robbers on land. In 1267 the merchants of Lübeck were allowed to form a separate hanse in London. In 1284-85 the five Wendish cities of Lübeck, Wismar, Rostock, Stralsund, and Greifswald waged war against King Eric of Denmark, and secured from him certain privileges. Before the end of the thirteenth century Cologne had been forced to take a subordinate position, and Lübeck was the recognized leader.

In the thirteenth century there were several instances of alliances formed between different groups of cities. These allied cities gradually found it advantageous to join the Lübeck union, which was constantly becoming more powerful. In 1343 it was officially designated as The Hansa. In 1362 the allies began a war against Waldemar IV. of Denmark, who had attacked Wisby in 1361, and in 1370 Denmark was compelled to conclude a treaty with the 'seventy-seven hansen,' in which the latter were guaranteed freedom to trade and an indemnity for the losses which they had suffered. In addition, it was agreed that no one in the future should receive the Danish crown without the advice of the cities and without the confirmation of the privileges of the Hanseatic League.

The entire League, which at one period embraced at least eighty-five towns, and included every city of importance between the Netherlands and Livonia, was divided at first into three, and later into four, classes or circles: (1) The Wendic cities of the Baltic; (2) the towns of Westphalia, the Rhineland, and the Netherlands; (3) those of Saxony and Brandenburg; (4) those of Prussia and Livonia. The capitals of the respective circles were Lübeck, Cologne, Brunswick, and Danzig.

The professed object of the League was to protect the commerce of its members by land and by sea, to defend and extend its commercial relations with and among foreigners, to exclude as far as possible all other competitors in trade, and firmly to maintain, and, if possible, to extend, all the rights and immunities that had been granted by various rulers to the corporations. For the promotion of these ends, the League kept ships and armed men in its pay, the charge of whose maintenance was defrayed by a system of taxation and by the funds obtained from the money fines which the Diet levied for infringements of its laws. In its factory at Bergen, in Norway, only unmarried clerks and serving men were employed, and an almost monastic discipline was enforced; but the by-laws of the

League prescribed a system of daily sports and light occupations for the recreation of the men, while judicious regulations for their comfort and cleanliness, and for the celebration of festivals at certain fixed times of the year, bear evidence of the sound sense that influenced the mode of government of the Hansa. This was further shown by the injunction to the masters of its factory to avoid everything that could hurt the prejudices of the foreigners among whom they were placed, and to conform in all things lawful to the habits of the country. At the Steelyard in London, where a German hanse was established as early as 1250, the regulations were similar in their severity to those of Bergen, and probably the customs at other factories were not far different.

For many years the Hanseatic League was the undisputed mistress of the Baltic Sea and the German Ocean. It created new centres of trade and civilization in numerous parts of Northern Europe, and contributed to the expansion of agriculture and of the industrial arts by the construction of canals and roads. It carried on trade with every European country. The greatest powers dreaded its hostility and sought its alliance, and many of the powerful sovereigns of the Middle Ages were indebted to it for most substantial benefits.

The League reached its culminating point in the fifteenth century. Its decline was rapid. In proportion as the seas and roads were better protected by the States which now arose in Europe with the passing of the old feudal anarchy, and as rulers learned to comprehend the true commercial interests of their dominions, the power of the Hansa declined. The discovery of America and of the new sea route to India gave an entirely different direction to the trade of Europe. The Hansa had, moreover, arrogated to itself, in the course of time, the right of imposing the greater and lesser ban, and of exercising other acts of sovereignty which were incompatible with the supremacy of the rulers in whose States they were enforced. Hence the League was necessarily brought into frequent hostile collision with the local authorities. In accordance with their narrow commercial policy, the Hansards refused to grant to merchants trading in foreign parts the same privileges in the Hanseatic cities which they themselves had enjoyed for centuries in England, Russia, and Scandinavia, and hence arose dissensions, which not unfrequently ended in a fierce maritime warfare. By way of retaliation for the pertinacity with which the League refused to grant to the English the same immunities which had been accorded to traders of other nations, the English Parliament required that Germans should pay the tax on wool and wine which was exacted from all other foreigners in the English markets; and although the Hansards strongly resisted, they were at length condemned by the courts, in 1469, to pay a fine of £13,500. They would probably have lost all they possessed in England if their cause had not been advocated by Edward IV., who had more than once been indebted to them for money and aid, and who in 1474 secured for them, by a clause in the Treaty of Utrecht, a restitution of nearly all their former rights in England. In 1598 their obstinacy in insisting upon the maintenance of their old prerogatives, notwithstanding the altered condition of the times, drew upon them the anger of Queen Elizabeth, who dispatched a fleet under Drake and Norris to seize upon the ships of the Hansa, sixty-one of which were captured. At the same time she banished the Hansards from their factory in London. These measures had the desired effect of compelling the League to receive English traders on equal conditions, and thenceforward the Hansards were permitted to occupy the Steelyard, as before. The Hansa had, however, outlived its usefulness, and at the Diet held at Lübeck, in 1630, the majority of the cities formally renounced their alliance. Hamburg, Lübeck, Bremen, and for a short time Danzig, remained faithful to their ancient compact, and continued to form an association of free republics, which existed unchanged until 1810, when the first three were incorporated in the French Empire. In 1815 they became members of the German Confederation. By a convention concluded in July, 1870, the powers and privileges of the three free towns were reëstablished and reorganized, and under the new German Empire they still retain their self-government. Consult: Sartorius, *Geschichte des hanseatischen Bundes* (Göttingen, 1802-08); Barthold, *Geschichte der deutschen Hansa* (Leipzig, 1854); *Hansische Geschichtsblätter* (Leipzig, 1871 et seq.); *Hansische Rezesse* (21 vols., Leipzig, 1873-99); Lindner, *Die deutsche Hansa* (Leipzig, 1901); Helen Zimmern, *The Hansa Towns* (New York, 1889).

HANSEMANN, hän'se-mân, David Justus Ludwig (1790-1864). A German publicist and statesman, born at Finkenwerder, near Hamburg. He set up as a wool-dealer at Aix-la-Chapelle in 1817, and after having attained considerable reputation in commerce and through railway construction, was elected a Deputy in the Provincial Diet of Rhenish Prussia in 1845. In 1847 he was elected a member of the United Diet, in which he became conspicuous as a leader of the Liberal Opposition, and in 1848 he was for a brief period Prussian Minister of Finance. He was the founder of the Diskontogesellschaft of Berlin, one of the most important financial institutions of Germany. His published works deal with economic and political topics of his time, and include: *Preussens wichtigste Eisenbahnfrage* (1837), and *Das preussische und deutsche Verfassungswerk* (1850).

HANSEN, hän'sen, Gerhard Henrik Armauer (1841—). A Norwegian physician, born at Bergen. He is known chiefly as the discoverer of the bacillus of leprosy. He received his early education in the cathedral schools of his native city, and on the completion of his medical studies became resident physician in the Rigshospital of Christiania. Later he spent some time as medical officer at the great Lofoten fisheries. In 1868 he was made assistant medical officer to the Bergen Leper Hospital, of which Danielssen was director. It was under the influence of this teacher that Hansen began his lifelong study of leprosy. Hansen's first investigation was to work out the significance of the 'leper cells' of Virchow. After more study in various universities, he returned to Norway to resume his investigations of leprosy. His researches pointed to the contagious and specific nature of the disease, and in recognition of the value of his work the Medical Society of Christiania voted a sum of money to enable him to continue his studies.

In his journeys about the country he came across instances of the disease which were explainable only by the theory of contagion. The conclusions at which he thus arrived conformed with those of Drognat-Landré, who had studied leprosy in Surinam, and who had published his views in 1869. Hansen's further labors were rewarded by the discovery of a bacillus in unstained preparations. Later the micro-organism was stained, and became known as Hansen's bacillus. This was in 1873. Subsequently Hansen for years tried to cultivate and inoculate the leprosy bacillus, but his efforts were unsuccessful. Nevertheless, legislation called forth by Hansen's proof of the contagious nature of leprosy has effected a marked diminution of the disease throughout Norway.

HANSEN, Hans Christian Peter (1840—). A Danish critic, born at Copenhagen. Noted as a journalist and critic, he became editor of *Nær og Fjern* (1872-80), a high-class newspaper, afterwards called *Illustreret Tidende*, which he also edited from 1880 to 1884. He made a Danish rendering of Goethe's *Faust* (1881-89), and his original publications include: A romance, *Kristian Kjobenhavner* (1882); an illustrated history of Danish literature, *Illustreret dansk Literaturhistorie* (1886); and a history of the Danish theatre, begun in 1889.

HANSEN, Maurits Christopher (1794-1842). A Norwegian poet and novelist, born at Modum. He was a teacher, and prepared numerous text-books, but is best known by his novels. They were the first accurately to describe the life and surroundings of the small towns of his own country, and were very popular. They include: *Luren; Den gale Christian;* and *Bjergmanden*. After his death a collection of them was made by Schwach (8 vols., Christiania, 1855-58). A further selection, *Noveller i Udvolg*, was printed at Christiania in 1882. Hansen also wrote a volume of poems, *Digtninger* (1816).

HANSEN, Peter Andreas (1795-1874). A German astronomer, born in Schleswig. He was employed by Schumacher, director of the Altona observatory, to assist in the measurement of an arc of the meridian in Holstein. In 1825 he succeeded Encke as director of the observatory of Seeberg, near Gotha, where he remained for the rest of his life. He devoted his attention chiefly to the lunar theory, and his *Tables de la Lune* (1857) were so excellent that they were awarded a prize of £1000 by the British Government, and were published at its expense. The tables have been adopted for use in the calculations of the various astronomical ephemerides and nautical almanacs. Hansen was also the author of a large number of papers relating to the determination of the orbits of comets and planets. Hansen was a foreign member of the Royal Society of England, and an associate of the English Royal Astronomical Society, and was on two occasions awarded their gold medal for his research work in astronomy and his lunar tables. He will rank for all time as one of the first mathematical astronomers of the nineteenth century.

HANSEN, Theophilus von (1813-91). An Austrian architect, born in Copenhagen. He studied in the Copenhagen Academy, and for further training traveled extensively in Italy and Greece. At Athens he practiced his profession to some extent, until the Revolution of 1843 compelled him to withdraw to Vienna, where he was appointed superior councilor of architecture in 1869, and was for several years professor of architecture in the Academy of Fine Arts. He was an exponent of the classic Greek style, and executed numerous works at Vienna, including the Greek Church, the restored façade of the Sina Palace, the Academy of Fine Arts, the Bourse, and the Epstein Palace. Niemann and Feldegg published *Theophilus Hansen und seine Werke* in an edition de luxe at Vienna, in 1893.

HANSE TOWNS, Laws of the; also known as the Hanseatic Code. A code of maritime law, ordained for the regulation of commerce by the towns comprised in the Hanseatic League. It was established about the end of the sixteenth century, and enjoyed great authority until superseded nearly a century later by the *Guidon de la Mer* and the *Ordonnance de la Marine* of Louis XIV. It was first published in German in 1597, and in 1614 was revised and enlarged by a congress of delegates from the several towns of the League, which was held at Lübeck. It has been translated into Latin (by Kuricke) and French (by Cleirac, in *Us et Coutumes de la Mer* (Paris, 1647).

HANSLICK, hāns'lĭk, Eduard (1825—). An Austrian musical critic and author. He was born at Prague, and prepared himself for the bar, studying law at Prague and Vienna. In 1849 he received his degree of doctor of law, and entered the Government service; but the attraction which music had for him gradually drew him into the career he subsequently followed. His studies under Tomaschek at Prague, and later his experiences as musical critic of the *Wiener Zeitung* (1848-49), increased his interest in music. His most prominent characteristic was an uncompromising antagonism to exaggerated and foolishly sentimental criticism in music, and his celebrated work, *Vom Musikalisch-Schönen: ein Beitrag zür Revision der Aesthetik der Tonkunst* (1854; 10th ed. 1902), is particularly severe. He was one of Wagner's most bitter opponents, and one of the last of the critics to recognize the possibilities in the new style of opera. His position with regard to the emotional content of music is, that music is incapable of conveying any meaning other than the one inherent in the tonal sequence. Few men of his day and generation have exercised a more healthy or restraining influence on musical criticism and the treatment of so-called programme music than Hanslick. It has been charged that he was unsympathetic, and that his legal training precluded a true conception of the real content of music. He was for many years musical editor of the *Neue Freie Presse*, and has been since 1861 professor in Vienna University, in the department of musical history and æsthetics. He is the author of many valuable treatises and works connected with his life work, among them being: *Geschichte des Konzertwesens in Wien* (1869-70); *Die modern Oper* (1875-1900); and *Konzerte, Komponisten und Virtuosen der letzten fünfzehn Jahre* (1896). His autobiography, *Aus meinen Leben*, appeared in 1894.

HAN'SOM, Joseph Aloysius (1803-82). An English architect and inventor. He was born at York, and began to practice his profession as an

architect at Halifax in 1825. He designed and built the Birmingham Town Hall, which he completed in 1833; but he became bankrupt under the terms of his suretyship for the builders. In 1831 Hansom patented a safety cab. The modern vehicle which bears his name differs materially from the original one. After 1842 he resumed his work as an architect, ecclesiastical and domestic, chiefly for the Roman Catholic Church, to which he belonged. Among the best known of the buildings designed and erected by him are Saint Walburge's Church, Preston, Lancashire; the cathedral at Plymouth; the Church of Our Lady and Saint Philip Neri at Arundel; the Jesuit church at Manchester; the Church of Saint François de Sales, near Boulogne; and Saint Asaph College.

HANSOM CAB. A light two-wheeled, one-horse, covered carriage, with the driver's seat elevated behind. It received its name from the inventor. See CARRIAGE.

HAN'SON, ALEXANDER CONTEE (1786-1819). An American editor and politician, born in Maryland, and educated at Saint John's College, Annapolis. As editor of the *Federal Republican*, of Baltimore, he published an article in 1812 attacking the Madison Administration with such bitterness that a mob, by way of reprisal, wrecked his office. A subsequent attempt to continue publication led to renewed violence, and he and a number of friends and supporters were removed to the local jail for safety. The populace, however, made its way into the jail, wounded Hanson and others, and killed General Lingan. From 1813 to 1817 Hanson was a Federalist member of the National House of Representatives, and from 1817 until his death was in the Senate.

HANSON, LEVETT (1754-1814). An English author, born in Melton, Yorkshire. He was a lifelong friend of Admiral Nelson, with whom he went to school at Walsham, Norfolk. Hanson studied at Cambridge, but went abroad when twenty-two years old, and spent the remainder of his life there, with but occasional visits to England. He was the recipient of many foreign orders and honors, while his experience in European courts gave him opportunity to collect material for his book, *An Accurate Historical Account of All the Orders of Knighthood at Present Existing in Europe* (1803). This was dedicated to Nelson, and his *Miscellaneous Compositions in Verse* (1811) to another friend, Warren Hastings.

HANSTEEN, hän'stĕn, CHRISTOPHER (1784-1873). A Norwegian astronomer, born at Christiania. At first intended for the legal profession, he subsequently devoted himself entirely to the study of mathematical science. In 1814 he was appointed to the chair of mathematics in the University of Christiania, and there, in 1819, published his celebrated work on magnetism, which was afterwards translated into German under the title *Untersuchungen über den Magnetismus der Erde*, and produced a great sensation, especially in England. He made an extensive journey to Siberia, for the purpose of making magnetic observations, in the years 1828 to 1830, and returned to Europe with a large collection of facts, which were of much service in aiding to dispel the obscurity which enveloped this subject. On his return to Christiania he prevailed upon the Government to erect an observatory, fitted also for magnetic observations. Besides occupying his chair in the university, Hansteen was professor of mathematics in the school of artillery, superintended the triangulation of Norway, and helped in the reorganization of the national system of weights and measures. He published lectures on astronomy, a work on mechanics, another on geometry, several scientific memoirs, and was one of the editors of the *Magazin for Naturvidenskaberne*.

HANSWURST, häns'vo͝orst (Ger., Hans Sausage). The conventional buffoon in old German comedy. The name first appears in 1519, and is used by Luther in his *Wider Hanns Worst* in 1541, and as the name of a peasant in a play of 1553, but first occurs in 1573 as the title of a character in comedy. The character received its conventional form and garb at Vienna, about the beginning of the eighteenth century, when Joseph Stranitzky represented it as a simple countryman of Salzburg. A bitter fight was waged against the existence of Hanswurst on the German stage, and he was defended by Lessing in his *Hamburgische Dramaturgie*.

HANTS. A colloquial name for the English county of Hampshire (q.v.).

HANUMAN, hä'no͞o-män. The sacred monkey of India, representing the god Hanuman (q.v.). See LANGUR; MONKEY; and Plate of MONKEYS OF THE OLD WORLD.

HANUMĀN, or HANŪMĀN. A famous monkey chief in Hindu mythology and the legends of the epic period of India, and still a favorite divinity in Hindustan. He is represented in the Sanskrit epic *Rāmāyana* (q.v.) as the special ally and friend of Rāma, and as leading the monkey hosts that helped this hero to recover his wife Sītā, who had been carried off by the demon Rāvana. The exploits of Hanumān play an important part in the account of this expedition and the great war which followed. On one occasion Hanumān bridged over the passage between India and Ceylon with enormous rocks, which he and his monkey followers threw into the sea. Adam's Bridge in the straits between the island and the mainland is still pointed out, according to tradition, as the remains of those boulders. Many other stories and curious legends regarding him are told in the *Rāmāyana*. His birth was semi-divine. His mother was a celestial nymph that had been cursed to assume a simian shape; his father was the god of the wind. Hence Hanumān is sometimes called Māruti, a child of the wind. His large face or monkey jaw is likewise accounted for in a legendary manner. The god Indra, angered at his youthful prowess, tried to slay him by the thunderbolt, but was able only to fell him and break his jaw. From this circumstance he received the name Hanumān, 'he of the (broken) jaw.' The monkey features, or mask-like face of this deified ape, whose idols are easily recognized by the prodigious tail, are familiar enough in India, and episodes taken from his history are found represented in sculpture or in painting almost everywhere in Hindustan. According to the *Rāmāyana*, he was an astute grammarian, and skilled in many branches of learning. His prowess is also recounted in the *Mahābhārata*, and a Sanskrit drama, the *Hanumān-nāṭaka*, celebrates his deeds in fourteen acts. It is not unlikely that

underneath the curious and uncouth figure of Hanumān and his monkey hosts we may recognize some representatives of the earlier and ruder civilization of lower India that may have joined forces with the invading Aryan civilization. The reverential regard paid to monkeys around the Hindu temples may, in a way, be associated also with Hanumān. Consult: Dowson, *Hindu Mythology* (London, 1879); Wilson, *Hindu Mythology* (London, 1900). See DRAVIDIANS; KOLARIANS; RĀMĀYANA. For illustration see Plate of Hindu Deities in the article INDIAN MYTHOLOGY.

HA'NUS, PAUL HENRY (1855—). An American educator, born at Hermsdorf unter'm Kynast, Silesia, Prussia. He was educated at the Wisconsin State Normal School (Platteville), and the University of Michigan, became a teacher, and in 1891 was appointed assistant professor of education at Harvard University. His publications include: *Elements of Determinants* (1886); *Geometry in the Grammar School* (1894); and *Educational Aims and Educational Values* (1899).

HAN'WAY, JONAS (1712-86). An English traveler and philanthropist, born at Portsmouth. On the death of his father the family moved to London, and in 1719 Hanway was apprenticed to a merchant in Lisbon. In 1743 he became interested in trade with the East, and journeyed through Persia, experiencing many hardships. After his return from Persia he spent five years in Saint Petersburg, at the end of which period he received a large bequest which enabled him to retire from business. He returned to London in 1750, where, excepting for two trips abroad, he spent the remainder of his life, devoting himself to philanthropy and literature. In 1756 he was one of the founders of the Marine Society, organized to train seamen for the navy, and two years later became a governor of the Foundling Hospital, where he was active as an opponent of indiscriminate relief. In 1758 he helped to found Magdalen Hospital for Fallen Women. Hanway was almost constantly employed in the promotion of important reforms, such as the protection of the infant parish poor and of child chimney-sweeps, the solitary confinement of prisoners, and the establishment of Sunday schools. He was, however, a man of many harmless eccentricities, of which his antipathy to tea-drinking was one of the most amusing, and his attack on the habit had the unique honor of drawing a reply from Samuel Johnson. It is said that he introduced the use of the umbrella in London, after thirty years of ridicule. As a writer Hanway was most prolific. Seventy-four books and pamphlets by him are enumerated, of which only one, his *Historical Account of the British Trade Over the Caspian Sea* (4 vols., 1753), which contains an account of his travels, is of any lasting value. The most of his writings were occasional in character, and were concerned largely with the reform movements in which he was interested. He also wrote several theological works, and *Common Sense: Nine Dialogues on the American War* (1775). As a reward for his public services, Hanway was appointed one of the commissioners for victualing the navy in 1762—an office which he held until obliged to resign, on account of ill health, in 1783. Consult Pugh, *Remarkable Occurrences in the Life of Jonas Hanway* (London, 1787).

HAN'WELL. A town in Middlesex, England, 10 miles west of Saint Paul's, London. It is the seat of the Middlesex County Lunatic Asylum (Map: England, E 4). It has a progressive municipality, owns a sewage farm and recreation grounds, and maintains an isolation hospital. Population, in 1891, 6100; in 1901, 10,400.

HAN-YANG, hän'yäng'. A departmental city of China, situated on the left bank of the Yang-tse, at the point where it receives the waters of the river Han, which separates it from Hankow. Its most conspicuous feature is Ta-pieh Shan, a precipitous hill crowned with ruined fortifications, from which a fine view of the surrounding country can be obtained. Commanding as it does both the Han and the Yang-tse, it early became an important military post, and the possession of Ta-pieh Shan was always an object of much interest to the contending parties in the numerous revolutions, rebellions, and wars which have characterized Chinese history from the earliest times. It received its present name in the sixth century, and while it continued to be a strong military post, its advantageous position for trade soon attracted attention, and it became a very populous and flourishing city. Notwithstanding its proximity to Hankow, this state of things continued until the Tai-ping Rebellion (1852-64), when it was almost entirely wiped out. Han-yang never recovered until Chang Chih-tung, Governor-General of Hu-kwang, selected it in 1889 for the site of the arsenal and the great steel and iron works, cotton-spinning factories, etc., which he has established there. The iron-works (begun in 1891) cover 70 acres, and include four immense hot-air blast-furnaces, several large steam hammers, innumerable rollers, and all the necessary machinery for producing everything required for the Hankow-Peking Railway, which he planned and which is now partly constructed. The sheds cover 20 acres. The coke used is obtained from Wales, but the ore needed in the manufacture of the rails is mined near Wang-shih King, 76 miles below Hankow. Both hard and soft coal are mined in the same neighborhood. The plant in Han-yang also includes a railway 1½ miles long, from the Yang-tse to the works, and thence to the Han, with an inclined plane on the Yang-tse bank, 300 feet high, up which the cars are hauled by powerful machinery. The whole is under foreign management.

HAN YÜ, hän yü, better known as **HAN WÊN KUNG,** hän wün kōōng (768-823). A Chinese poet, essayist, and philosopher. He was born at Tēng-chow, in Ho-nan, in 768, became a diligent student of the classics, graduated with honors at twenty-four, and shortly thereafter entered the public service. In 819, while vice-president of the Criminal Board, he incurred the displeasure of the Emperor, a great patron of Buddhism, by addressing to him a strongly worded remonstrance against certain public honors with which an alleged relic of Buddha was being conveyed to the palace. Through the intervention of friends he escaped with his head, but was dismissed from the Court and banished to a semi-barbarous region in the present Province of Kwang-tung. There he served for eight months as Governor, civilizing the inhabitants and conferring upon them many benefits. Afterwards he was recalled to the capital, restored

to high office at Court, and loaded with honors, dying at fifty-seven, in 823. He was canonized as *Wén Kung*, 'Prince of Letters,' was ennobled as Earl of Ch'ang-li, and in 1084 his tablet was placed in the Temple of Confucius. Many editions of his works have appeared, and his name is venerated as the foremost scholar in China.

HAPARANDA, hä'pä-rän'dä. The most northerly town of Sweden, situated near the mouth of the Torneå, near the northern shore of the Gulf of Bothnia (Map: Sweden, L 4). It is noted chiefly for its meteorological station, established in 1859, and known as one of the northernmost stations of the world. Population, in 1890, 1252.

HAPAXANTHIC, hă'päks-ăn'thĭc, **HAPAXANTHOUS** (from Gk. ἅπαξ, *hapax*, once + ἄνθος, *anthos*, flower). A botanical term applied to plants that blossom and fruit only once in their life cycle. They are also characterized by the almost complete absence of vegetative reproduction. The term and its synonym, monocarpic, are in contrast to pleiocyclic (q.v.). All annuals, most biennials, and a few perennials (such as the century plant) are hapaxanthic plants.

HAPHTARAH, hăf-tä'rä (plural *haphtaroth*, Heb., sections, from *pātar*, to split). The fifty-four sections from the prophets used in the synagogues on Sabbaths and feast-days, in connection with the same number of sections into which the law is divided, called *parshioth*. This reading of the law and prophets is alluded to in the New Testament (Luke iv. 17; Acts xiii. 15).

HAPLO'MI (Neo-Lat. nom. pl., from Gk. ἁπλόος, *haploos*, single + ὦμος, *ōmos*, shoulder). An order of soft-rayed, pike-like fishes, characterized chiefly by the absence of the mesocoracoid bone. They are mostly inhabitants of fresh waters, and include the mud-minnows (Umbridæ), the pikes (Luciidæ), the great group of top-minnows, killifishes, and other 'cyprinodonts' (Pœciliidæ), and the blindfish (Amblyopsidæ).

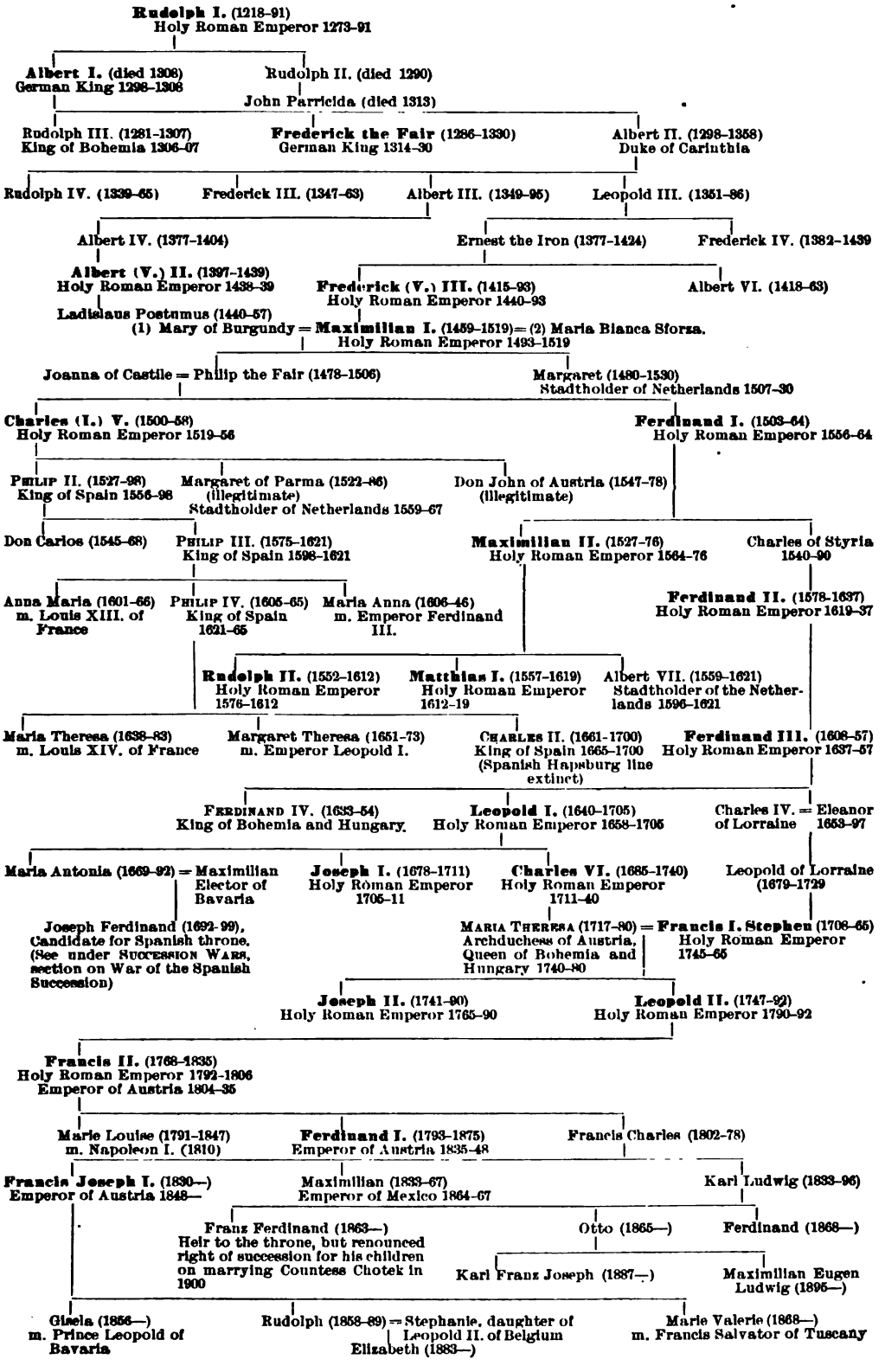
HAPPY VALLEY, THE. A blissful abode, in Johnson's *Rasselas*, which is shut in by mountain barriers from the cares and sorrows of the outside world, and accessible only through a single passage. From it the Prince of Abyssinia starts on his journey through the world.

HAPSBURG, or **HABSBURG**, häps'bŏŏrk, HOUSE OF. The Imperial royal house of Austria-Hungary. It is commonly supposed to have derived its name from the Castle of Habsburg, or Habichtsburg (Hawk's Castle), on the bank of the Aar, in the Swiss Canton of Aargau. The castle is said to have been built about 1027 by Werner, Bishop of Strassburg. His nephew, Werner I., was the first Count of Hapsburg; but the real founder of the House of Hapsburg was Albrecht or Albert III. (c.1172), the son of Werner II., who, in addition to extensive estates which he had inherited in Upper Alsace, acquired several Swiss districts (in the neighborhood of Zurich, the Lake of Lucerne, etc.). To these his son, Rudolph I., added the Countship of Aargau. On Rudolph's death, in 1232, his sons, Albert IV., the Wise, and Rudolph II., divided their father's possessions—Rudolph becoming the founder of the Hapsburg-Lauffenburg line. This branch became extinct in 1415, its possessions, except the Klettgau, reverting to the Austrian line.

The son and successor of Albert IV., Rudolph III., was elected to the Imperial throne of Germany in 1273 (as Emperor, styled Rudolph I.), and founded the greatness of the House of Hapsburg. In 1276 he vanquished Ottokar II. of Bohemia and forced him to give up the duchies of Austria and Styria, with other territories. In 1282 he invested his sons Albert and Rudolph with the territories which he had thus acquired. Albert I. purchased his brother's share in 1283, and on the death of his father, in 1291, succeeded to that prince's possessions, which included large districts in Switzerland. (See AUSTRIA-HUNGARY.) He was raised to the Imperial throne of Germany in 1298, and was murdered in 1308 by his nephew, John the Parricide, while preparing to subdue the Swiss, who had risen in defense of their liberties. Of his six sons, Rudolph was King of Bohemia, 1306-07, and Frederick I. was one of the rival kings of Germany (as Frederick III.) from 1314 to 1322 (died 1330). For the succeeding hundred years the Imperial office was held by other families, and the Hapsburgs were occupied mainly in ruling their hereditary possessions. It was a family principle that the lands were indivisible, and that the brothers should rule jointly. This principle was neglected at times, but the deaths of holders of territories which had been separated from the main possessions brought all Hapsburg lands under a single rule in 1457, and again in 1490. During this early period there were relatively few children, and many of the princes died without leaving heirs. This is in striking contrast with the later Hapsburgs, who were remarkably prolific, families of thirteen to fifteen children being common.

From 1438 until the abdication of Francis II. in 1806, all but two of the Emperors of the Holy Roman Empire (Charles VII. and Francis I.) were Hapsburgs. The house attained its greatest power through the marriage alliances in the last quarter of the fifteenth century. In 1477 Maximilian, who became Emperor in 1493 (Maximilian I.), married Mary of Burgundy, daughter of Charles the Bold, and thus obtained all the Burgundian possessions, which included the Netherlands, at that time the most opulent country in Europe. His son, Philip, who died in 1506, married Joanna, heiress of Spain, daughter of Ferdinand and Isabella. Their eldest son, Charles I. (Charles V. of the Empire), received as his share of the family possession Naples, Sicily, and Sardinia, while the Austrian possessions (Austria, Styria, Carinthia, Carniola, Tyrol, Alsace, Breisgau, etc.) were left to him and his brother Ferdinand, jointly. His share in these last Charles relinquished to Ferdinand. In 1535 Charles added the Duchy of Milan to his possessions. Charles was the founder of the Spanish line of Hapsburgs. Ferdinand was elected in 1526 to the throne of Bohemia (the Bohemian kingdom at this time including Moravia, Silesia, and Lusatia), which soon became practically hereditary in the Hapsburg line. At the same time he was elected king in a part of Hungary, the crown of which country, after the expulsion of the Turks, was by violence made hereditary in the Austrian dynasty (1687). The union of so many different countries in the hands

THE HAPSBURG FAMILY



of one family threatened the security of the other European countries, and especially of France, which was shut in by the possessions of Charles V. The rivalry which resulted continued until the end of the eighteenth century, and brought upon Europe many wars. (See EUROPE.) In the sixteenth and seventeenth centuries the struggles between France and the Hapsburgs were involved with the religious wars. In the second half of the sixteenth century the power of the Spanish branch of the Hapsburgs received a severe blow in the revolt of the Netherlands, the northern provinces of which finally achieved their independence. By the middle of the seventeenth century the Hapsburg power was declining steadily. The Spanish branch, which after Charles I. (Charles V.) had been represented by Philip II., III., and IV., and Charles II., became extinct in 1700. The Austrian Hapsburgs became extinct in the male line by the death of Charles VI. in 1740. By the Pragmatic Sanction (q.v.), however, his daughter, Maria Theresa, succeeded to the throne. She was married to Francis I. of the House of Lorraine, and their descendants have continued to rule in Austria until the present day. One of Maria Theresa's fifteen children was Marie Antoinette, the wife of Louis XVI. of France; a great-granddaughter, Maria Louisa, was the wife of Napoleon; another great-granddaughter was the wife of Pedro I. of Brazil; and a great-grandson was Maximilian I. of Mexico.

Consult: Lichnowsky, *Geschichte des Hauses von Habsburg* (8 vols., Vienna, 1836-44); Coxe, *House of Austria* (3 vols., London, 1807); Schultze, *Geschichte der Habsburger in den ersten drei Jahrhunderten* (Innsbruck, 1887); Weihrich, *Stammtafel zur Geschichte des Hauses Habsburg* (Prague, 1892); Hoernes, *Oesterreich-Ungarn und das Haus Habsburg* (Teschen, 1892). See genealogical table of the Hapsburg family.

HAP'TERA (Neo-Lat. nom. pl., from Gk. *ἅπτειν*, *haptein*, to fasten). A botanical term denoting organs for attachment that contain no vascular bundles, and are, therefore, not roots. They occur on various marine algæ, on the tendrils of Ampelopsis, etc.

HARA-KIRI, hä'rä-kē'rē (Japanese, belly-cut), or, more elegantly, **SEPPÚKŬ**, sĕp-pōō'-ku (the Japanese pronunciation of *Ts'ich-fuh*, to cut belly). Self-disembowelment; a form of suicide permitted in feudal Japan among the territorial nobles and Samurai (q.v.), when unwilling to survive some disgrace. From being a custom, it had, about A.D. 1500, developed into a privilege, so that noblemen and gentlemen could demand that the form of judicial punishment be death at their own hands, instead of dying like common criminals. The ceremonies and etiquette of *seppúkŭ* became very elaborate, and this form of judicial suicide degenerated into execution at the hands of one's best friend. Arrayed in the neatest of clothing, in a measured space, behind white curtains, the victim and his friends and the official witnesses took their places. The dirk was laid upon a tray and presented by the second, while at the moment of incision, or while the principal was stretching out his hand to seize the dirk, the 'best man' or friend of the accused took off the latter's head with a sweep of his sword. Then, the official witnesses having inspected and identified the head, it was reverently washed by friends. With the decay of feudalism, the custom has fallen out of use, but is even yet occasionally practiced. *Harri-karri*, a form of the word hara-kiri, which is frequently found in newspapers and other more pretentious publications, is erroneous, as is the translation 'happy dispatch.' Consult: Mitford, *Tales of Old Japan* (London, 1876), and Chamberlain, *Things Japanese* (London, 1891).

HAR'ALD or **HAR'OLD I.**, surnamed HAARFAGR, or FAIR-HAIRED (c.850-933). King of Norway from about 860 to about 930. He was a descendant of the ancient race of the Ynglings, and the son of Halfdan the Swarthy, the most powerful of the many jarls or petty kings who then ruled in Norway. According to the popular saga, Harald was induced to attempt the subjugation of the whole of Norway, by his love for a beautiful maiden, named Gyda, who declared that she would not be his wife until he was sole king of the country; and he swore that he would neither cut nor comb his hair till he had subdued all the land to his sway—an oath which he kept. After many years' contest with his brother jarls, and after defeating the last general confederacy of the independent Norwegian chieftains, in a naval battle at Hafrsfjord, west of the present Stavanger, he remained sole ruler of the land (872). Harald's severity compelled the deposed rulers to seek other homes; and his reign is memorable for the many new settlements which were made by these exiles in the Orkneys, the Hebrides, the Shetlands, the Faroe Islands, and Iceland. Thence they continued their customary sea-roving and plundering until these islands, too, with the exception of Iceland, were subdued by Harald. The most celebrated of the Norwegian jarls exiled by Harald was Rolf the Ganger, or Walker, who, after repeatedly ravaging the northwestern portions of France, received from Charles the Simple, in 911 or 912, an extensive grant of territory in that region, and became the first Duke of Normandy. Although a barbarian, Harald ruled with a sound policy in advance of his age, and by his firmness succeeded in suppressing for a time the private warfare and sea-piracy which had prevailed in Norway before his reign. The dissensions of his numerous sons, however, checked all the good that might have resulted from his measures. To restore concord in his family, he divided his dominions among his children, but vested the supreme power in his eldest son, Eric Blodoexe, or Bloodaxe (c.930). Harald died about 933. Consult Boyesen, *Norway* (New York, 1886).

HARALD or **HAROLD III.**, surnamed HAARDRAADE, or HARD RULER (1015-66). King of Norway from 1046 to 1066. He was the son of Sigurd, chief of Ringerike, and a descendant of Harald I. In his boyhood he was present at the battle of Stiklestad in 1030, in which his brother, Olaf, King of Norway, surnamed the Saint, was slain. Harald subsequently went to the Court of Jaroslaff, Grand Prince of Novgorod and Kiev, and afterwards to Constantinople, where he became captain of the Varangian bodyguard of the Greek Emperors. In this office he experienced many marvelous adventures, which have supplied abundant materials for the narratives of the older sagas and the modern romances of the North. According to these, he took part

in the expedition against the pirates of the Mediterranean, and visited Jerusalem, where he fought successfully against the Saracens, whom he also defeated in eighteen pitched battles in Sicily and Africa. On his return to Constantinople he drew upon himself the vengeance of the Empress Zoë by an intrigue with her relative, Mary, after he had rejected Zoë's proffered love. He escaped with difficulty from prison, where he had been thrown on a charge of treason, returned to Russia, 1044, married the daughter of Prince Jaroslaff, and took her with him to Norway (1046), where his nephew, Magnus, the son of Saint Olaf, agreed to divide the royal power with him, in return for a share of his treasures. The death of Magnus, in 1048, left him sole King of Norway. His unruly spirit would not, however, suffer him to rest; and in violation of the pledge he had given his dying nephew, he entered into a war to dethrone the King of Denmark, to whose crown he had no just claim. Although he was successful in battle against the Danes, he gained no real advantages by the contest; and in 1064 he concluded a peace in which he recognized the right of Sweyn, the nephew of Canute, to the throne of Denmark. He occupied himself for a time with the internal affairs of Norway. In 1066 he landed in England to aid Tostig (q.v.) against his brother Harold, King of England, but was slain in battle at Stamford Bridge. Consult Boyesen, *Norway* (New York, 1886).

HA'RAN, or **CHARRAN**, kăr'răn (Ass. *Kharranu*, road). A city in the north of Mesopotamia, and southeast of Edessa, on the small stream called Jullab, at the junction of the Damascus road with the highway from Nineveh to Carchemish. For the Assyrians it became a strategic position of first-rate importance, and is mentioned in inscriptions as early as the time of Tiglath-pileser I., about 1100 B.C. Sargon II. (B.C. 721-705) refers to his having restored the ancient privileges of the place, and later kings, like Asshurbanipal, devoted themselves to the restoration of the temple to the moon-god, which enjoyed a high reputation as a place of pilgrimage. Haran, the Carrhæ of the Greeks and Romans, became, by virtue of its situation, the centre of considerable commerce. It was here that the Roman general Crassus, in his eastern expedition, was attacked and slain by the Parthians (B.C. 53), and here also the Emperor Caracalla was murdered at the instigation of Macrinus, A.D. 217. The place retained its importance down to the period of the Arab ascendency; but by Albulfeda it is mentioned as having before his time fallen into decay. It is now wholly in ruins. According to the Book of Genesis, which traces the name to Haran, a son of Terah, Haran was the first resting-place of the latter and his family, after their migration from Ur of the Chaldees, and here Terah died before Abraham's migration into Canaan (Gen. xi. 31-32). The story is of value as recalling the tradition of the sojourn of some clans—probably of Aramean origin—associated with Hebrews at some remote period. Consult: Metz, *Geschichte der Stadt Harran* (1892); Sachau, *Reise in Mesopotamien* (Leipzig, 1900).

HARAR, hä-răr'. See HARRAR.

HARATIN, hăr'ă-tēn'. 'Black' Berbers, living on the southern slopes of the Atlas Mountains. Their darker complexion is doubtless owing to mixture with negroes. They form a division of the Imazighen or Atlas Berbers, who have been thus divided: (1) Abkail or Kabyles; (2) Shellala or Shilluhs (Shluhs); (3) the Haratin. They are interesting to the ethnologist in that they still preserve the patriarchal tribal state, similar to that of the Bible. These kinship groups survived in the midst of all the different forms of government to which they have been subject. See BERBERS; MOORS.

HARAUCOURT, ä'rō'kōōr', EDMOND (1857—). A French poet and novelist, born at Bourmont (Haute-Marne). His first work, *La légende des sexes, poèmes hystériques* (1883), under the pen-name of Le Sire de Chabley, attracted some attention. *L'âme nue* (1885), a collection of verse, in which some of the earlier poems were included, and *Seul* (1891), showed the poet's increasing power and melancholy charm. He also wrote the romance *Amis* (1887); *Shylock* (1889), a play; the *Passion* (1890), a drama; *Héro et Léandre* (1893); *Alienor*, an opera; *Don Juan* (1894); and *Elisabeth* (1894). He received the Academy prize for his poem, *Les Vikings* (1890).

HARBAUGH, här'bą, HENRY (1817-67). An American clergyman of the German Reformed Church, born near Waynesborough, Pa. He took partial courses in Franklin and Marshall College and Mercersburg Seminary, and held pastorates from 1843 to 1864, when he became professor of theology in Mercersburg Seminary. He was the chief exponent of the 'Mercersburg theology,' and belonged to the high-church wing of that communion. From 1850 to 1866 he was the editor of the *Guardian*, a monthly magazine, and afterwards of the Mercersburg *Review*. He published some poems in the 'Pennsylvania Dutch' dialect. Among his many works are: *Heaven* (3 vols., 1843-53); *The Fathers of the German Reformed Church* (1858); and *Christological Theology* (1864).

HARBOR (ME. *harbor, herbore, herberwe, herberge*, Icel. *herbergi*, OHG. *heriberge*, Ger. *Herberge*, from OHG. *heri*, Ger. *Heer*, AS. *here*, army + OHG., Ger. *bergen*, AS. *beorgan*, to shelter). An indentation or inlet on the shore of a sea or lake so protected from the winds and waves, whether by natural conformation of the land or by artificial works, as to form a secure roadstead for ships. In the broadest meaning harbor works include all the structures and appurtenances which facilitate the safe anchorage, loading, unloading, and repairs of vessels which seek harbors in the way of commerce and safety from storm; in this sense quays, docks, breakwaters, jetties, piers, and wharves, etc., are essential parts of harbors. In this article, however, the broad question of harbor construction as illustrated by typical harbors will alone be considered, specific consideration of the parts of harbor works being limited to the articles on BREAKWATERS; DOCKS; JETTIES; LIGHTHOUSES; QUAYS; etc. Furthermore, only artificial harbors will be considered here.

EARLY HARBOR WORKS. With the birth of commerce and naval warfare, in the earliest ages of civilization, arose the necessity for artificial harbors. The Phœnicians set to work to protect their scanty strip of Levantine coast. At Tyre, two harbors were formed, to the north and to

the south of the peninsula on which the city was placed. At Sidon, similar but less extensive works long testified to the wealth and engineering genius of the Phœnicians. The breakwaters were principally constructed of loose rubble. Carthage, in another part of the Mediterranean, also possessed a harbor, though its site is not very satisfactorily determined. It was in two divisions, formed by moles; time, however, has dealt so hardly with it that few traces remain. In Greece nature provided so many navigable inlets that little remained to be done by man. Nevertheless, some minor works were executed at the Piræus and elsewhere, chiefly for warlike purposes. The Romans, finding ships necessary to the dominion of the world, set about constructing harbors for them. The coasts of Italy still show how well they understood both the principles and the practice of this branch of engineering. A distinguishing feature of their harbor-making is the open or arched mole. Built with open arches, resting upon stone piers, it gives full play to the tidal and littoral currents, thus preventing the deposit of sand or mud; but in proportion as this advantage is increased (by increasing the span of the arches), so also is the agitation, and consequent insecurity, of the water within.

The decay of commerce and civilization, consequent upon the fall of the Roman Empire, put a stop to harbor-making; nor did the art revive until the revival of commerce by the Italian republics of the Middle Ages. The rich traffic of Venice and Genoa soon led to the construction of suitable ports at those places; and the moles of the latter city, and the works in the lagoons of Venice, remain to this day. France was next in the field, embanking, protecting, and deepening the mouths of the rivers along her northwestern shores, as at Havre, Dieppe, Dunkirk, etc. In 1627, during the siege of La Rochelle, Metezeau constructed jetties of loose rubble-stone, to prevent access to the city. England lagged far behind her Continental rivals. With few exceptions, her ports were absolutely unprotected, or rather uncreated, until late in the last century. Two of the few exceptions were Hartlepool, where a harbor was formed about 1250, and Arbroath, in 1394. In the seventeenth century, at Whitby and Scarborough, also in Yorkshire, rough piers were thrown out, protecting the mouth of the port; while at Yarmouth, in Elizabeth's reign, a north jetty, and subsequently a south one, were formed. An ancient mole existed at Lyme Regis. But the chief efforts of the early English engineers were directed against the shoals and waves of Dover. With the advent of Smeaton, however, things took a different turn; and now few countries surpass Great Britain in the number of artificially improved commercial harbors, or in the just appreciation of their importance.

The development of harbor works in America, of course, belongs entirely to modern times. The first regular appropriation for harbor work in the United States was made in 1802; it amounted to $30,000, and was to be devoted to the erection of public piers at Philadelphia, Pa. In 1822 an appropriation of $22,700 was made for the construction of a harbor of refuge in Delaware Bay. The first approach to a river and harbor bill was made in 1826, when about $150,000 was appropriated for carrying on work in about twenty localities. From 1826 to 1838 aggregate appropriations carried by the various river and harbor bills were about $9,000,000. From 1838 to 1866 the aggregate expenditure was $6,600,000. The total aggregate expenditure of the United States on river and harbor works from 1820 to 1894 was $262,845,900. Since 1894 the annual amount set aside by Congress for such works has rapidly increased, until in 1900-01 the River and Harbor Bill called for an appropriation of nearly $60,000,000 for new work, and the Sundry Civil Service Bill called for an appropriation of $7,000,000 for continuing work in progress.

Harbor Construction. The designing and construction of harbors constitute one of the most difficult departments of civil engineering. In discussing this branch of the subject attention will be limited to commercial harbors, including harbors of refuge. The general plan of commercial harbors differs in different nations, and there is a great diversity of form due to the methods of commercial means of disposing of the freight received from vessels. It may be set down, as a general rule, that the ship itself does not determine the character of the harbor beyond the fact that it must be of sufficient depth to accommodate ships of the maximum draught using the harbor. In some of the most important ports of the world there are practically no installations for handling freight, the ships anchoring in the open harbor and discharging their cargoes into lighters. Railways play a far more important rôle in determining the arrangement of the harbor, particularly in regard to the dock and quay arrangement. In the last respect, also, the local movement of commerce of the city itself plays an important part.

Turning now to the natural conditions which influence the character and arrangements of harbors, it may be stated that the topographic and geologic conditions exercise a decisive influence. A harbor may be situated directly upon the seacoast or in some river, bay, or gulf, or far in the interior on some river or maritime canal. The effects of the ocean, the action of the winds and tides, and the general conformation of the shore-lines are other controlling factors in determining the arrangement of harbor works. Finally, the nature of the soil, whether alluvial, or diluvial, or rocky, plays an important part in the arrangement of the basins, either natural or artificial, and the adoption of quays, jetties, piers, etc.

The great variety of commercial and natural conditions which influence the arrangement of harbor works of course call for a corresponding variety of arrangements; it is obviously impossible to describe each here. For the sake of clearness we may somewhat arbitrarily divide harbors into, first, those located on a comparatively open coast; second, those located at river mouths or on bays or gulfs, and thus more or less landlocked; and third, those located well inland on rivers or maritime canals.

The simplest form of open-coast harbor consists of a quay wall or bulkhead wall open to the sea, and serving only to enable ships to tie up alongside the shore and discharge and receive cargoes. Such a quay affords comparatively no protection from the winds, tides, and currents. The next advance is a straight pier extending out from the shore. This pier affords little shelter to ships from waves coming directly inshore, but in case of winds and waves along shore it affords

protection on its lee side. Another step in advance is to build the pier bent or curved with its concave side toward the shore. A still further improvement is to build two curved piers converging toward each other so as to include a harbor basin with an opening between the sea ends of the piers. Still another method is to build off shore an insular breakwater, which prevents the waves from breaking on the shore, and thus forms a comparatively tranquil basin between the breakwater and the shore. Harbors of all these forms are found in practice. More generally, however, two or more of the structures mentioned are combined to form harbor basins of various forms and dimensions. Figures 1 and 2 show in outline form two representative open-coast harbors.

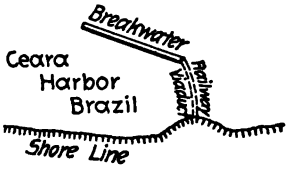


FIG. 1.

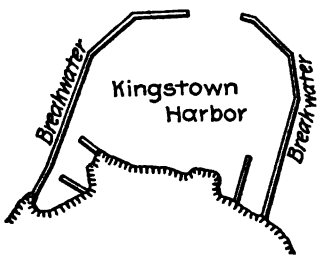


FIG. 2.

When the conformation of the coast-line is of the nature of an indentation in the land, as in the case of a bay, gulf, or river-mouth, then the portion of it may be too much to take the place of one or more of the structures necessary to form an open-coast harbor. For example, the harbor of New York is so inclosed by land that no artificial structures in the shape of piers or breakwaters are needed to secure a tranquil harbor basin. Where the bay or inlet is less perfectly landlocked, piers, breakwaters, or jetties are constructed to supply the necessary protection at the exposed points. Figs. 3 to 6 show actual arrangements of such structures in different circumstances.

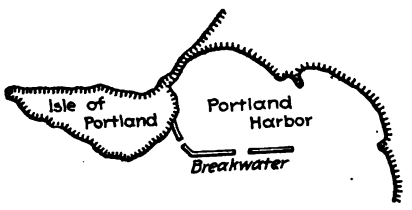


FIG. 3.

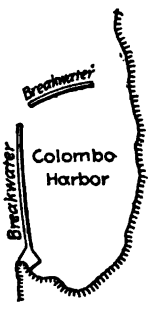


FIG. 4.

The artificial works involved in inland harbors consist of jetties at the mouth of the river or canal, bank protection, and other constructions for preserving the channel, and the building of docks and quays in the harbor proper. Among the notable inland harbors of the world are those of Hamburg, Manchester, and Amsterdam, in Europe; and Charleston and Philadelphia, in America. Fig. 7 shows the entrance harbor of the ship canal leading to the harbor of Amsterdam, and Fig. 8 that at the entrance of the Suez Canal, at Port Said.

In what has preceded, we have concerned ourselves only with the general arrangement of harbor structures under different topographic conditions. For specific information concerning jetties, breakwaters, docks, piers, quays, etc., the reader should consult the articles with these titles. Whatever the construction and arrangement of these constituent structures of a harbor may be, they are such that the harbor consists of an entrance, of an anchorage space, and of docks. By the entrance is meant the navigable piers by which vessels enter the harbor. Some ports have natural entrance channels of large dimensions and great depth, and in other harbors this channel is of small size and has to be artificially constructed and maintained. Generally speaking, the minimum width of practical entrance for ships of modern dimensions is from 230 feet to 490 feet, but for large commercial ports it should be preferably from 650 feet to 1000 feet wide. Sometimes the entrance channels constitute the anchorage basin tributary to the entrance channel and the docks. No general rule can be laid down for the area of anchorage space, for this is governed by the local conditions at each port. When the natural harbor bank does not give sufficient room for the commerce of a harbor, various methods are adopted for increasing this shore space. The most simple is to build out from the shore a series of piers or wharves with water spaces between them to form docks. When this is not practicable quays are built which inclose dock basins. The nature of these two classes of structure is described in the article on DOCKS.

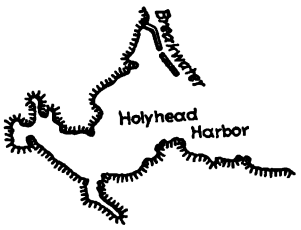


FIG. 5.

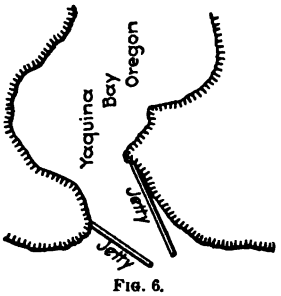


FIG. 6.

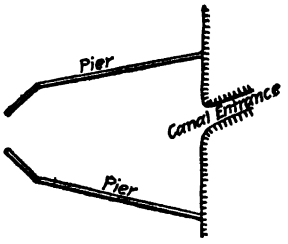


FIG. 7.

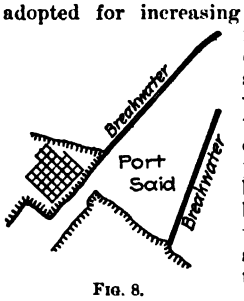


FIG. 8.

For a comprehensive treatise on harbors, consult: De Cordemoy, *Les ports modernes* (Paris, 1900); Vernon-Harcourt, *Harbors and Docks* (London, 1885). The best

descriptions of important recent harbor works will be found scattered through the proceedings of the various engineering societies and the engineering papers.

HARBOR. As judicially defined, a place to shelter ships from the violence of the sea, and where ships are brought for commercial purposes to load and unload goods and passengers. It includes quays or docks and other instrumentalities for the use and protection of ships. The term is generally considered a legal synonym for 'haven' and 'port,' although at times it is employed in a somewhat narrower sense than either of these terms. It is not necessary, to constitute a harbor, that it be landlocked or absolutely safe for ships. It is enough that it affords a reasonably safe place of retreat from winds and storms.

In Great Britain the right to construct or control harbors is vested in the Crown, but at present they are generally owned or managed by boards or commissions under special acts of Parliament. Even when an individual is the owner of a harbor, under a grant from the Crown or by prescription, he holds it subject to the right of the public to make use of it and of the State to control it. The Government has the power, also, of closing particular harbors or ports, either absolutely, or to certain lines of imports or exports. It has the power, too, of regulating all harbor fees and the conduct of business transacted in harbors. At present, the various boards or commissions are authorized by Parliament to make all needful regulations and, within certain limits, to fix the charges on goods and ships. It is their duty, on the other hand, to keep the harbors in a reasonably safe condition for those entitled to use them. If they do not, they are liable for any injury which results from their negligence. This rule does not obtain in harbors controlled directly by the Government, and known as the King's harbors. Here the maxim applies that "the King can do no wrong;" that is, the State cannot be sued without its consent for injuries due to its negligence.

In the United States the development and control of harbors are shared to some extent by the Federal and the State governments. Large appropriations are frequently made by Congress for the improvement and defense of harbors, and the Federal Government, under its power to regulate foreign and interstate commerce, exercises a large degree of control over most ports. On the other hand, the ownership of docks, wharves, warehouses, and other harbor facilities afforded to commerce, is generally a matter of State legislation. Each State, too, has its pilot laws, its quarantine rules, and its harbor regulations, with which the Federal Government does not interfere, but which are subject to Federal laws so far as the subject—as quarantine, for example—is within the Federal jurisdiction.

A *harbor master* is a State official with extensive authority. He has power to regulate the times of landing, unloading, and loading vessels; to make room for such as need to be immediately accommodated by temporarily removing others; to collect harbor fees; to enforce obedience to his lawful orders, and, in certain cases, to settle disputes between the masters of vessels. In some States a board of harbor commissioners is provided for with large powers of control. Consult: Moore, *History of the Foreshore and the Law Relating Thereto* (London, 1888); *United States Revised Statutes*, Secs. 5244-5255; Birdseye, *General Laws of New York—Navigation Law and New York Harbor* (New York, 1901).

HARBOR GRACE. A port of entry on the west side of Conception Bay, Newfoundland, 27 miles west by south of Saint John's; the second town of importance in the island (Map: Newfoundland, G 5). The harbor is large, but exposed; it has a patent slip 260 feet long, and the wharves are protected by the beach. The trade of Harbor Grace is nearly one-fourth of that of the entire island. Population, in 1891, 6467; in 1901, 5184.

HARBORING. In law, the act of receiving and retaining a person in violation of the rights of another or of the public. Harboring the wife of another after notice from the husband not to do so is an actionable wrong against him, unless such act is a proper one for her protection. So the harboring of an apprentice or servant, with knowledge of the latter's obligation to his master, is an actionable tort at common law. One who knowingly harbors a felon becomes at common law an accessory to the crime, while the intentional harborer of one who has committed a misdemeanor is himself guilty of a misdemeanor. An innkeeper who is accustomed to harbor thieves is indictable at common law for maintaining a public nuisance. Some modern statutes make it criminal for any one to harbor thieves; that is, to shelter them or permit them to congregate on his premises. Other statutes impose a penalty for harboring seamen, knowing them to belong to any vessel. Under such statutes, and generally, the offense of harboring does not necessarily involve the element of secrecy or concealment. It is committed by merely sheltering or entertaining the prohibited person or permitting him to take refuge under one's roof. See ACCESSORY; HUSBAND AND WIFE; MASTER AND SERVANT; PARENT AND CHILD; and authorities there cited.

HARBORNE, WILLIAM (c.1545-1617). An English traveler and diplomat, the first English Ambassador to Turkey, born at Yarmouth. In 1575 he was elected to Parliament, but was not allowed to take his seat, and in 1577 he went to Turkey. Five years afterwards he was appointed Ambassador to that country. The Turkey Company, formed in 1579, received, thanks to his efforts, larger privileges than those granted to any other nation. He left Constantinople in 1588, and died at Mundham. An account of his journey from Constantinople in 1588 was printed in Hakluyt's *Collection of Voyages*, as well as the description of his outward voyage.

HARBOR-SEAL. The common seal (*Phoca vitulina*) of all northern seas, which formerly frequented numerously all the bays and harbors of the Atlantic coast as far south as Virginia, but now is uncommon south of Nova Scotia. Stragglers, nevertheless, are still seen at long intervals in the Hudson, and even in the Delaware rivers, where they once regularly ascended as far as tidewater went. It is still numerous in the Saint Lawrence, and has been taken in Lake Champlain. The leopard seal of the Pacific Coast (south to Southern California) is the same, and has been known to ascend the Columbia 200 miles. This seal attains a total length of about

5½ feet, and a weight of from 80 to 100 pounds. Brownish yellow with dark spots is the commonest color, but many variations occur, such as almost uniform dark brown, nearly black, and dark spotting on a light ground, or the reverse. It is distinct in habits from other seals, with which, in the North, it never associates on the ice-floes, but remains by itself on or near the shore, where it ascends the Arctic rivers almost to their sources in pursuit of the salmon. Hence it is known to seamen as the 'fresh-water' seal. The white skins of the young seals are regarded by the northeastern Eskimo as the best and prettiest material from which to make undergarments and the jackets of women and children. This is the common seal of Northern Europe and the British Islands. It is often captured young and petted and trained, when it shows great docility and affection, and its tricks are frequently exhibited in public shows.

HARBOR SPRINGS. A village and the county-seat of Emmet County, Mich., five miles northwest of Petoskey, on Lake Michigan and on the Grand Rapids and Indiana Railroad (Map: Michigan, H 3). It is a favorite summer resort, annually visited by some 5000 persons. It has an excellent landlocked harbor. The principal manufactures are lumber in various products, and flour. Population, in 1890, 1052; in 1900, 1643.

HARBURG, här'bŏŏrk. The capital of a circle in the Prussian Province of Hanover, situated on an arm of the Elbe, over which are built a railroad and a street bridge on the road to Hamburg, 7 miles to the north (Map: Prussia, C 2). The most noteworthy building of the town is the old castle on the Elbe. Harburg has a 'real' gymnasium and several industrial and commercial schools. It is a place of some industrial activity, producing jute, linseed and cocoanut oil, gutta-percha wares, chemicals, leather, cement, glass, machinery, boilers, and small steamers. It is connected by rail with Hamburg, Cuxhaven, and Bremen, and with Hamburg also by an electric street railway, and has a growing trade in groceries, wine, oil, coal, timber, etc. Harburg obtained municipal rights in 1297; belonged to Lüneburg and Hanover; and passed to Prussia in 1866. Population, in 1890, 35,081; in 1900, 49,153.

HAR'COURT, Simon, first Earl Harcourt (1714-77). An English diplomat and statesman. He was the only son of the Hon. Simon Harcourt, who died in 1720. On the death of his grandfather, Simon, first Viscount Harcourt, in 1727, he succeeded to the family titles and estates. After an excellent education and four years of foreign travel, he was appointed lord of the bedchamber to George II. In 1745 he raised a regiment for defense of the kingdom against the rebels, and in 1749 was advanced to the dignity of an earl. Harcourt was appointed governor to the Prince of Wales, afterwards George III., but resigned owing to his dislike of the absolutist principles in which the young Prince was instructed. Promoted to be lieutenant-general in 1759, he was appointed in 1761 special ambassador to demand the hand of the Princess Charlotte in marriage for the young King, who had succeeded to the throne in 1760. He was made Ambassador to Paris in 1768, and Lord Lieutenant of Ireland in 1772. By a proposal to tax the rents of absentee landlords he gained much popularity in that country, but the proposal was rejected by the Irish Parliament, which was swayed by English opinion. There was much official corruption during his term as Lord Lieutenant. He resigned in 1777.

HARCOURT, William, third Earl of (1743-1830). An English field-marshal. His military career began at the age of sixteen, when he took command of a troop raised at his father's expense and known as 'Harcourt's Black Horse.' He was aide-de-camp to Lord Albemarle at the siege of Havana (1762), but returned home to represent Oxford in Parliament (1768-74). He was a lieutenant-colonel of dragoons in the American Revolutionary War, and distinguished himself in the capture of Gen. Charles Lee, near the Delaware. During the war in Flanders he was raised to the command of the Duke of York's cavalry (1795), was made a general the following year, as well as head of the Royal Military College, Great Marlow, a position he held from its opening until 1805, and he was created field-marshal on the occasion of the coronation of George IV.

HARCOURT, Sir William George Granville Venables Vernon (1827—). An English statesman. He completed his preparation in Trinity College, Cambridge. Beginning the practice of law in 1854, he was in 1866 appointed Queen's Counsel. From 1868 to 1880 he represented Oxford in the House of Commons; from 1880 to 1895, Derby; and from 1895 to the present, Monmouthshire West has had him as a representative. His principles have been thoroughly liberal. His election to the professorship of international law in the University of Cambridgeshire in 1869 is evidence of scholarship in his special field of study; so, too, was his appointment to the royal commission for amending the neutrality laws and to the royal commission for amending the naturalization laws. He was Secretary of State for the Home Department, 1880-85, and Chancellor of the Exchequer, 1886 and 1892-95. From 1894 to 1898 he led the Liberal opposition; and after the latter date he took an active stand against the policy of the Government with reference to the sinking fund, to the negotiations with the Transvaal, and to the raising of funds for the support of the South African War. As Home Secretary he introduced in 1884 an important bill for the reform of the municipal government of London. The budget which he, as Chancellor of the Exchequer, presented in 1894 made the income tax considerably more graduated, and reformed the 'death rates.' This budget is often mentioned as his greatest work. Amid his political labors he contributed to the *Saturday Review;* and various political pamphlets and letters originally printed in the *Times*, and signed 'Historicus,' were afterwards republished in a volume with considerable additions.

HARDANGER (här'däng-ĕr) **FJORD.** An inlet of the Province of South Bergenhus, Norway, on the southwest coast. It is about 68 miles long and extends northeastward and south, encircling the Folgefond. With a regular steamboat service, it is a notable visiting place for summer tourists, owing to its wild and picturesque scenery, embracing mountain peaks, lofty cliffs, waterfalls, and on the east the Hardanger Fjeld, an elevated

ice-clad plateau. The narrow strips of well-cultivated land along the shores are densely populated by the Harænger, a people distinguished for their interesting national customs and dress.

HARD CASH. See VERY HARD CASH.

HARD'CASTLE. A family, the members of which are principal characters in Goldsmith's *She Stoops to Conquer*. The scene is laid about the country house of jovial Squire Hardcastle, the father of Kate, the heroine of the comedy, who assumes the airs of a barmaid in order to win the love of the bashful Marlow. The pretentious Mrs. Hardcastle is the mother of Tony Lumpkin, the Squire's stepson.

HARD CLAM, or ROUND CLAM. The quohog. See CLAM.

HAR'DECANUTE', HARDACNUT, or HARTHACNUT (c.1019-42). King of England and of Denmark. He was the son of Canute the Great and Emma of Normandy, and at the time of his father's death (1035) was ruling as under-king in Denmark. Canute had intended the crown of England for Hardecanute, but the English Witan decided that his half-brother Harold should be King of the North, and Hardecanute should have only Wessex. As Hardecanute neglected to take possession of his kingdom, it passed to Harold in 1037. On the latter's death, however, in 1040, Hardecanute was chosen King of England by the Witan. He arrived in England with a fleet of sixty ships, for the maintenance of which he extorted a heavy *danegeld*. He was coarse and violent in his habits, and unscrupulous in the means he adopted for the establishment of his power. His reign was peaceful. He died June 8, 1042, at the marriage banquet of one of his nobles, and with him ended the Danish line in England. He was succeeded by his half-brother, Edward the Confessor (q.v.). Consult Freeman, *The Norman Conquest*, vol. i. (Oxford, 1869).

HAR'DEE, WILLIAM JOSEPH (1815-73). An American soldier, prominent on the Confederate side in the Civil War. He was born in Savannah, Ga.; graduated at West Point in 1838; and served with distinction through the Seminole and Mexican wars. At the outbreak of the Civil War he resigned from the United States Army to accept a commission as colonel in the Confederate service, and during the first year of the war held various commands in the West. The next spring he commanded a corps in the Army of the Mississippi, and at Shiloh, April 6, 1862, led the first Confederate line of battle. During Bragg's invasion of Kentucky in the following September, he commanded the left wing of the invaders, and later took a prominent part in the battles of Perryville and of Murfreesboro. By this time he had attained the rank of lieutenant-general. In the summer of 1863 he was placed in charge of the defense of Mississippi and Alabama, but rejoined the army in time to command his corps at the battle of Missionary Ridge. Soon after this, December 2, 1863, he succeeded General Bragg in command of the Army of Tennessee, but was himself replaced by Polk on December 23d, who, however, gave way to Joseph E. Johnston on December 27th. Under General Johnston, Hardee fought through the Atlanta campaign, and after the fall of Atlanta was assigned to the command of the Department of South Carolina, Georgia, and Florida. His forces, largely composed of the local militia, were unable to make any effectual opposition to Sherman's march to the sea; and it was only by good generalship that Hardee was able to escape from Savannah before the Federal forces had completed its investment. He thereupon retreated northward through the Carolinas, and effected a junction with Johnston, under whose command he continued to serve until that general surrendered on April 26, 1865. After the war, he became a planter at Selma, Ala.

HARDELOT, ärd'-lō', GUY D'. A French song composer, born near Boulogne-sur-Mer, of patrician ancestry. After her marriage she was a resident of London, England, where she became known by her husband's name (Rhodes), although her compositions were always published under the signature of D'Hardelot. Her first published composition attracted attention to her work, after which Melba, Pol Plançon, and Calvé popularized her songs throughout the world, and particularly in the United States and England. Her songs, nearly all written to French words, although accompanied by an English translation, were marked by considerable melodic originality, and a general appropriateness of text and music; and as a rule make up in artistic daintiness what they lack in depth. Some of her better-known songs are: *A vous! Avec toi, Little Boy Blue, Mignon, Say yes, Truelove Land, Tristesse, Quand on aime*, and *A Bunch of Violets*. She made one visit to the United States, in company with Mme. Calvé.

HAR'DEN, MAXIMILIAN (1861—). A German journalist and author, born in Berlin. After a secondary education he became a contributor of essays and critiques on subjects of literature and the drama to the *Frankfurter Zeitung*, the *Gegenwart*, and the *Nation*. He first attracted attention by a series of articles on social and political topics, published originally in the *Gegenwart*, with the signature 'Apostata,' and subsequently in two volumes, with the title *Apostata* (1892). In 1892 he established the *Zukunft*, a weekly periodical which proved a very successful venture, and in 1896 published *Theatre und Litteratur*. His individual and witty style and his unreserved expressions of opinion made him *persona non grata* to the Government, which he particularly opposed in connection with the policy of Von Caprivi. In 1900 he was condemned to six months' imprisonment in a fortress on the charge of *lèse-majesté*.

HARDENBERG, här'den-bĕrk, ALBERT (1510-74). A Dutch theologian, whose real name was Rizäus, but who is usually called Albert Hardenberg, from his birthplace in Holland. In 1517 he entered a monastic school, and about 1530 went to Louvain, where he soon developed a distaste for scholastic theology. At Mainz, where he went to study, he met Johannes a Lasco (q.v.), and was turned to Protestant ideas. He returned to Louvain, and preached the Reformation in a very mild form, but was forced to leave the city. He taught at Aduard for three years (1540-43), and then, through the efforts of A Lasco and of Melanchthon, left the Roman Church and went to Wittenberg (1543). Afterwards he came under the protection of the Archbishop of Cologne, who was friendly to the Reformation, and was settled as pastor at Kem-

pen. He is best known in Church history for his opposition to Luther's doctrine of ubiquity, and for his attempt to introduce Calvinistic tenets on the nature of the elements in the sacrament. In 1561 he went to Bremen, then to Sengwarden, and in 1567 to Emden, where he died. Consult Spiegel, *Dr. Albert Rizäus Hardenberg* (Bremen, 1869).

HARDENBERG, Friedrich von. A German lyric poet. See Novalis.

HARDENBERG, Karl August, Prince (1750-1822). A Prussian statesman, born at Essenrode, in Hanover, May 31, 1750. He was educated at Leipzig and Göttingen, and in 1776-78 traveled in France, Holland, and England. On his return to Hanover he became Councilor of the Privy Chamber, and was raised to the rank of count; but a private quarrel with a member of the royal family induced him, in 1782, to quit the Hanoverian service. He took up his residence at the Court of Brunswick, where the Duke appointed him, in 1787, president of the Council of State. Soon afterwards he was sent on a diplomatic mission to Frederick William II. of Prussia, who received him with marked distinction. In 1790 the Margrave of Ansbach and Bayreuth requested the Prussian monarch to furnish him with a person competent to administer the affairs of his dominions, and Frederick William recommended Hardenberg. When Ansbach and Bayreuth were united with Prussia in 1791, Hardenberg was appointed Minister of State and a member of the Cabinet. At the commencement of the war with France, the King summoned him to his headquarters at Frankfort-on-the-Main as administrator of the army. Early in 1795 he was sent to Basel, where on April 5th he concluded a peace between Prussia and the French Republic. After the accession of Frederick William III., Hardenberg was recalled to Berlin (1798), and was intrusted with the partial management of foreign affairs. In 1804 he became first Prussian Minister on the resignation of Haugwitz, and in this capacity endeavored to keep Prussia neutral in the war between France and England. Nevertheless, by the victory of Napoleon at Austerlitz, Prussia was compelled to enter into an alliance with Napoleon in the winter of 1805-06. Hardenberg was deprived of his office in April, 1806, and Haugwitz, who was friendly to the French, returned to power. Prussia was driven in the same year to take up arms against Napoleon. After the fatal battle of Jena, Hardenberg accepted the portfolio of Foreign Affairs, which he held for a few months only, Napoleon, who considered him the chief opponent of France in Prussia, demanding his dismissal at the Peace of Tilsit. In 1810 he was appointed Prussian Chancellor. Hardenberg now proceeded to carry out Stein's plan for a regenerated Prussia through the enactment of radical and far-reaching reforms. The victories of the British troops in the Spanish Peninsula, and the disasters that overwhelmed Napoleon's vast army in Russia, made it possible for Hardenberg to realize his patriotic efforts, and he had the satisfaction of seeing his plans crowned with success. The War of Liberation freed Prussia. Hardenberg subscribed to the Peace of Paris, May 30, 1814, and was soon after raised to the rank of prince by his sovereign. He accompanied the allied sovereigns to London and took part in the proceedings of the Congress at Vienna and in the conferences at Paris (1815). In 1817 he reorganized the Council of State, of which he was appointed president. He was present at the meetings of the monarchs of the Holy Alliance at Karlsbad, Laibach, Troppau, and Verona. His later policy showed reactionary tendencies, however, and lost him much of his previous popularity. During a tour through the north of Italy, he was taken suddenly ill at Pavia and died at Genoa, November 26, 1822. The services rendered by Hardenberg to his country were great; to him, next to Stein, Prussia is indebted for the improvements in her army system, the abolition of serfdom and feudal burdens, the throwing open of the civil service to all classes, and the complete reform of the educational system. Hardenberg's *Memoirs, 1801-07*, were suppressed until fifty years had elapsed, and were then edited with a biography by Ranke, *Denkwürdigkeiten des Fürsten von Hardenberg* (5 vols., Leipzig, 1877). Consult also: Klose, *Leben Karl Augusts, Fürsten von Hardenberg* (Halle, 1807); Meier, *Die Reform der Verwaltungsorganisation unter Stein und Hardenberg* (Leipzig, 1881); Seeley, *Life and Times of Stein* (London, 1879).

HAR'DEN-HICK'EY, James Aloysius (1854-98). An American adventurer and journalist, called a baron. He was born in San Francisco, but at the age of twenty-three settled in Paris, where he started a paper called the *Triboulet*, so conspicuous for its strong satirical attacks upon the Government that it was suppressed in about two years (1880). The editor had also been drawn into duels with other journalists, but his literary activity continued unabated, and under the nom-de-plume 'Saint-Patrice' he published *Un amour dans le monde* (1877); *Mémoires d'un gommeux* (1877); *Près du gouffre* (1877); *Sampiero* (1878); *Lettres d'un Yankee* (1879); *Aventures merveilleuses de Nabuchodonosor Nosebreaker* (1880); *Les facéties de Trogneville* (1883); *Nos écrivains* (1888); *La théosophie* (1890); *Plagiats bibliques* (1891).

HARDERWIJK, här'dĕr-vīk. A small seaport and fishing town of the Netherlands, situated on the southeastern shore of the Zuyder Zee, 28 miles east of Amsterdam (Map: Netherlands, D 2). It is a fortified town and a recruiting station for the Dutch East India troops. The chief exports are grain, lumber, and fish. Population, in 1900, 7300. Harderwijk was a Hanse town and from 1648 to 1811 was the seat of a university.

HARDHACK. See Spiræa.

HARDHEAD. A fish. (1) See Halfbeak. (2) See Steelhead. (3) A sailors' name for the California gray whale (q.v.), said to be due to its propensity for striking and upsetting the whalers' boats with its head.

HARDICANUTE. See Hardecanute.

HAR'DIE, James Allen (1823-76). An American soldier, born in New York City. He graduated at West Point in 1843, and during the Mexican War was the military commandant of San Francisco. During the Peninsular, Maryland, and Rappahannock campaigns of the Civil War he was acting adjutant-general of the Army of the Potomac, and on November 29, 1862, was commissioned brigadier-general of volunteers. In

1863 he was appointed assistant adjutant-general with the rank of major on the staff of the regular army, and on May 24, 1864, was made inspector-general with the rank of colonel. After the close of the war he was a member of the board which decided upon the disposition of the arms and munitions in the Government arsenals, and he audited the war claims of Massachusetts and Kansas. On March 13, 1865, he was brevetted a major-general in the Regular Army.

HARDING, Chester (1792-1866). An American portrait painter. He was born in Conway, Mass., September 11, 1792. In 1812 he enlisted in the army as a drummer boy. Owing to failure in business, he went to Pittsburg, where he was engaged as a house-painter. At this time he became interested in portrait painting, and went to Paris, Ky. After a short time spent in study at Philadelphia he spent successful seasons at Saint Louis and Washington. In 1823 he established a studio in Boston, where he enjoyed great popularity. In 1832 he went to Europe. In London he met David Leslie and Sir Thomas Lawrence, and during a stay of three years painted the portraits of several prominent Englishmen, including the Dukes of Essex, Norfolk, and Hamilton, Samuel Rogers, and Lord Aberdeen. The chief characteristic of his portraits is their indication and appreciation of character. Harding had many friends, one of whom was Daniel Webster, whose portrait by Harding hangs in the Bar Association, New York. He died in Boston, April 1, 1866. Among his principal portraits are those of Washington Allston, John Randolph (Corcoran Gallery, Washington), General Sherman, Henry Clay, John C. Calhoun, Chief Justice Marshall, Charles Carroll, and Presidents Madison, Monroe, and John Quincy Adams.

HARDING, James Duffield (1798-1863). An English landscape painter and teacher, born in Deptford. He first studied painting and engraving, and then took up water-colors and became a member of the Water-Color Society (1821). He was one of the first after Turner to use body-color in this medium, and obtained excellent results with it. His paintings treat European scenes in a rather studied manner. He was the inventor of 'Harding's papers' (paper in different tints and textures for sketching), which were used until recently. He gave much attention to lithography, and obtained two gold medals from the Academie des Beaux-Arts for his plates. Among his works in it are *Home and Abroad* (1836, fifty plates), *Park and Forest* (1841), and *Picturesque Selections* (1861). Harding was a successful teacher, and published a number of text-books of no great importance.

HARDING, Karl Ludwig (1765-1834). A German astronomer, born at Lauenburg. He was educated at Göttingen, where he studied theology, and became a tutor in the family of Schröter in Lilienthal. Schröter was an enthusiastic astronomer, and Harding was soon appointed observer and inspector in his observatory. Here he discovered the third planetoid, Juno (1804). In 1805 he went to Göttingen as professor of astronomy, and eight years afterwards discovered, independently of Pons, the second comet of 1813. His published works include: *Atlas Novus Coelestis* (1808-23; reëdited by Jahn, 1856), for long the most complete astronomical chart; *Kleine astronomische Ephemeriden* (edited with Wiessen, 1830-35); and the fifteenth in the series of Sternkarten of the Berlin Academy's publications (1830).

HARDING, Stephen (?-1134). The third abbot of the celebrated monastery of Citeaux. Of his parentage and youthful history little is known beyond the fact that he was born at Sherborne, near Dorchester, England, of a respectable family, and in early life traveled first to Scotland, then to Paris, and later to Rome. On his way back he stopped at the Benedictine monastery at Molesme, near Dijon, Burgundy, and joining the Order, received the name of Stephen. He delighted in austerities, and left the monastery with some twenty companions, including the abbot and prior, in order that they might start a new monastery where the Benedictine rule should be strictly observed. Citeaux, the 'cisterns,' fifteen miles south of Dijon, a barren and marshy spot, seemed attractive to the band, and there the monastery was built. In 1110 Stephen was elected its abbot. The rigor of observance which he enforced had such an effect in deterring novices from entering the new Order that at first grave fears were entertained for its stability; but Stephen persevered, and was rewarded in 1113 by the accession of Saint Bernard (q.v.) and thirty others, who gave such an impulse to the institute that in a short time the number of claimants for admission compelled him to found several new convents, and especially that of Clairvaux (1115), which, under the rule of Saint Bernard, attained to the very highest distinction in that age. Stephen continued till his death, at Citeaux, March 28, 1134, to direct the fortunes of the Cistercian Order. In 1119 he drew up, in conjunction with Saint Bernard and other members of the brotherhood, the well-known constitutions of the Order, entitled the *Charter of Charity*, which were approved by Popes Calixtus II. and Eugenius III., and, with some modifications, have continued down to modern times as the rule of the Cistercian institute. Two of Stephen's letters are preserved among the *Epistolæ Sancti Bernardi* (Epp. 45 and 49). See Cistercians.

HARDINGE, härd'ing, Sir Henry, first Viscount Hardinge of Lahore (1785-1856). An English field-marshal and commander-in-chief. The third son of the Rev. H. Hardinge, rector of Stanhope, Durham, he was born at Wrotham, Kent, on March 30, 1785. After a brief education at Eton, he was gazetted as ensign to the Queen's Rangers in Upper Canada before he had attained his fifteenth year. In 1806-07 he studied with success at the Wycombe Royal Military College. He obtained a brigade command in Spain before his twenty-fifth year, after which he was attached to the Portuguese Army from 1809 to 1813 in the capacity of deputy quartermaster-general. On Napoleon's return from Elba, Hardinge joined the allied armies in Belgium, and was appointed by the Duke of Wellington commissioner at the Prussian headquarters. He lost his hand at Ligny, and was unable to participate in the victory of Waterloo. In 1826 he entered Parliament, and in 1828 succeeded Lord Palmerston as Secretary of War. He next filled the office of Secretary for Ireland. From 1844 to 1847 he was Governor-General of India. When the Sikh

War broke out, he hurried to the northwestern frontier of India, and served as second in command under Lord Gough during the battles of Mudki, Ferozeshah, and Sobraon. After the pacification of Lahore, his services were rewarded by a viscounty, the East India Company granting him a pension of £5000, and Parliament voting him an annuity of £3000 for himself and his next two successors. On the death of the Duke of Wellington in 1852, Hardinge was appointed Commander-in-Chief of the British Army, and filled the home command during the Russian War. He resigned through illness a few months before his death. In October, 1855, he was advanced to the rank of field-marshal. He died September 24, 1856, at his seat, South Park, near Tunbridge, Kent.

HARD LABOR. As a form of criminal punishment, hard labor is comparatively modern. It was introduced in England as an alternative to transportation and penal servitude. It is the creation of statute law both in Great Britain and in this country. A court has no right to sentence a convicted criminal to hard labor, in addition to other punishment, unless a statute gives authority therefor. Hard labor is generally authorized by Federal as well as by State legislation, however, in most cases where the convicted criminal is subject to imprisonment in a State prison or penitentiary. The kind and amount of labor required of the sentenced criminal are regulated by statute or by prison rules. Consult: Stephen, *History of the Criminal Law of England* (London, 1883); *Encyclopædia of the Laws of England;* United States Revised Statutes, § 5542. See PUNISHMENT.

HARDMAN, FREDERICK (1814-74). An English novelist and journalist. He was the son of Joseph Hardman, a London merchant, but, disliking the life in a counting-house for which his father intended him, went to Spain in 1834 and served against the Carlists. In 1840 he began contributing to *Blackwood's Magazine,* and after ten years of literary work became foreign correspondent of the London *Times.* Among his works are: *Peninsular Scenes and Sketches,* and *The Student of Salamanca,* both reprinted from *Blackwood; Central America* (1852); and a translation of Weiss's *History of the French Protestant Refugees* (1854).

HARDMOUTH. A fish. See CHISELMOUTH.

HARDNESS, SCALE OF. The hardness of a solid substance may be measured by its capacity for scratching, or being scratched by, other substances. The variations in degree of hardness presented by different minerals give valuable physical indications by which one mineral may be readily distinguished from others. The hardness of a given substance is generally determined with reference to a few well-known minerals, which form a standard 'scale of hardness,' as follows:

1. Talc.	6. Feldspar.
2. Gypsum.	7. Quartz.
3. Calcite.	8. Topaz.
4. Fluorite.	9. Sapphire.
5. Apatite.	10. Diamond.

Talc is easily scratched by the finger-nail; gypsum is not easily scratched by the finger-nail; calcite has about the same hardness as coin-copper; fluorite is not scratched by a copper coin, and does not scratch glass; apatite scratches glass with difficulty, and is easily scratched by a knife; feldspar scratches glass easily, and is not easily scratched by a knife; quartz is not scratched by a knife, and yields with difficulty to the file; topaz, sapphire, and diamond are all harder than flint.

HARDOUIN, är'dōō'ăN', JEAN (1646-1729). A French scholar, born at Quimper, in Brittany. He early entered the Jesuit Order, for a time lectured on rhetoric, and in 1683 became librarian in the Collège Louis le Grand, Paris. His attainments were notable, his vagaries profound. He prepared an edition (1685) of the *Historia Naturalis* of Pliny the Elder, of which Huet observed, with some exaggeration, that Hardouin had accomplished in five years a task for which five other savants together would have required fifty; and on the other hand, he solemnly adduced theories which involved him in controversy with many of the chronologists and antiquaries of his time, and disagreement with all, and provoked his superiors to demand a public recantation (1708). This curious archæologist declared that the greater part of the books commonly attributed to the ancients are in reality the work of Benedictine monks of the Middle Ages under the direction of a hypothetical Severus Archontius. He accepted as genuinely classic only Homer, Herodotus, Pliny the Elder, Cicero, the *Epistolæ* and *Satyræ* of Horace, and the *Georgics* of Vergil. In all other cases allusions to Christianity, references to historical events of the Middle Ages, or obvious allegory (as, for example, the *Æneid,* which describes the voyage of Saint Paul to Rome and the proclamation of the Gospel in Italy), determine a recent origin. Similarly all coins and medals pretending to be of the antique world are the work of modern artists. Also, despite all evidence, no council of the Roman Catholic Church was held previous to that of Trent. Hardouin's epitaph by Jacob Vernet, professor of theology at Geneva, well reads: "Hic jacet hominum paradoxotatos." His further publications include the titles: *Nummi Antiqui Populorum et Urbium Illustrati* (1684), and *Conciliorum Collectio Regia Maxima* (1714-15). Consult De Backer, *Bibliothèque des écrivains de la compagnie de Jésus* (Liège, 2 vols., 1853-54).

HARDPAN. The hard stratum of earth beneath the layer of surface soil, especially noticeable in alkali soils (q.v.). Sometimes this is produced in arable lands by the pressing of the plow and the trampling of the team; but it may be prevented or destroyed when formed, by plowing at varying depths.

'HARDS,' or 'HARD-SHELLS.' The name of a short-lived faction of the Democratic Party in New York State. See BARNBURNERS and HUNKERS.

HARDTAIL. A fish. See JUREL.

HARD TIMES. A novel by Charles Dickens, which appeared as a serial in *Household Words,* and was published in 1854. The story is a satire on those who see nothing in life but statistics, illustrated by the leading character, Mr. Gradgrind.

HARDWAR, or HURDWAR, hŭrd-wär' (*Hari dwara,* gate of Hari or Vishnu). A frontier town of the Saharanpur District, United Provinces, British India, one of the most famous

spots on the Ganges (Map: India, C 3). It stands on the west bank of the river, at the mouth of a gorge where the waters emerge from the sub-Himalayas into the plains of Hindustan, and at the head of the Ganges Canal (q.v.). From its position on the sacred stream, it attracts immense numbers of pilgrims for the purposes of ablution. The chief feature is the Hari-ke-charan, or bathing ghat, with the adjoining temple of Gangadwara. The *charan*, or foot-mark of Vishnu, imprinted on a stone let into the upper wall of the ghat, forms an object of special reverence. The orthodox pilgrim season comprises the end of March and the beginning of April. In ordinary years the attendance amounts to 200,000 or 300,000; but on the occasion of every twelfth year a feast of peculiar sanctity takes place, the latest having occurred in 1894; the visitors, from the commencement to the close of this festival, are stated to have averaged about 2,000,000. Commerce mingles with religion in an annual fair, which possesses considerable mercantile importance, being one of the principal horse fairs in Upper India. Commodities of all kinds, Indian and European, find a ready sale, and the trade in grain and foodstuffs of the surrounding districts is considerable. Hardwar is 1024 feet above the sea, in latitude 29° 57′ N. and longitude 78° 14′ E. Population, in 1891, 29,125; in 1901, 25,597.

HARDWARE. A commercial term which includes an enormous variety of articles manufactured from iron, copper, brass, or bronze, and variously known as *carpenters'*, *housekeepers'*, or *builders'* hardware. It is almost impossible to classify the articles which come under the general term, including, as it does, implements and materials used by saddlers, miners, contractors, machinists, stationers, car-builders, and furniture makers and dealers. Many toys and the limitless varieties of what are called 'fancy' articles belong to this branch of manufacture, as indeed does almost any article not assignable to any other branch of trade. A typical hardware catalogue contains the list of a regular stock of nearly fifty thousand articles and sizes. Until the latter half of the nineteenth century the United States was almost wholly dependent on England and Germany for its hardware. Such implements as were made at home were usually the work of the village blacksmith, who was an individual of the first importance in those days. The manufacture of American hardware in general began about 1850, and has increased till now the American product is in many branches the standard for excellence the world over. A characteristic of American hardware is the neatness with which the finished product is packed and incased for the market.

HARD'WICK, Charles (1821-59). An English clergyman, born at Slingsby, Yorkshire. He was educated at Cambridge; was professor of divinity, Queen's College, Birmingham, 1853, and two years later lecturer on divinity at King's College, Cambridge. Soon after being appointed Archdeacon of Ely he was killed by falling over a precipice in the Pyrenees. He ranked high as a Church historian, his chief works being *History of the Articles of Religion* (1851); *History of the Middle Age of the Church* (1853; 6th ed. by Dr. William Stubbs, 1888); *History of the Reformation* (1850; 9th ed. by Stubbs, 1888); and *Christ and Other Masters* (1855-58; 3d ed. by Francis Proctor, 1874).

HARD'WICKE, Philip Yorke, first Earl of (1690-1764). An English jurist and Lord Chancellor, born at Dover. He was educated at a private school in Bethnal Green, was then apprenticed to a London solicitor, studied at the Middle Temple, and was admitted to the bar in 1715. The favor of Lord Macclesfield, together with his own talents and attractive personality, resulted in his rapid advance in the profession. In 1719 he was elected a member of Parliament for Lewes, and the following year for Seaford, which he represented until he became a peer. Within a few days of his first speech, in 1720, on the supremacy of the British over the Irish Parliament, he was appointed Solicitor-General, and three months later was knighted. In 1724 he succeeded to the Attorney-Generalship; in 1733 was appointed Lord Chief Justice of the King's Bench, and was created Baron Hardwicke of Hardwicke; and in 1737 he became Lord Chancellor. Among the chief events of his long career were his co-administration of the Government during the King's absences in 1740, 1748, and 1752; the punishment of Edinburgh for the Porteous riots in 1737; the pacification of Scotland after the Jacobite rebellion of 1744, wherein the wisdom of the abolition of heritable jurisdictions was somewhat counterbalanced by his injudicious proscription of the tartan; and the loss of Minorca and the trial and execution of Byng. To him is largely due the reduction of English equity to a scientific system of logical deduction. In 1754 he was created Viscount Royston and Earl of Hardwicke, and two years later he retired into private life. Consult Harris, *The Life of Lord Chancellor Hardwicke* (London, 3 vols., 1847).

HARDY, ärʹdēʹ, Alexandre (c.1570-c.1631). A very fertile French dramatist, born in Paris. He is thought to have written 600 plays, of which 41 were printed (1624-28). Of these the best is *Mariamne*. He was an artisan rather than an artist, and first appears in 1593 as author for a strolling company of actors. In 1599 he filled a similar place in Lecomte's company at the Parisian Theatre of the Hôtel de Bourgogne. Of his life little else is known. In his dramas he emancipated the stage from the scholarly mannerisms of Jodelle (q.v.), and became the founder of popular secular tragedy in France. The scenic traditions remained, but Hardy ignored the classic unities of time and place, and soon discarded the chorus. Hardy had little stylistic or poetic talent, but he had dramatic tact and the instinct of stage effects, using old material freely for tragedies, tragi-comedies, and pastorals, which in freeing the French stage from the bondage of Latin, Spanish, or Italian models, made it an attractive field for literary men. Before Hardy's death, Théophile had written his *Pyramus and Thisbe*, Racan his *Shepherd Plays* (*Bergeries*), Mairet his *Sylvie*, Gambaud his *Amaranthe* (1617-25), all for the Hôtel de Bourgogne. He lived to see the first successes of Corneille (q.v.), and the first 'regular' French tragedy, Mairet's *Sophonisbe* (1639). Hardy's *Works* have been republished in 5 vols. (Marburg, 1884). Consult Rigal, *A. Hardy et le théâtre français* (Paris, 1889).

HARDY, Arthur Sherburne (1847—). An American novelist, diplomat, and writer on mathematics. He was born at Boston, graduated at West Point at the age of twenty-two, and served for some time in the army. He was professor of civil engineering, Iowa College, from 1871 to 1873, received the degree of Ph.D. from Amherst in the latter year, then studied abroad, and held the chairs of civil engineering (1874-78) and mathematics (1878-93) at Dartmouth. The latter position he resigned for the purpose of devoting himself to literary and diplomatic pursuits. He was United States Minister Resident and Consul-General at Teheran, Persia (1897-99); Minister to Greece, Rumania, and Servia (1899-1901); Minister to Switzerland (1901-02); and in 1902 was appointed Minister to Spain. His mathematical publications include the following: *Elements of Quaternions* (1881); *New Methods in Topographical Surveying* (1884); *Elements of Analytic Geometry* (1888); *Elements of Calculus* (1890); and a translation of Argand's work on Imaginaries (New York, 1881). He is better known by his fiction, which includes: *But Yet a Woman* (1883); *The Wind of Destiny* (1886); *Passe Rose* (1889). He is also author of two poetical works, *Francesca of Rimini* (1878) and *Songs of Two* (1900), and of the *Life and Letters of Joseph Hardy Neesima* (1891).

HARDY, Arthur Sturgis (1837-99). A Canadian statesman. He was born at Mount Pleasant, Ont.; was educated at the grammar school of his native town and at Rockwood Academy; studied law, and was called to the bar in 1865. After a period of successful law practice, he was made a Queen's Counsel in 1876. He entered political life in 1873, and was returned as Liberal member for South Brant in the Ontario Legislature. In 1877 he was made Provincial Secretary, and in 1899 Commissioner of Crown Lands in the Mowat Cabinet, and when the latter became a member of the Dominion Cabinet at Ottawa in 1896, Mr. Hardy became Premier and Attorney-General of Ontario. He was an active and very useful legislator, and in his term of office introduced many bills, most of which were passed, relating to railways, courts, and legal procedure, sanitation, and liquor licenses.

HARDY, Sir Charles (c.1716-80). An English admiral. He was the son of Vice-Admiral Sir Charles Hardy, entered the navy in 1730, and in 1737 was promoted to be a third lieutenant. After serving on several ships he was sent in 1744 in charge of a convoy to Newfoundland. In this he was unsuccessful, and having been blamed for the loss of part of the convoy, was court-martialed, but was acquitted. In 1745 he commanded a ship off the coast of Portugal, where he fought a severe though indecisive action with a French man-of-war. Appointed Governor of New York in 1755, and rear-admiral of the blue the following year, he aided Admiral Boscawen in the siege and reduction of Louisbourg in 1758. He was second in command under Hawke during the blockade of Brest, and at the battle of Quiberon Bay was made vice-admiral in 1762, and admiral in 1770. The most important event in Hardy's professional life was his appointment to the command of the Channel Fleet in 1779, when an invasion by the combined French and Spanish fleets was imminent. He had only thirty-nine ships of the line against the enemy's sixty-six; but the allied admirals declined to attack, and returned to Brest.

HARDY, Gathorne. See Cranbrook, First Earl of.

HARDY, Thomas (1840—). An English realistic novelist, born in Dorsetshire. At the age of sixteen he was articled to an ecclesiastical architect in Dorchester. He studied for a time at King's College, London, and in 1863 received a prize from the Royal Institute of British Architects for an essay upon *Coloured Brick and Terra-Cotta Architecture*. He worked as an architect—especially in the Gothic School—under Sir A. Blomfield in London from 1862 to 1867, and though he deserted it for literature the following year, the influence of his early studies is left upon his writing. His desire for scientific precision sometimes leads him to the introduction of technical words and phrases, which mar the otherwise severe simplicity of his style. The architect is perforce the antiquary, and from the days when Hardy took professional excursions to different village churches to see if they were worth restoring, he steeped himself in the lore of his native county, which he calls Wessex.

His first publication was an article in *Chambers's Journal* (March, 1865), entitled *How I Built Myself a House*, and after an unsuccessful attempt, called *The Poor Man and the Lady*, which George Meredith advised him to reconsider, he brought forth his first novel, *Desperate Remedies* (1871), a crude and fantastic effort, but interesting as illustrative of the author's formative stage. He struck a surer note in *Under the Greenwood Tree* (1872), an idyllic love story, or, as the title-page has it, "A Rural Painting of the Dutch School." Here, the lightness of touch is equaled in none of his later work. *A Pair of Blue Eyes* (1873) marked Hardy's progress in the study of the whimsicalities of womankind, and their resultant tragedy; but *Far from the Madding Crowd* was the book which first gained him popular favor. While running as an anonymous serial in the *Cornhill Magazine* throughout the year 1874, it was attributed to George Eliot, not from any similarity of style, but because no other living author was considered capable of writing it. A farcical production, called *The Hand of Ethelberta: A Comedy in Chapters* (1876), illustrated by George Du Maurier, preceded *The Return of the Native* (1878), the first really great work of Hardy, and one which by some is even regarded as his masterpiece. By this time he had shaken off self-consciousness, invention had given place to imagination, and he was able to create dramatic characters and situations worthy of their inimitable stage setting, Egdon Heath. His description of that wild moorland, in the opening chapters, is a fitting introduction to the stormy lives that are mingled with it; and here the author's feeling for nature is most vividly illustrated. In *The Trumpet Major* (1880), he returned to his earlier manner of the *Greenwood Tree* and the *Madding Crowd* without attaining the graceful charm of the one or the strength of the other. Hardy is supreme in his own Wessex; here, he exhibits, on the one hand, a high degree of sensibility to the delights of her rural life, and, on the other, the keenest sympathy with the rustic point of

view. When he forsakes the types of these regions, the result is not convincing. *A Laodicean* (1881) justifies the name, in being neither cold nor hot. The tale *Two on a Tower* (1882) develops a very curious and complicated situation with much skill. But he is tethered to Wessex, and paints more confidently on that background, in *The Romantic Adventures of a Milkmaid* (1883), and in the *Mayor of Casterbridge: The Life and Death of a Man of Character* (1886), a title which is no misnomer. Henchard, the hero, is a strongly drawn personality, to whose level the author has been climbing, through similar types of men.

The Woodlanders (1887), though flanked by *The Return of the Native* and *Tess of the D'Urbervilles*, suffers from comparison with neither, expresses the same intimate kinship of man with nature, and gives like instances of true nobility engaged in the lowliest occupations. Of the *Wessex Tales* (1888), gathered from different magazines, the strongest is *The Three Strangers* (*Longman's*, March, 1883), which was dramatized under the title *The Three Wayfarers*, and produced at Terry's Theatre, in London (1893), eleven years after Comyns Carr's version of *Far from the Madding Crowd* had been seen in Liverpool, and in the Globe Theatre, London. Another collection of short stories entitled *A Group of Noble Dames* (1891) preceded the publication of *Tess of the D'Urbervilles: A Pure Woman Faithfully Presented* (1891), through which Hardy became most widely known. Whatever may be said for or against the purity of the woman, there cannot be two opinions regarding the vividness of the presentation, although the art of *Tess* is marred at times by philosophic digressions that do not match the remainder of the literary fabric. Yet it is doubtful if any one of Hardy's stories holds the reader's interest more closely, or makes a stronger appeal to his sympathies, than does this tragedy of Tess. Nor is there anywhere in Hardy's writing more convincing insistence upon a logical connection and a consequent force of uncontrollable circumstance, or more relentless reiteration of the idea that man may be forced to reap where he has not sown. Whether here, and elsewhere when he writes in this vein, Hardy reveals himself a fatalist, or a rigid moralist, is a question which will be answered largely in accordance with the temperament of the reader. A dramatization of *Tess*, made by Lorrimer Stoddard (1897) and taking no more than the usual liberties with the original plot, gave Mrs. Minnie Maddern Fiske (q.v.) the means for defending, even more effectively than does the author, the subtle characterization of the heroine.

Whatever else may be said of *Jude the Obscure* (1895), it seems quite apparent that here Hardy gives the fullest expression to his genius for minute and merciless character analysis. There is even a feeling, at times, that the psychology is in danger of being refined into nothingness. The story of Jude's early discouragements in his efforts to get a university education is said to be autobiographical to a certain extent. The whole is a harrowing, and yet in the main convincing, study of the degradation of a character cursed from the outset with certain of the most dangerous moral weaknesses, which are steadily cultivated by cunningly conceived circumstances and plausibly arranged episodes. It can scarcely be denied that both of these books are literary masterpieces in their genre; and consideration of the remarkable fertility and resourcefulness of expression which each displays, makes the more inexplicable their author's occasional descent to the employment of indelicate metaphor and frankly indecent 'realism.'

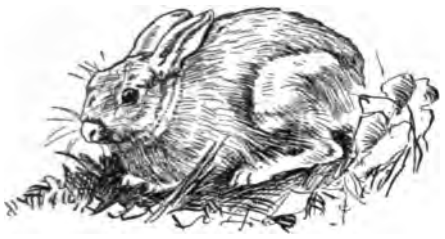
Life's Little Ironies (1894) are short stories evidencing Hardy's grim sense of humor no less than his appreciation of values. He knows and shows how few among the coveted prizes of life are worth a struggle. *The Well-Beloved*, which was serially published in 1892, and in book form five years later, is of less importance. The reciprocal feeling of his native county found expression in his appointment as one of its magistrates (1894). Some of Hardy's earliest efforts were in verse, and the stray poetical productions of thirty years were collected in two volumes, *Wessex Poems* (1899) and *Poems of the Past and Present* (1901). They bear his mark in the saturnine flavor of some, the sympathy with the country and country-folk of others, the patriotic English sentiment of all; but the instrument is not his own. He is hampered by the requirements of rhyme and rhythm, and has but little to say which he might not have expressed at least more spontaneously in prose. Consult: W. Sherren, *The Wessex of Romance* (London and New York, 1902); and Windle, *The Wessex of Thomas Hardy* (London and New York, 1901); Macdonell, *Thomas Hardy* (London, 1894); and Johnson, *The Art of Thomas Hardy* (London, 1894).

HARDY, Sir Thomas Duffus (1804-78). An English paleographer, born at Port Royal, Jamaica. He succeeded Petrie as editor of the *Monumenta Historica*, published in 1848. As deputy keeper of the new Record Office he did much to make all records accessible to the public, and brought to London the muniments of the three palatinates. He edited many of the rolls for John's reign: *A Descriptive Catalogue of MSS. Relating to the History of Great Britain and Ireland* (1862-71); *Registrum Palatinum Dunelmense* (1873-78); *Catalogue of the Lords Chancellors, etc.* (1843); and articles on the date of the Athanasian creed.

HARDYNG, John (1378-c.1466). An English chronicler. He was page to Sir Henry Percy, whom Shakespeare has immortalized as 'Harry Hotspur,' and went to the wars with his master. His rhyming chronicle, a curious but entirely unreliable document, evidences the profundity of his historical knowledge and his adaptability in treating current events in a manner pleasing to his patrons. Ellis's modern edition of this *Chronicle of England unto the Reign of King Edward V.* was published in 1812.

HARE (AS. *hara*, Icel. *here*, OHG. *haso*, Ger. *Hase*, hare; connected with OPruss. *sasnis*, OIr. *cenach*, Skt. *śvaśura*, for **svaśura*, hare). One of a genus of rodent quadrupeds, of which there are many species very similar to each other. The Linnæan genus Lepus now forms the family Leporidæ, of which a peculiar characteristic is the presence of two small incisors immediately behind the ordinary rodent incisors of the upper jaw, so that these teeth seem to be double. This peculiarity is also found in the pikas (q.v.). The

HARES AND PIKA



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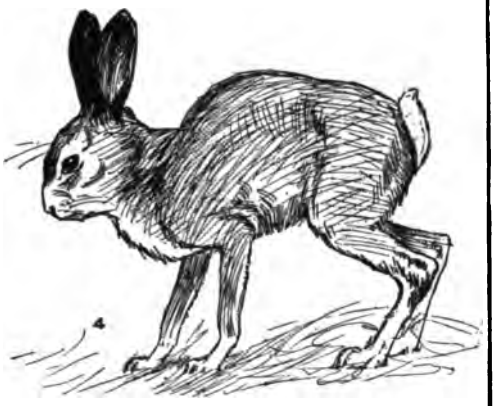

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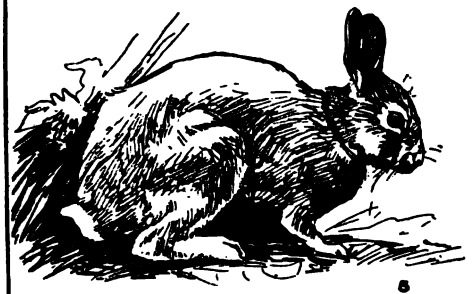

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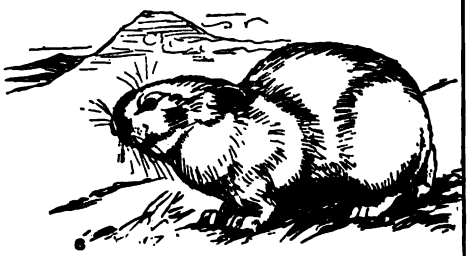

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1. COMMON EUROPEAN RABBIT (Lepus cuniculus).
2. LOP-EARED RABBIT (domestic variety).
3. VARYING HARE (Lepus Americanus).
4. BLACK-EARED JACK-RABBIT (Lepus melanotis).
5. COTTON-TAIL (Lepus sylvaticus).
6. ROCKY MOUNTAIN PIKA (Ochotona princeps).

molar teeth, six on each side above and five below, are transversely grooved, and are formed of two vertical plates soldered together. All the animals of this family feed exclusively on vegetable food, and chiefly on herbage, although they are also fond of grain, roots, and the bark of trees. Their fore feet have five toes, their hind feet four; the soles are hairy. Their fur is soft; the colors mostly gray or brown. The alpine and arctic species become white in winter; and all, except one Indian species, have white upon the under surface of the tail. As this is invariably upturned in flight, it is regarded by naturalists as a recognition mark by which the young or companions may keep in view and follow their flying leader. From this characteristic arises the name 'cottontail,' popularly given to one of the smaller American hares. The black markings which become so conspicuous upon the ears of several species when they are lifted serve a similar purpose, and all disappear when the animal squats, and it then presents to the eye of the searcher only a neutral-tinted back. Hares thus offer good illustrations of 'protective coloration' and 'recognition marks' (qq.v.). The rabbit also belongs to this family, but it is so different in many ways that it is described by itself. It may be said, in passing, that although the term 'rabbit' is used generally for all kinds of leporine animals in North America, where the true rabbit does not exist, it belongs exclusively to the burrowing *Lepus cuniculus* of Europe; and all others of the family, including all the American species, should be called hares. About thirty species of Lepus are known, of which one is found in South America and some twenty in North America.

HARES OF THE OLD WORLD. The type of the family is the common hare (*Lepus Europæus*), which is found all over Europe, except in Ireland, Scandinavia, and the north of Russia. Its length is from 20 to 22 inches, and its usual weight seven or eight pounds. Another familiar Old World species is the mountain or Alpine hare (*Lepus timidus*). This occurs in Ireland, all over Northern Europe and Asia, and in the Pyrenees, Alps, Caucasus, and thence east to Japan; while the Polar hare of America is regarded by some naturalists as identical with it. It is considerably smaller than the common hare, and has a rounder head, with shorter ears, hind legs, and tail, and a lighter-colored coat, which, at least in the colder parts of its range, turns white in winter. In Central Asia are found several other species, some of which are confined to the higher slopes of the great mountain ranges. A remarkable species is the Indian or hispid hare (*Lepus hispidus*), of the foothills of the Eastern Himalayas. This hare has coarse, bristly ears, which are shorter than the skull, small eyes, a tail which is dark below and above, and hind legs only a little longer than the front ones. It is not a gregarious animal, but it is said to burrow as a rabbit does, and its young, therefore, are probably born naked and blind. It is reported that its flesh is white. Sumatra has an allied species. In Africa several species of hares inhabit the more open parts of the continent from the Sahara to the Cape. The habits of all these (except the hispid) are much alike.

The members of this family live among rocks and bushes, or in open country among the grass and brush. Each has a 'form' in the grass or sheltered by a rock, and sometimes returns to this form every day for much of the year. Hares feed at night, are mainly nocturnal in their movements, and do not return to their forms until sunrise. Because of the greater proportionate length of their hind legs, they run up hill more easily than down, and they develop great speed. All the members of the genus are remarkable for their extreme timidity, yet they are often bold and courageous in defense of their young, and pugnacious toward others of their own race. Their angry stamping upon the ground with the hind feet is well known to all countrymen. With these hind feet they can deliver powerful blows, and this is their method in fighting. The hare never becomes fat, but its flesh is excellent food. Though shot and trapped, the ordinary method of hunting it, as a sport, is by coursing with greyhounds—a sport of classic antiquity. (See COURSING.) It is a prolific animal, although not nearly so much so as the rabbit. The female produces from two to five at a birth, and may begin to breed at six months of age, and produce two or three broods a year. The young (*leverets*) are born covered with hair, and with the eyes open. When, as in the case of the hares of California, their natural enemies—beasts and birds of prey, and serpents—are greatly reduced, this multiplication goes on with little to check it, while if the food-supply is yearly added to by enlarging plantations, the increase may be so rapid that the animals become a serious menace to agriculture, and special efforts must be made to keep them down.

AMERICAN HARES. The Canadian Polar hare is a variety (*arcticus*) of the European northern hare, and turns from its brownish grizzle in summer to pure white in winter. It comes little south of the Arctic Circle, except on the east coast, where it is to be found in Labrador and Newfoundland. Other American hares turn white in winter, however. The most conspicuous of these is the 'varying' hare (*Lepus Americanus*), which is distributed from the middle parts of the United States throughout the northern parts of the continent wherever forests grow. It shows a great variety of reddish and brownish tints, always with the tips of the ears black behind, and in winter among northern specimens only these black ear-tips relieve the snowy white of the pelage; but southern specimens often make only a partial change of coat. On the Western plains and in California are found several species of large hares of gaunt form and immense ears, naturally called 'jack-rabbits' ('liebres' by the Mexicans). Just how many species and subspecies of these there are, naturalists are not yet agreed, but practically five may be recognized. These include the white-tailed hare and the various black-tailed rabbits. The white-tailed or prairie hare (*Lepus campestris*) is found all over the plains north of Kansas and throughout the Utah Basin. It is the only jack-rabbit whose coat turns white in winter, and it may be recognized in summer by the fact that its tail is entirely white. The tails of the other jack-rabbits are more or less black on the top—a fact easily seen, as none of this group of hares turns up its tail as do the wood-hares. Among the Western black-tailed rabbits are: (1) A buff-bellied species found in California and southwestern Oregon (*Lepus Californicus*); (2) a large, long-limbed species inhabiting southern Arizona and Sonora, known as Allen's hare (*Lepus Alleni*); (3) a

widely distributed white-bellied animal with long ears, occurring in the Great Basin, and commonly known as the Texan jack-rabbit (*Lepus Texanus*); and (4) the tall black-eared jack of the Great Plains (*Lepus melanotis*). It is doubtful whether any real distinction exists between the two last named, and the jack-rabbit of the southern plains may be said to extend westwardly to the Pacific Coast.

These hares of the plains do not burrow, nor seek the protection of holes or shelter of any kind, beyond that afforded by a thicket of brush which may shield them from the winter's wind or the equally dreaded rays of the midsummer sun. Some dwell in a region where the winter temperature may fall as low as 50° F. below zero; others where the noonday sun heats the air to 140° and makes the rocks unbearable to touch; some in rich valleys, others on the sourest of deserts; yet all thrive with that remarkable adaptability to varying conditions which must be reckoned with in any consideration of these animals as a pest. Their food consists of grass, herbage, and largely of bark. It is difficult to find any considerable extent of country which does not supply enough of this fodder for a population of hares, and as they drink but little, they do not suffer from the lack of water even in an almost desert land, for the moisture in the ordinary desert herbage seems to be all they require. They have comparatively few enemies, against which they are guarded by their invisibility when crouched in their 'forms'; by their senses of sight and smell; and by the remarkable acuteness of their hearing, for the augmentation of which the great ears have been developed. If danger comes too near they can usually escape it by flight—a word that approaches literal accuracy as a description of the series of high bounds, each 15 to 20 feet in length, with which their great hind legs carry them over the ground.

They multiply rapidly, yet are not so fecund as is frequently alleged. Those in the arid Southwest seem to produce only one to three at a birth, but have several broods a year, between January and September; while the Northern species breed no more than twice, as a rule, with four to six young in a litter. Most births fall in April, May, and June. The period of gestation is about thirty days. The young are born fully furred, with their eyes open, and often with several teeth in sight. They attain their full size (but not weight) in about two months. It will be seen that at this rate of increase, under such favorable conditions as are brought about in the West by irrigation, agriculture, and the diminution of serpents and birds and beasts of prey, the danger from an over-population of hares is very great; and for many years this has been a serious pest. Large sums have been spent on 'rabbit-proof' fences, and on various devices for excluding the animals from fields and orchards; and still larger losses have occurred through the absence or failure of protection. The principal measure has been that of the periodical 'drive.' All the men and boys and many women and girls of a given district gather in a circle about a square mile or more of space, and drive the hares into an inclosure, where they are slaughtered with clubs. These battues have been most numerous, systematic, and effective in southern California, though occasional wherever the necessity arises, and in the San Joaquin Valley have so reduced the hares that they are no longer dangerous. Students of the problem have concluded, however, that 'driving' is only a partial and a demoralizing remedy; and assert that the only true safety for crops and orchards lies in the rabbit-proof fence. A complete discussion of this matter, with its history, statistics, and teachings, together with much information as to the utilization of the American hares as food and for their skins, hair, etc., may be found in Palmer, *The Jack-Rabbits of the United States* (Department of Agriculture, Washington, 1896); Beddard, *Mammalia* (London, 1902).

Wood-Hares. Of the smaller hares, the woodhare or 'cottontail' (*Lepus sylvaticus*) is the 'common rabbit' of the United States, where it is scattered from the Atlantic to the Pacific, but does not extend far north. It is about 18 inches long, gray, more or less varied with black above, and somewhat tinged with yellowish brown; white below; tail cottony white; ears two-thirds the length of the head. The little marsh-hare (*Lepus palustris*), whose tail is not grayish nor cottony, and the water-hare or 'swamp-rabbit,' are familiar Southern species, the latter large and yellowish brown, white below.

Consult Audubon and Bachman, *Quadrupeds of North America* (New York, 1856); Stone and Cram, *American Animals* (New York, 1902); Sharp, *Wild Life Near Home* (New York, 1901); Thompson, *Wild Animals I Have Known* (New York, 1898).

See Rabbit; Pika; and Plate of Hares and Pika.

Hare Kangaroo. One of the small banded wallabies (q.v.) of the genus Lagostrophus, which resemble hares, and have habits singularly like that animal's. They inhabit swampy districts on the west coast of Australia, and make refuges for themselves by forming tunnels through the dense scrub, biting away twigs and branches until a clear passage and chamber are formed.

Hare. In point of law, one of the wild animals called game, which are specially protected by game laws. The close season for hares is regulated in this country by State legislation. See Game Laws.

HARE, Augustus John Cuthbert (1834-1903). An English author, the nephew of Julius and Augustus Hare. He was born in Rome, and educated at Harrow and at University College, Oxford. The results of his travels he has given in guide books and other works of the highest value. Among them are: *Walks in Rome* (1870); *Cities of Northern and Central Italy* (1875); *Walks in London* (1877); *Cities of Southern Italy and Sicily* (1882). His *Story of My Life* (6 vols., 1896-1900) is full of delightful reminiscences of many celebrated people; and his *Memorials of a Quiet Life* (1872-76) is a charming biography of his aunt and uncles. To him we are also indebted for the only good life of Maria Edgeworth (1894).

HARE, Augustus William (1792-1834). An English clergyman, brother of Julius Charles Hare. He was born in Rome, and was educated at Winchester and New College, Oxford, where he attacked several ancient customs, and became founder of the Attic Society. He had been adopted (1798) by the widow of Sir William Jones, his godfather, but broke with her because

of his refusal to qualify for the valuable living of Hurstmonceaux, formerly held by his father, and in the gift of the Jones family. He was a tutor at New College for several years, and became rector of Alton-Barnes, a small rural community, where he lived from 1829 until poor health drove him to Rome, where he died. He wrote *Sermons to a Country Congregation* (1837), and, with his brother, *Guesses at Truth* (1827). Consult Augustus J. C. Hare, *Memorials of a Quiet Life* (London, 1872).

HARE, GEORGE EMLEN (1808-92). An American clergyman, born in Philadelphia. He graduated at Union College in 1825, became a priest of the Protestant Episcopal Church, was rector of Saint John's, Carlisle, Pa. (1830-34); of Trinity Church, Princeton, N. J. (1834-43); and of Saint Matthew's, Philadelphia (1845-52). He had had charge of the Episcopal Academy during a part of his pastorate at Saint Matthew's, and was made instructor in the diocesan training school and, after its development into the Philadelphia Divinity School, a professor of biblical learning, and then (1881) of New Testament literature in the latter institution. He wrote: *Christ to Return* (1840); and a volume of sermons, *Visions and Narratives of the Old Testament* (1889).

HARE, JOHN (1844—). A well-known English actor and manager. He was born in London; was educated in Yorkshire; and made his first stage appearance at the Prince of Wales Theatre, Liverpool. Soon afterwards (1865) he came to the London Theatre of the same name, where he was very popular in the comedies of T. W. Robertson, with some of which in later years he toured in America. In 1875 he became manager of the Court Theatre, where he brought out *Olivia, A Scrap of Paper,* and other pieces. With Mr. Kendal at the Saint James Theatre (1879-88) he produced *Still Waters Run Deep* and *The Ironmaster.* In 1889 he assumed the management of the Garrick Theatre, and afterwards appeared with several of A. W. Pinero's plays, notably *The Notorious Mrs. Ebbsmith* and *Lady Bountiful.* He took the Globe Theatre in 1897, producing *A Bachelor's Romance* there, and in 1899 Pinero's *The Gay Lord Quex,* which he brought to America in the season of 1900-01. Consult: Pemberton, *John Hare, Comedian* (London, 1895); Scott, *The Drama of Yesterday and To-day* (London, 1899).

HARE, JOHN INNES CLARK (1817—). An American jurist, born in Philadelphia. He was educated at the University of Pennsylvania, was admitted to the bar in 1841, was associate judge of the Philadelphia district court (1851-67), then its presiding judge (1867-75), and from 1875 to 1895 was presiding judge of the Court of Common Pleas in the same city. In 1868 he received the degree of Doctor of Laws at the end of ten years' service as a trustee of the University of Pennsylvania, in which he served for many years as professor of the institutes of law. He wrote: *American Leading Cases,* with Horace B. Wallis (1847); *The Law of Contracts* (1887); and *American Constitutional Law* (1889); and edited: *Smith's Leading Cases in Law* (1852); *White and Tudor's Leading Cases in Equity* (1852); *Hare on Contracts* (1887); and *The New English Exchequer Reports.*

HARE, JULIUS CHARLES (1795-1855). Archdeacon of Lewes, a well-known English writer. He was born at Valdagno, 50 miles northwest of Venice, Italy, September 13, 1795. While still a boy he passed a winter at Weimar (1804-05), where he met Goethe and Schiller, and gained a knowledge of German literature which influenced his style and sentiments throughout his whole career. On the death of his mother in 1806, he was sent to the Charterhouse in London, where he remained until 1812, when he entered Trinity, Cambridge. There he became fellow in 1818, and after traveling abroad he began to read law in London in 1819. In 1822 he was appointed assistant tutor at Trinity College, which position he retained for ten years. Turning his attention from law to divinity, he was ordained in 1826. In 1827 appeared the *Guesses at Truth by Two Brothers,* written by Hare and his eldest brother, Augustus William (q.v.). On the death of his uncle in 1832 he succeeded to the rich family living of Hurstmonceaux, in Sussex, where he accumulated a library of 12,000 volumes, especially rich in German literature. Before taking up his residence in his parish, he once more went abroad. In 1840 Hare was appointed Archdeacon of Lewes, and in the same year preached a course of sermons at Cambridge, *The Victory of Faith* (3d ed. by Plumptre, 1874); followed in 1846 by a second, *The Mission of the Comforter* (3d ed. 1876). In 1853 he became a Queen's chaplain. He was eminently unfitted to be a country parson, but did much better as an archdeacon. His sermons and charges were unmercifully long because he considered not at all the patience and interest of his auditors. But withal he was a scholar and a conscientious worker. He died at Hurstmonceaux, January 23, 1855. For his biography, consult A. J. C. Hare, *Memorials of a Quiet Life* (London, 1872).

HARE, ROBERT (1781-1858). An American chemist, born in Philadelphia. As a boy he was employed in his father's brewery, and had little spare time for study, but he managed to gain a considerable knowledge of chemistry and physics, and in 1801 invented the oxyhydrogen blowpipe. For this the American Academy of Boston awarded him the Rumford medal. He was professor of chemistry at the University of Pennsylvania from 1818 until 1847, and subsequently was elected a life member of the Smithsonian Institution. He made many ingenious and practical inventions of laboratory apparatus, and wrote a number of papers on scientific subjects, in addition to which he published: *Brief View of the Policy and Resources of the United States* (1810); and *Chemical Apparatus and Manipulations* (1836). His collection of chemical and physical apparatus is preserved by the Smithsonian Institution.

HARE, WILLIAM HOBART (1838—). An American clergyman, bishop of the Protestant Episcopal Church. He was born at Princeton, N. J., and was educated at the University of Pennsylvania. He preached in Philadelphia until 1870; was for three years the general agent of the foreign committee of the Board of Missions, and was then elected Missionary Bishop of Niobrara. In 1883 his diocese was extended to include the State of South Dakota. He wrote several pamphlets on missionary work in the West.

HAREL, ȧ'rĕl', PAUL (1854—). A French poet and innkeeper, born at Echauffour. He suc-

ceeded his grandfather as host of the inn *A la Croix Saint-André;* early showed himself master of a simple and beautiful lyric style; was elected a member of the Academy of Caen; and in 1887 received a prize from the French Academy. He published: *Sous les pommiers* (1879); *Gousses d'ail, et Fleurs de serpolet* (1881); *Les vingt-huit jours du caporal Ballandard,* with Le Vavasseur (1882); *Rimes de broche et d'épée* (1883); *Aux champs* (1886); *La hauterie* (1889); the less successful play, *L'herbager* (1891); and *Voix de la glèbe* (1895).

HARELIP. A deformity of the lip, frequently involving also the roof of the mouth, consisting of a cleft through these structures, to one side of the median line, or on each side of it. Median fissure occurs at times, but is very unusual. It exists at birth, and the lip should be repaired during early infancy by operation. The cleft palate should be left till the bones have fully developed with adult life, and may then be repaired, or the opening may be closed with an obturator. In the ordinary (single cleft) form, the mouth of the babe resembles that of a cat or hare. The double-cleft palate is rare. See DEGENERATION.

HARELIP, or **CUTLIPS.** An elongated sucker (*Lagochila lacera*), common in clear streams of the central Mississippi Valley. It is remarkable for having the lower lip divided into three distinct lobes, and otherwise strangely modified. Hence many local names, as 'splitmouth,' 'rabbit-mouthed sucker,' and 'pea-lip sucker.'

HA'REM (Ar. *kharîm,* forbidden, from *kharama,* to exclude). The name given in Mohammedan countries to the apartment in a dwelling set aside for the female members of the household. The term is also applied to the ground around a mosque, and particularly to the mosques at Mecca and Medina. The Koran enjoins that women shall be discreet in their association with the other sex, and forbids them to expose face or person except to a husband, father, son, or certain intimate male relatives (Sura xxiv. 31; xxxiii. 53-55). But such injunctions are not peculiar to Islam, and the extraordinary precautions observed by Mohammedans with respect to their women represent a deeply rooted Oriental idea much older than the rise of Islam. The setting aside of a special apartment for women in a house is but one of these precautions, and undoubtedly antedates the time of Mohammed. The excavations conducted at Susa by Dieulafoy indicate that the palaces of the Persian kings contained a separate wing for the women, a view which is in accord with certain allusions in the Book of Esther (v. 12; vii. 1). In other books of the Old Testament there are also allusions to a special woman's apartment, and from the fact that in Babylonian *kharimtu* is one of the names for woman, we may conclude that already in ancient Mesopotamia the women were kept in a greater or lesser degree of seclusion. It is, however, due to the influence of Islam that the harem as an institution has been so rigidly maintained in the East. It is at the risk of life that a non-believer or a male Mohammedan who does not fall within the prescribed category of husband, father, son, or other intimate relative enters the harem of a Mohammedan householder, to which there is always a separate entrance. While within the household the social intercourse between husband and wife is quite free, the wife or the wives of a man, attended by servants, mostly females, lead to a large extent isolated lives. The women visit one another, and spend most of their time in each other's apartments. Restrictions of various kinds are imposed on them when they leave these apartments. They are to be veiled when appearing in the street, are accompanied by a male servant, and it is equivalent to loss of caste for a woman to be seen in company with a man unless veiled and in the presence of her husband. The harem as an institution is not necessarily connected with polygamy, for although a Mohammedan has by the law of the Koran the right to take four wives, there are comparatively few householders who avail themselves of this rather costly privilege. One wife or a wife and a concubine form the rule, and it is mostly in the case of persons occupying a high official position that several wives are gathered together under one roof. By an unwritten law the Sultan has the right to seven wives, and an indefinite number of concubines, but it should be added that the tales of an extensive harem maintained by the rulers of Turkey are largely exaggerated, and rest upon a confusion between actual wives (or concubines) and female attendants and slaves, of which there are of course large numbers in a royal household. The harem customs and the treatment accorded the women vary considerably in the various Mohammedan countries—Egypt, Syria, Arabia, Persia, Turkey, and India. In general more liberties appear to be allowed the women of the harem in Turkey and India than elsewhere; but it must be remembered that even where the women are under the strictest surveillance, long-standing custom has deprived the technical imprisonment of any sense of degradation; and from the Mohammedan point of view, it is not for the purpose of humiliating women that the harem as an institution has been introduced. Care is exercised to preserve the position of the 'chief' wife, who takes rank above the others. In case a man has several wives, the latter may exact of their husband that each be provided with a separate apartment, consisting of at least a bedchamber and a kitchen. Within the harem, however, the woman reigns supreme; there she entertains her female friends, and there, surrounded by attendants to look after her wants, she spends her days with her children. The most objectionable features of the harem from the sociological and moral point of view are the idleness and vacuity of the life there, and the time-honored employment in large and particularly in royal households of eunuchs as supervisors of the harem and as attendants. Most of the tales of cruelty, immorality, intrigue, and crime to be found in works descriptive of harem life in the past may be traced to these features. Consult: Lane, *Manners and Customs of the Modern Egyptians* (London, 1837); Emmeline Lott, *Harem Life in Egypt and Constantinople* (London, 1869). Lady Mary Wortley Montagu's letters may be consulted for descriptions of harem life in the Sultan's household in the eighteenth century, but the picture is only in a measure applicable to present conditions.

HAREN, hä'ren, WILLEM VAN (1710-68). A Dutch poet, born at Leeuwarden. He studied there, at Franeker under Hemsterhuys and Heineccius, and at Groningen in the home of Jean

Barbeyrac. In 1728 he succeeded to the Castle of Henkenshage, at Saint Anna Parish, after the death of his grandfather. The castle was burned four years later, with many valuable papers. It was rebuilt in 1734; but the fire seemed the beginning of misfortune for him, and in 1768 he committed suicide, discouraged by financial losses. He wrote: A lyric, *Leonidas* (1742), urging Holland to join in the War of the Austrian Succession; *Lierganzen* (1742), which with *Leonidas*, was republished in 1824; and an epos, *Friso* (1742 and 1758). His brother, ONNO ZWIER (1713-79), was a patriot and poet, too. He wrote *De Geuzen* (1772) and several dramas, of which *Agon* (1769) is the best. The collected works of the two brothers were published in 1854. Consult Van Vloten, *Leven en Werken van Willem en Onno Zwier van Haren* (Deventer, 1872-74).

HARFLEUR, är'flĕr' (called in the Middle Ages *Hareflot*). A town in the Department of Seine-Inférieure, France, near the mouth of the Lézarde, about four miles east of Havre (Map: France, G 2). The chief building is a beautiful Gothic church with an elegant tower supposed to have been constructed by Henry V. of England. Population, in 1901, 2686. In former times, before the rise of Havre, Harfleur was a flourishing town, and the key to the entrance of the Seine. It was taken by the English under Henry V. in 1415, retaken by the French in 1433, again seized by the English in 1440, and ten years later recaptured by Charles VII. of France.

HAR'FORD, JOHN SCANDRETT (1785-1866). An English biographer, born in Bristol, of Quaker parents. He was educated at Cambridge, but received an honorary degree from Oxford in 1822. He gave financial aid in the restoration of the Llandaff and Saint David's cathedrals, while he and his brother gave the ground for the erection of Saint David's College, Lampeter, Wales. The friend of Wilberforce and Hannah More, who immortalized him as *Cœlebs in Search of a Wife*, Harford was a philanthropist, but an anti-socialist, less of a hero than a hero-worshiper, and wrote such excellent biographies as *R. V. Pryor* (1808); *T. Paine* (1820); *T. Burgess, Bishop of Salisbury* (1840); and *Rev. Richard Chapple Whalley, Rector of Chelwood* (1846). Perhaps his most important work is contained in the *Memoirs of Michael Angelo, Savonarola, Raphael, and Victoria Colonna* (2 vols., 1857).

HAR'GOOD, Sir WILLIAM (1762-1839). An English admiral. His first voyage began when he was thirteen years old, at which time he went to Newfoundland on the *Romney*. After service on other vessels, including the *Hebe*, on board which he had Prince William Henry, afterwards William IV., for a shipmate, Hargood was made commander of the *Swallow* in 1789. Three years later he was captain of a frigate taken by the French, and was court-martialed for surrendering too easily, but was honorably acquitted. His next experience was with mutineers on the *Leopard* in 1797, and the following five years he spent in Chinese and East Indian waters. In 1804-05 he was acting under Lord Nelson and was present at Trafalgar, when his ship, the *Bellcisle*, and her crew suffered severely, as she was one of the first in action. Hargood's further services in North America, the West Indies, the Mediterranean, the Adriatic, and elsewhere were rewarded by his appointment to the command of the Channel Squadron, with the rank of admiral (1831), and subsequently to the chief command at Plymouth (1833-36). He was knighted by the King, who ever retained for him a friendly regard.

HARGRAVES, här'grâvz, EDMUND HAMMOND (1816-91). The discoverer of the gold-fields of Australia, born at Gosport, England. He was engaged in sheep-farming at Sydney, Australia, from 1834 to 1849, and spent the years 1849-50 in California. From the similarity in geological structure of the California gold-bearing districts to the west side of the Blue Mountains, in New South Wales, he concluded that there might be gold deposits in the latter place also. Accordingly he returned to Australia in 1850, was instrumental in the discovery of the Australian gold-fields in February, 1851, and made the first announcement regarding them to the Colonial Secretary at Sydney. He acted for a time as a Commissioner of Crown lands, and in 1853 was awarded the sum of £10,000 by the Legislative Council of Sydney. In 1877 the New South Wales Parliament voted him a pension of £250. He published *Australia and Its Gold-Fields: A Historical Sketch of the Progress of the Australian Colonies . . . with a Particular Account of the Recent Gold Discoveries* (1855).

HARGEAVES, här'grēvz, JAMES (?-1778). Inventor of the carding-machine and the spinning-jenny. He was an artisan at Stanhill, in Lancashire, where probably he was born. Hargreaves was an illiterate man, and supported himself and family by weaving and spinning, which, according to the custom of the time, he carried on in his own house. In 1760 he invented the carding-machine as a substitute for the use of hand-cards, and four years later he produced the spinning-jenny. Hargreaves had frequently tried to spin with two or three spindles at once, holding the several threads between the fingers of his left hand; but the horizontal position of the spindles frustrated his attempt. One of his children, however, is said to have upset the spinning-wheel while he was at work, and as he retained the thread in his hand, the wheel continued revolving horizontally and the spindle vertically. The observation of these motions produced the thought that if a number of these spindles were placed upright and side by side, many threads could be spun at once. Hargreaves now put his idea into practice, and constructed the jenny, at which he and his family worked. A few of these machines were sold and served to increase eight times the work of the spinner. This success led his fellow-spinners, who were imbued with strong prejudices against machinery, to break into his house and destroy his frame. He then removed to Nottingham in 1768, where he erected a spinning-mill. Two years later he took out a patent for his machine; and discovering that it was in use by manufacturers in Lancashire without his permission, brought an action for £7000 damages. Pending the trial he was offered by a company £3000 for the use of the jenny, but refused; and it having been proved that he sold some of his machines before the patent was obtained, it was thereby declared to have been invalidated, and his claim for compensation fell to the ground. Hargreaves

continued to carry on business as a yarn manufacturer, with moderate success, till his death in April, 1778.

HARGROVE, ROBERT KENNON (1829—). An American ecclesiastic, Bishop of the Methodist Episcopal Church, South. He was born in Alabama in 1829, graduated at the State University in 1852, and was professor of mathematics there from 1852 to 1857. He was employed in pastoral work and teaching until 1882, when he was chosen bishop. In 1889 he was elected president of the board of trustees of Vanderbilt University.

HARICOT. See KIDNEY-BEAN.

HARI-KARI, hä'rē kä'rē. See HARA-KIRI.

HÄRING, hä'ring, WILHELM. A German novelist. See ALEXIS, WILLIBALD.

HARINGTON, Sir JOHN (1561-1612). An English author, born at Kelston, near Bath, in 1561. He was son of John Harington, author of the graceful *Verses on Isabella Markham*. Queen Elizabeth was his godmother. Educated at Eton and at Christ's College, Cambridge, he studied law at Lincoln's Inn; but he soon became attached to the Court. At the command of Elizabeth he translated Ariosto's *Orlando Furioso* (1591). For this easy and free rendering of an Italian classic Harington is best known. In 1596 he lost for a time the favor of the Queen by a series of tracts in the outspoken manner of Rabelais: *Metamorphosis of Ajax* (i.e. 'a jakes'), *Ulysses upon Ajax*, *An Anatomy of Ajax*, and *An Apology*. He served in Ireland under Essex, and was knighted on the field by the Earl, to the great annoyance of Elizabeth. After long striving for preferment under James I., he became at length one of the tutors of Prince Henry, for whom he wrote some shrewd sketches of the bishops of Elizabeth's reign, entitled *A Brief View of the Church of England* (first published 1653). He also composed many popular epigrams (complete ed. 1618). He died November 20, 1612. Consult the memoir by C. Markham, prefixed to *Tract on the Succession*, Roxburghe Club (Edinburgh, 1880); *Nugæ Antiquæ*, miscellanies in verse and prose, ed. H. Harington (London, 1769; reëdited by Park, 1804); and *Metamorphosis*, etc., ed. by Singer (Chiswick, 1814).

HARIRI, hä-rē'rē, ABU MOHAMMED AL-KASIM IBN ALI (c.1054-1122). A celebrated Arabic philologian and poet. He was born at Basra, about 1054, and died there, 1122. Little is known of his life and circumstances save that he was the son of a silk-merchant (whence his name Hariri, from *harir*, silk). Hariri wrote several valuable grammatical works, of which two have been published: *Durrat al-gawwas*, edited by Thorbecke (Leipzig, 1871), and *Molhat al-irab*, edited and translated into French by Pinto (Paris, 1885-89). The most famous of all his writings, and one of the most remarkable compositions of all times and countries, is his book entitled *Makamat*, 'Sittings.' It may be described as a novel, or a collection of fifty rhymed tales, loosely strung together, the centre of which is always a certain Abu Zaid from Seruj, who, witty, clever, amiable, of pleasing manners, well read in sacred and profane lore, but a thorough rogue, turns up under all possible disguises, and in all possible places—sermonizing, poetizing, telling adventures and tales of all kinds—always amusing and always getting money out of his audience. It is witty, imaginative, dramatic, and displays a great command of language. There have been many translations and imitations, of which by far the best is by Rückert, *Verwandlungen des Abu Seid von Serug* (Frankfort, 1826); there are English translations by Chapellon (London, 1767), Preston (ib., 1850), and Chenery (ib., 1867). The text has been edited with notes by De Sacy (Paris, 1882; reëdited by Reinaud and Derenbourg, ib., 1847-53); and by Steingass (London, 1896). Consult Delabre, "Hariri, sa vie et ses écrits," in *Revue Orientale*, 1853.

HARIŚCHANDRA, hä'rish-chän'drä. A Hindu king of the solar dynasty, a descendant of Ikshvaku, and one of the more prominent personages in the legendary history of ancient India. The earliest mention is made of him in the *Aitareya Brāhmana*, 7, 13-18 (see VEDA), where he is the subject of one of the most interesting legends of the Vedic period. He is represented here as desirous of obtaining a son, and of making a compact with the god Varuna, by which he proposed to sacrifice to the god his son, if he were granted one. Varuna accepted his prayer, and a son, Rohita, is born to the King. The *Aitareya-Brāhmana* then proceeds to relate how Hariśchandra delayed, from time to time, the fulfillment of his part of the compact, until at last the son himself finds his own substitute in Śunahśepa, the child of another, who sells his son for 100 cows, to be offered in sacrifice to Varuna. Ultimately, however, Śunahśepa was released from his bondage through the intervention of the gods. The story is important in connection with early accounts of human sacrifices. According to the epic poem *Mahābhārata*, Hariśchandra was a type of munificence and piety, and after death became elevated to the Court of Indra; and some of the Puranas are still more explicit on his fate. Having given his whole country, his wife and son, and finally himself, to Viśvamitra, in satisfaction of the demands made by this priest, Hariśchandra, in consequence of this act, became elevated with his subjects to the paradise of Indra; but, having been misled by Narada to boast of his merits, was again precipitated. The repentance of his pride, however, arrested his downward descent, and he and his train paused in mid-air, where his city is popularly believed to be at times still visible. Consult Wilson's translation of the *Vishnu-Purāna*. The *Mārkandeya-Purāna*, bks. vii.-viii., translated by Wortham in the *Journal of the Royal Asiatic Society* (London, 1881), is the source of an interesting Sanskrit drama which deals with the text or trial of Hariśchandra. This play, entitled *Canda-Kāuśika*, is accessible in a cheap and admirable translation, with introduction, by Fritze, published in the Reclam Series (Leipzig, 1894).

HARIVANŚA, hä'rē-vän'shä. A Sanskrit epic composition of some 16,000 couplets, and forming a supplementary book to the *Mahābhārata*, of which it professes to be a part. In many respects, however, it resembles a Purāna (q.v.). As its title, 'Race of Hari, or Vishnu,' implies, it is devoted largely to the life and adventures of Krishna as an incarnation of the god Vishnu. Its first part gives an account of creation, together with the legendary dynasties leading down to its main theme, the life of its hero;

its third or last part treats of the future age and decadence of the world. Some allusions in Sanskrit literature which connect it with the *Mahābhārata* show that it must have been as old as the fifth century A.D., in fact as old as certain portions of the great epic itself, although these are generally regarded as later portions. As a rule the *Harivansa* is not considered by scholars to be a work of great antiquity or value, although often quoted by later Sanskrit writers. There is a French translation by A. Langlois (Paris, 1834); and the best separate edition of the text was published in Bombay (1891).

HARKAVY, här'kȧ-vĭ, Avraam (or Albert) (1839—). A Russian Orientalist and Hebrew rabbi, born at Novogrudok in Lithuania, and educated at Vilna and at the University of Saint Petersburg. He studied in Berlin under Rödiger and Dümichen, and in Paris under Oppert, and would have been appointed docent in Saint Petersburg save for a personal enemy. As librarian of the Imperial Public Library of Saint Petersburg, which is especially rich in Semitic manuscripts, he wrote *Studien und Mitteilungen aus der Sankt Petersburger kaiserlichen Bibliothek* (incomplete, 1879-92); and published, in Hebrew, several works on the Jews in Russia (1865 and 1867); in French, *Les mots égyptiens de la Bible* (1870), and *Sur un passage des 'Prairies d'or' de Macoudi concernant l'histoire ancienne des Slaves* (1876); in German, besides the *Studien* already mentioned, contributions to Stade's *Zeitschrift für alttestamentliche Wissenschaft*, a *Katalog der hebraïschen Bibelhandschriften der kaiserlichen-öffentlichen Bibliothek* (with Strack, 1875); *Altjüdische Denkmäler in der Krim* (1876); *Aus dem archäologischen Congress* (1882); and *Neugefundene hebräische Bibelhandschriften* (1884); and in Russian, works on Mohammedan writers concerning the Slavs and Russians (1870); on the original home of the Semites, Indo-Europeans, and Hamites (1872); and contributed to the Russian edition of Gustav Karpele's *History of Jewish Literature* (1890). He edited vols. vi. and x. in the Russian edition of Graetz, *History of the Jews* (Leipzig, 1883-1902).

HARKNESS, Albert (1822—). An American scholar and educator, born at Mendon, Mass. He graduated at Brown in 1842, was senior master of the Providence High School from 1846 to 1853, pursued studies in Germany at the University of Berlin and that of Bonn, and was the first American to obtain a degree from the latter (Ph.D., 1854). In 1855 he was appointed professor of Greek in Brown University. He visited Europe in 1870 and 1883, and there made investigation of educational questions, in particular of the methods of German and English universities. He assisted in founding the American Philological Association, of which he was a first vice-president in 1869-70, and president in 1875-76. As a member of the Archæological Institute of America, he was appointed in 1881 to the committee on the expediency of establishing an American School of Classical Studies at Athens, an institution which was opened in 1882. In 1884 he was elected director of the school. He lectured extensively before learned societies, contributed valuable papers on original researches in philology to the *Transactions* of the Association, and from 1851 published a series of text-books in Latin studies, of which it may be said that from them dated the beginning of a new era in the Latin department of classical education in America. The volumes include: *First Latin Book* (1851); *Second Latin Book and Reader* (1853); a *Latin Reader* (1865); *Introduction to Latin Composition* (1868, 1888); annotated editions of (1870, 1886) Cæsar's *De Bello Gallico*, of (1873, 1882) select orations of Cicero, and of (1878, 1884) Sallust's *Catilina;* an annotated *Course in Latin Prose Authors* (1878); and a standard *Latin Grammar* (1881), published in a thorough revision with many additions as *A Complete Latin Grammar* (1898). Professor Harkness received the degree of LL.D. from Brown University in 1869.

HARKNESS, William (1837-1903). An American astronomer, born at Ecclefechan, Scotland, a son of James Harkness (1803-78). He was educated at Lafayette College, Rochester University, and in New York City, where he studied medicine. He served as a surgeon in the Union armies during part of the war. From 1862 to 1865 he was an aid in the United States Naval Observatory, and then, after service on the monitor *Monadnock*, was employed in the Hydrographic Office. During the eclipse of August, 1869, he discovered the coronal line *K* 1474. Three years later he was made a member of the Transit of Venus Commission, had charge of the party at Hobart, Tasmania, in 1879, and at Washington in 1882, when he became its executive officer. But his greatest fame rests on his theory of the focal curve of achromatic telescopes and on his invention of the spherometer, caliper, and other astronomical instruments. He was astronomical director of the Naval Observatory (1894-99), and director of the *Nautical Almanac* (1897-99). He retired two days after attaining the relative rank of rear-admiral (December, 1899). He was president in 1893 of the American Association for the Advancement of Science. Of his works, the most important is *The Solar Parallax and Its Related Constants* (1891).

HARLAN. A city and the county-seat of Shelby County, Iowa, 45 miles northeast of Council Bluffs; on the West Nishnabotna River, and on the Chicago and Northwestern and the Chicago, Rock Island and Pacific railroads (Map: Iowa, B 3). It is the commercial centre for a farming section, and manufactures gas and gasoline engines, foundry products, agricultural implements, bricks, flour, etc. Population, in 1890, 1765; in 1900, 2422.

HARLAN, James (1820-99). An American lawyer and legislator, born in Clarke County, Ill. He graduated at Indiana Asbury (now De Pauw) University in 1845, studied law, and, removing to Iowa, became State Superintendent of Public Instruction in 1847. In 1850 he was tendered the Whig nomination for Governor, but refused it on account of being under the required age. In 1853 he was chosen president of Iowa Wesleyan University. Two years later he was elected to the United States Senate, but after he had served until January, 1857, his seat was declared vacant on a technicality. He was immediately reëlected by the Iowa Legislature, however, and was again reëlected on the expiration of his original term in 1861. His recognized ability as a legislator attracted the attention of President Lincoln, who in 1865 appointed him Secre-

tary of the Interior. In 1866 he resigned from the Cabinet to reënter the Senate, to which he had been reëlected for a third term, and he continued as one of the Republican leaders in that body until 1872, when he was defeated for reëlection by William B. Allison. From 1882 to 1885 he was presiding judge of the Court of Commissioners of Alabama Claims at Washington.

HARLAN, JOHN MARSHALL (1833—). An American jurist, born in Boyle County, Ky. He graduated at Centre College in 1850, and at the law department of Transylvania University in 1853; practiced his profession for a time at Frankfort, and became judge of Franklin County in 1858. From 1861 to 1863 he served in the Federal Army as colonel of the Tenth Kentucky Infantry, and from 1863 to 1867 was Attorney-General of Kentucky. He was a Republican candidate for Congress in 1871 and 1875, but was each time defeated, and in 1877 was appointed by President Hayes a member of the Louisiana Commission, which was formed to inquire into and so far as possible remove the obstacles to regular procedures under the laws and Constitution of the State, so that a single Legislature might come to be recognized, and the Government be maintained with armed resistance. In November, 1877, he was appointed an associate justice of the United States Supreme Court, where his conduct was marked by legal capability and intellectual vigor. When the constitutionality of the Wilson Tariff Act of 1894, providing for an income tax, was questioned, and a test case was brought before the Supreme Court, he was one of the four justices who upheld the validity of the instrument.

HARLAND, HENRY (1861—). An American novelist, born at Saint Petersburg, Russia, March, 1861. He was educated at the College of the City of New York and at Harvard, and, after traveling in Europe as a correspondent and serving for a time in the Surrogate's Office in New York City, removed to London, where, among other labors, he edited *The Yellow Book*. Among his novels may be named *As It Was Written* (1885); *Mrs. Peixada* (1886); *The Land of Love* (1887); *The Yoke of the Thora* (1887); *My Uncle Florimond* (1888); *Mr. Sonnenschein's Inheritance* (1888); *A Latin Quarter Courtship* (1889). Later he produced *Mea Culpa* (1893), and won deserved success with *The Cardinal's Snuffbox* (1900) and *The Lady Paramount* (1902). His earlier novels, which dealt with American Jewish life, were written under the name of 'Sidney Luska.'

HARLAND, MARION. The pseudonym of the American novelist Mary Virginia Hawes Terhune (q.v.).

HARLAW. A locality in Scotland, about 18 miles northwest of Aberdeen, noted as the scene of a battle fought July 24, 1411, between the Highlanders under Donald, Lord of the Isles, and the forces of the Lowlands under Alexander Stewart, Earl of Mar. The Highlanders were defeated with the loss of nearly 1000 men. The battle of Harlaw passed into legend as one of the most desperate attempts on the part of the Celtic tribes of Scotland to stem the tide of Anglo-Norman invasion.

HARLAY DE SANCY, de sän'sē', NICOLAS. See SANCY, NICOLAS DE HARLAY DE.

HARLEIAN (här-lē'an) **COLLECTION.** A valuable collection of manuscripts in the British Museum (q.v.), consisting of 7639 volumes and 14,236 original rolls, charters, deeds, and other legal documents. The collection, made by Robert Harley, first Earl of Oxford (1661-1724), and by his son, Edward Harley (1689-1741), was purchased by the English Government from Lady Oxford in 1753 for £10,000, and deposited in the British Museum. The collection is indexed. Consult *Life and Times of Robert Harley, Earl of Oxford* (New York, 1902).

HAR'LEM. A town in the Netherlands. See HAARLEM.

HARLEM. A village in Cook County, Ill., nine miles from the Chicago court-house; on the Chicago and Northwestern, the Illinois Central, and other railroads (Map: Illinois, C 1). It is mainly a residential suburb of Chicago, and has the well-known Harlem race-track. There are several cemeteries here, among them Forest Home and Waldheim cemeteries, the latter of note as the site of a monument to the anarchists who were executed for complicity in the riots of 1886. (See CHICAGO.) Settled in 1854, Harlem was incorporated in 1883. It is governed by a president, annually elected, and a board of trustees, chosen on a general ticket. The water-works and electric-light plant are owned and operated by the municipality. Population, in 1900, 4085.

HARLEM. A local name for that part of New York City above 106th Street between the East and Harlem rivers and Eighth Avenue. Originally a separate settlement, for many years it was a quaint Dutch village, mainly of private residences surrounded by gardens and farms. It was noted for abundance of shade-trees, and the sleepy quietness so quaintly described by Washington Irving in the *Knickerbocker's History of New York*. The designation is often applied, in a loose sense, to the entire northern portion of the city.

HARLEM RIVER. A tidal channel about 500 feet wide, separating Manhattan Island, New York City, from the mainland, and extending from the Hudson at Spuyten Duyvil Creek seven miles southeast to the East River at Randall's Island (Map: Greater New York, D 4). A short ship-canal across the northern end of Manhattan Island, between the Hudson and the Harlem, was opened in 1895. The Harlem is spanned by a number of bridges, the finest being Washington Bridge and High Bridge, the latter an aqueduct bridge. A magnificent roadway, known as the Speedway, has been constructed along the western shore of the Harlem. On a lofty eminence on the opposite shore are the beautiful buildings of New York University.

HARLEQUIN (OF. *harlequin*, Fr. *arlequin*, Ital. *arlecchino*, from OF. *herlequin, herlekin, hellequin, hellekin*, demon, from the Germanic; cf. AS. *helle cynn*, folk of hell; scarcely from It. *il lechino*, plate-licker, in allusion to the gluttony of the primitive Harlequin). One of the most noted of the conventional personages in pantomime (q.v.). The character developed in the early popular comedies of Italy (*commedia dell' arte*). Attempts to trace him back to the Roman *Atellanæ* and the mimic *Sannio*, through the Italian word *zanni*, are inconclusive. When the persons in the extempore comedy represented local types, Harlequin stood for Bergamo, just as did his brother *zanni*, Scapino, commonly for

Naples, and Pantalone, the old man whom Arlecchino served, for Venice, while 'the Doctor,' Scapino's master, was supposed to be a pedant from Bologna. Harlequin is a suitor of Columbine, and gets her away from poor Pedrolino (the French *Pierrot*). Though full of amusing blunders, Harlequin combines his childlike capers with a good deal of mature *finesse*. He is represented with a tight suit of parti-colored patches, a black mask, and a wooden sword. When he was introduced into France in the sixteenth century, the witty side of his character was more fully developed, and he was speedily adopted by other nations. Famous among the Harlequins of France in the seventeenth and eighteenth centuries were Domenico Biancolelli, called from Vienna to Paris by Mazarin about 1660; Vizentini, known as Thomassin and Bertinazzi, called Carlin, who won the admiration of Garrick. The first English Harlequin is said to have been Joe Haines, in 1667. During the eighteenth century, when pantomime became so popular at Drury Lane in Rich's time, Harlequin's name was attached to numerous pieces, such as *Harlequin Dr. Faustus* (1723), and *Harlequin, a Sorcerer*, a little later. Two other noted English Harlequins were Joseph Grimaldi (q.v.), and Tom Ellar, who died in 1842. The modern Christmas pantomime preserves the elements of the legendary plot, the lovers Harlequin and Columbine being favored by fairy interference in despite of their persecutors, Clown and Pantaloon. The word harlequin has come to be commonly used, however, in a general sense almost synonymous with clown.

Consult: Moeser, *Harlekin oder Vertheidigung des Grotesk-Komischen* (Leipzig, 1771; trans. by Warnecke, London, 1766); Reynaud, *Quelques mots sur Arlequin*, etc., in *Etudes romanes dédiées à Gaston Paris* (Paris, 1891); Broadbent, *A History of Pantomime* (London, 1901).

HARLEQUIN CABBAGE-BUG, or CALICO-BACK. A bug (*Murgantia histrionica*) noted as a very destructive enemy to cruciferous vegetables in the Southern United States. It is an oval, somewhat flattened black bug with bright red and yellow markings, whence the names 'harlequin' and 'calico.' It lives throughout the year on cabbage, radish, mustard, and other cruciferous plants, puncturing the leaves with its beak and causing them to wither and dry. The eggs, which resemble miniature white barrels with black hoops, are laid in a double row on the under side of the leaves. There are several generations in a year, and the adult bugs hibernate. It is the worst enemy of the Southern cabbage-growers on account of the difficulty of destroying it. Mixtures made strong enough to kill the bugs kill the plants also. The best method is to plant an early trap-strip of mustard, upon which the over-wintering bugs will cluster in the spring, and upon which they may be killed with pure kerosene. This is originally a Central American insect, and has been spreading toward the northeast for 40 years or more. It is now found in southern New Jersey and in most of the intervening territory southwest to the Rio Grande.

HARLEQUIN DUCK. A name given, in allusion to its variegated colors, to a rare duck (*Histrionicus histrionicus*) inhabiting the polar regions, and occasionally seen in Northern Europe and Canada. It is a near relative of the now extinct Labrador duck. Several other sorts of birds have been called 'harlequins' because of their quaintly contrasted colors.

HARLEQUIN-SNAKE (so called from the coloring). The small red and black venomous coral-snake (*Elaps fulvius*) of Florida, also called 'candy-stick.' See CORAL-SNAKE.

HARLESS, härʹlĕs, GOTTLIEB CHRISTOPH ADOLF (1806-79). A German Protestant theologian, born in Nuremberg. He studied theology at Halle and Erlangen, and became professor of theology at the latter institution. For his opposition in the Bavarian Diet of 1842 to the order requiring persons in the army to kneel at the passing of the sacramental host, he was removed from his professorship. In 1845, however, he was chosen to the consistory of Bayreuth, professor of theology at Leipzig, and Court preacher. In 1852 he was made president of the Protestant Consistory of Munich. Among his many important works are: *Theologische Encyklopädie und Methodologie* (1837); and *Die christliche Ethik* (1842; English trans. 1868). His autobiography, entitled *Bruchstücke aus dem Leben eines süddeutschen Theologen*, was published in 1872.

HARLETH, GWENDOLEN. The heroine of George Eliot's *Daniel Deronda*.

HARLEY. The hero of Henry Mackenzie's *Man of Feeling*.

HARLEY, Sir EDWARD (1624-1700). An English Parliamentarian, born in Brampton-Bryan, Herefordshire. Educated at Shrewsbury, Gloucester, and Oxford, he studied law, but took up arms in the Parliamentary cause against the King in 1642, though disapproving of military supremacy in the nation. By 1646 he was a member of Parliament for his native county, but his opposition to Cromwell brought about his banishment from it for ten years, though he was rewarded at the Restoration by Charles II., who made him Governor of Dunkirk (1660). Despite his changes of front (for he was against the Stuarts once more at the Revolution of 1688), Harley was a conscientious upholder of the rights of the people, who showed their appreciation by sending him continuously to Parliament. Though a churchman himself, he fought against any form of persecution of the dissenters, was without party prejudice, and was remembered more for his practical benefactions than for such theoretical performances as *A Scriptural and Rational Account of the Christian Religion* (1695).

HARLEY, ROBERT, Earl of Oxford and Mortimer (1661-1724). An English statesman. The son of Sir Edward Harley, he belonged to an illustrious Herefordshire family. The father had been a military officer, a member of Parliament, and an opponent of Cromwell during the Civil War. Robert, elected to Parliament for the borough of Tregony, was at first a Whig, but gradually changed his politics till he became leader of the Tory and Church party. His cleverness and tact, however, retained for him the support of many Whigs and Dissenters. He shortly acquired a great reputation for his knowledge of Parliamentary law and practice, a study not much pursued in those days; and in the Parliament which met under the chieftainship of Rochester and Godolphin in February, 1701, he was elected Speaker by a large majority.

Harley retained his post, having been twice re-elected, till 1705. In 1704 he became a member of the Privy Council and Secretary of State. Assisted by his cousin, Abigail Hill—afterwards Lady Masham—he excited Queen Anne against her Whig ministers, Marlborough and Godolphin, who in turn plotted against him. By convicting Harley's secretary of treasonable correspondence with France, they caused Harley himself, though entirely exculpated, to resign his office in February, 1708. Harley, on his part, by persistently working on the Queen through Lady Masham during his two years of retirement, finally brought about the overthrow of the Whigs. In August, 1710, Godolphin was dismissed, and Harley, appointed to the post of Chancellor of the Exchequer, brought back the Tories. An event occurred in 1711 which raised him to the acme of popularity. A French priest and spy, who assumed the title of Marquis de Guischard, when brought before the Council on March 8th, on the charge of treasonable correspondence with the French, rushed upon Harley, and stabbed him with a penknife. He fell dangerously ill from the wound; and when he recovered he was congratulated by Parliament on his escape, created Earl of Oxford and Mortimer, decorated with the Garter, and in the following May appointed Lord High Treasurer of Great Britain. From this point Harley's course was downward; he was not a man of business, and was destitute of decision of character. He was an astute political leader, but lacked sincerity, breadth of view, and, in brief, all other noble qualifications. The principal act of his administration was the Treaty of Utrecht. Harley ceased to pay court to Lady Masham, and Bolingbroke succeeded in getting him dismissed on July 27, 1714. Lord Oxford retired on Tuesday; Bolingbroke became Premier; and the Queen died on Sunday. George I. was proclaimed, and the period of Tory ascendency came to an abrupt end. The conduct of both the Tory leaders in their relations with the Stuarts had been such as to render their impeachment possible as well as probable. In March, 1715, Bolingbroke fled to France, but Oxford remained to meet his fate. He was sent to the Tower, and after two years' imprisonment brought to trial on a charge of treason. The two Houses quarreled about the mode of procedure, and as the Commons in anger refused to take any part in the trial, he was acquitted by the Peers and released. He spent the remainder of his life in retirement. He was the founder of a collection of books and MSS., which perpetuates his name. Consult: Burnet, *History of His Own Time* (6 vols., London, 1838); Macaulay, *History of England* (London, 1855); Stanhope, *History of England, Comprising the Reign of Queen Anne Until the Peace of Utrecht* (London, 1870); Lecky, *History of England in the Eighteenth Century* (London, 1878-90); Manning, *Speakers of the House of Commons* (London, 1851); Lodge, *Portraits of Illustrious Personages of Great Britain* (London, 1850); Howell, *State Trials* (London, 1809-26); Boyer, *Political State of Great Britain* (London, 1724); Roscoe, *Robert Harley, Earl of Oxford, Prime Minister 1710-14* (London, 1902).

HARLEZ, härlā', CHARLES DE (1832-99). A Belgian Orientalist who attained to special eminence in the fields of Iranian and Chinese philology. He was born at Liège, and was educated at the university there, and afterwards took clerical orders, and rose to be a distinguished prelate in the Catholic Church, with the title of monsignor. His interest in the Orient early attracted him to the study of Sanskrit and Avestan; and in 1867 he became actively engaged in teaching these studies at the University of Louvain. His translation of the Avesta, *Livre sacré des sectateurs de Zoroastre* (1875-77; 2d ed. 1881), still holds a high rank among scholars. It was followed by a series of other studies in Zoroastrianism: *Études avestiques* (1878); *Des origines du Zoroastrisme* (1879); *L'exégèse des textes avestiques* (1883); and several grammars or manuals for the study of Sanskrit (1878; 2d ed. 1885); Avesta (1879; 2d ed. 1882); Pahlavi (1880), including one also on Manchu (1884).

About 1884, in connection with his researches into the language of Manchuria, he began to turn from Persia and India to China, and he devoted the remainder of his life to investigations connected with the literature, language, and life of China herself. A long series of monographs or volumes from his pen on the subject of Chinese was the result. These are to be found published in the Annals of the Musée Guimet, of Paris, and in the Memoirs of the Royal Academy of Belgium. In 1896 a large number of his pupils and friends issued a volume in honor of this distinguished scholar; it bears the title *Recueil de travaux d'érudition offert à Mgr. Charles de Harlez* (Leyden, 1896). The breadth of Harlez's studies and interest is shown likewise by his acquaintance with several of the American languages and also with Magyar literature.

HARLINGEN, härling-*en* (Frisian *Harns*). A seaport of the Netherlands, in the Province of Friesland, situated on the Zuyder Zee, 16 miles west of Leeuwarden, with which it is connected by rail and canal, about 65 miles north-northeast of Amsterdam (Map: Netherlands, D 1). The town is cut up by canals and is built on the site of a city which was swept away by an inundation in 1134. It has a school of navigation. Harlingen carries on an active trade with England and Norway, exporting the agricultural products of the Province of Friesland, and is connected by steamship lines with Amsterdam, Hull, and London. The harbor is an excellent one, reconstructed in 1870-77, and protected by enormous dikes. Population, in 1890, 10,110; in 1900, 10,267.

HARLOT'S PROGRESS, THE. A group of six paintings by Hogarth, representing the history of a fallen woman, from her first false step to her tragic end. They were completed late in 1731. Five of the paintings were burned at Fonthill in 1755; the remaining one is now at Gosford House, in the possession of the Earl of Wemyss.

HARLOW, GEORGE HENRY (1787-1819). An English artist, born and educated in London. He was instructed by Henry De Cort, the landscape painter, Samuel Drummond, a portrait painter, and by Sir Thomas Lawrence. As the result of a quarrel with Lawrence he began to work out his own theories in defiance of academical rules. He had remarkable power of close and rapid observation, and soon had a number of portraits on exhibition at the Royal Academy, although he outspokenly opposed that institution. He

was less successful in historical painting, though several of his pictures of this kind showed strong points. In 1818 he visited Italy to study the old masters, and was very cordially received in Rome, where he worked assiduously, and made great progress. Soon after his return to England in 1819 he was seized with an acute throat affection which caused his death in less than a month. Harlow was an artist of great promise, who died before the full development of his powers. His works, notwithstanding defects of judgment and immaturity, have vital qualities of excellence. Among them are a group of portraits of Charles Mathews, the actor; "Queen Elizabeth Striking the Earl of Essex," "The Earl of Bolingbroke Entering London," "The Trial of Queen Catherine," and "Wolsey Receiving the Cardinal's Hat in Westminster Abbey."

HAR'LOWE, CLARISSA. The heroine of Richardson's *History of Clarissa Harlowe.* To escape a distasteful marriage she puts herself under the protection of a lover, who proves unworthy of her confidence. He offers to marry her to atone for his crime, but she refuses, and dies of shame broken-hearted.

HARMACHIS, här'mȧ-kĭs (Egyptian *Hormtakh*, Horus in the two horizons). An Egyptian god, a manifestation of Horus (q.v.). According to certain inscriptions, the gigantic Sphinx (q.v.) near the pyramids of Gizeh, perhaps a work of Chephren (q.v.), represented this god, but he is usually represented in the form of a hawk.

HAR'MALIN AND HAR'MIN (from Neo-Lat. *harmala*, from Ar. *harmal*, Syrian rue). Two vegetable bases occurring in the husk of the seeds of the *Peganum harmala*, or Syrian rue, a plant that grows abundantly in the steppes of Southern Russia. *Harmalin*, $C_{13}H_{14}N_2O$, when pure, crystallizes in colorless prisms. *Harmin*, $C_{12}H_{12}N_2O$, crystallizes in delicate prisms. The red coloring matter known in commerce as *harmala red* is obtained from the seeds of the same plant. The *Peganum harmala* belongs to the natural order Zygophyllaceæ. It is a half-shrubby plant, with smooth linear pinnate or bipinnate leaves, and solitary white flowers. The seeds are used by the Turks as a spice.

HAR'MAR, JOSIAH (1753-1813). An American soldier, born in Philadelphia, Pa., and educated at the Quaker School of Robert Proud. At the outbreak of the Revolutionary War he entered the patriot army as captain in a Pennsylvania regiment. He became its colonel in 1777, was promoted in 1783 to be brevet colonel in the first United States regiment, became brevet brigadier-general in 1787, and on September 29, 1789, was made commander-in-chief of the United States Army. In order to punish the Indian tribes of the Northwest, who had been incited to hostilities by British agents, an expedition under the command of Harmar was sent out from Fort Washington, on the site of the present Cincinnati, in 1790. He inflicted considerable damage in desolating the country through which he passed; but in a battle with the Miamis, fought in September of that year, the main body of troops was left unsupported in consequence of an advance sortie of the cavalry and some militia, and after a severe defeat the expedition returned to Fort Washington. Harmar resigned his commission in 1792, and from 1793 till 1799 was adjutant-general of Pennsylvania.

HARMAT'TAN (through the Arabic; probably from the native name). A very dry wind along the west coast of Northern Africa from the Gulf of Guinea to Senegambia. This wind blows from the interior of Northern Africa or the Desert of Sahara southward and westward, and is felt over the Atlantic Ocean to a considerable distance from the coast. It prevails especially during December, January, and February, with occasional occurrences in November and March. On the Gold Coast it blows from the northeast in the night-time, but from the southeast at mid-day. During its prevalence the sky is cloudless and the regular diurnal variations of temperature are large; the morning minimum temperatures are lower and the mid-day maximum temperatures slightly higher; the relative humidity is from 25 to 50 per cent. below the normal, and this dryness produces rapid evaporation and a profound sensation of coldness. The barometric pressure is slightly higher during the first part of the Harmattan, and the wind, when once started, lasts for several days, or in extreme cases for several weeks. Vegetation is dried up very much as in the case of the dry winds of California and the plains on the eastern slope of the Rocky Mountains. The natives, being thinly clad, can prevent the skin from cracking and keep it soft and pliable only by anointing the body with oils or fats.

A peculiar whitish haze usually accompanies the Harmattan; this is due to the presence of an immense number of fragments of the microscopic shells of diatoms, together with other foreign matter floating in the air. As seen through this haze the sun and moon have a reddish tint. This diatomaceous dust is undoubtedly brought by the wind from the interior, possibly from the desert itself. The Harmattan wind is usually cool and dry, but in a few localities it is warm and dry. Everything points to the fact that it is a descending wind blowing out from under the great area of moderately high pressure that prevails over the Sudan, and toward an area of moderately low pressure temporarily prevailing over the equatorial part of the Atlantic Ocean. This wind blowing from the Sudan northward toward Europe becomes the Sirocco of Italy. The same wind blowing over the desert itself and carrying great clouds of sand gives rise to the Simoom. The cool, dry, cloudless weather and hazy horizon that prevail occasionally in the eastern portion of the United States, and especially in the dry months of California are analogous to the African Harmattan.

HARMENOPULOS, här'mĕn-ŏp'ụ-lŏs, KONSTANTINOS (c.1320-c.1380). A Byzantine jurist, an Imperial counselor under Kantakuzenos and John Palæologus and later a judge in Thessalonica. His *Promptuarium Iuris* (edited by Heimbach, 1851) had much use through the Middle Ages and has a certain value still. Consult Dirksen, *Das Rechtsbuch des Harmenopulos* (1847).

HARMO'DIUS AND AR'ISTOGI'TON (Lat., from Gk. *Ἁρμόδιος, Ἀριστογείτων*). Two Athenian citizens, of the family of the Gephyræi. Harmodius was a beautiful youth who ardently loved his relative Aristogiton. Hipparchus, son of the tyrant Pisistratus, endeavored to separate the two friends and to secure the friendship of

Harmodius for himself, but, not succeeding, avenged himself by insulting publicly the sister of Harmodius. Thereupon the two laid a plot to slay both Hipparchus and his brother Hippias on the day of the great Panathenaic festival, B.C. 514. The plot miscarried by reason of a premature attack being made. Hipparchus was slain, but Harmodius was at once overpowered by the guards. Aristogiton fled, but was afterwards taken and executed; though put to the torture, he did not disclose the names of the real conspirators. Hippias was afterwards expelled (B.C. 510), and then and in all later times Harmodius and Aristogiton were honored as martyrs who had fallen in the cause of liberty. Their praises were sung in drinking songs, and they received almost divine honors. Two bronze statues, made by Antenor, were set up in their honor on the Agora; these were carried away by Xerxes at the time of the Persian War, but were afterwards brought back by Alexander the Great. Other statues by Critius and Nesiotes, however, in 477 replaced those carried away by the Persian king. The descendants of Harmodius and Aristogiton enjoyed freedom from taxation and from all public duties. Consult: Harrison and Verrall, *Mythologies and Monuments of Ancient Athens* (New York, 1890); p. 77 ff.; Frazer, *Pausanias* (Cambridge, 1898), vol. ii., p. 92 ff.; and the better histories of Greece and of Greek sculpture.

HAR'MON, JOHN. The hero of Dickens's *Our Mutual Friend*, who, under the respective aliases of Julius Handford and John Rokesmith, returns to England, escapes a charge of murder, and watches the use which his deceased father's steward makes of his inheritance until his disguise is accidentally discovered. He eventually marries Bella Wilfer.

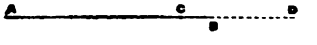
HARMON, JUDSON (1846—). An American lawyer. He was born at Newtown, Ohio, and graduated at Denison University in 1866, and at the Cincinnati Law School in 1869. He was originally a member of the Republican Party, but left it in the Greeley-Grant campaign. In 1878 he was elected to the Superior Court of Cincinnati; but nine years later he returned to active practice, from which, in 1895, he was called to succeed Richard Olney as Attorney-General in President Cleveland's second Cabinet. In 1897, immediately after his retirement from the Cabinet, he was elected president of the Ohio Bar Association. Soon afterwards he became a lecturer on agency in the law department of the University of Cincinnati.

HARMO'NIA (Lat., from Gk. Ἁρμονία, from ἁρμός, *harmos*, joint, from ἁρεῖν, *arein*, to be about to join). In the Theban legend, the daughter of Ares and Aphrodite, and wife of Cadmus (q.v.), who received her after slaying the dragon. The wedding was attended by all the gods, and in the Theban cycle seems to have occupied as prominent a place as that of Peleus and Thetis in the tale of Troy. Among the gifts were a mantle and necklace, which played a large part in the later legend as bringing ruin to their possessors; with the necklace Polynices bribed Eriphyle to betray her husband, Amphiaraus (q.v.), to his death. When Cadmus was introduced into the Samothracian mysteries, Harmonia became the daughter of Zeus and Electra, and sister of Dardanus and Iasion, and the marriage was celebrated at Samothrace. Another version told how Cadmus carried off Harmonia, who was sought during the mysteries, as Core at Eleusis. Harmonia seems originally to have been a goddess of love and the harmonizing power of nature. Different in origin is the Attic Harmonia, who joins in the chorus of Muses and Graces, as companion of Aphrodite, and even becomes mother of the Muses in Euripides. There she is simply a personification of order and harmony.

HARMON'ICA (Neo-Lat. nom. sg. fem., from Lat. *harmonicus*, Gk. ἁρμονικός, *harmonikos*, harmonious, musical, from ἁρμονία, *harmonia*, harmony). A musical instrument, invented by Benjamin Franklin. The instrument consisted of a series of glasses, each one in the shape of a cup, or half-globe, being put into a revolving motion on its centre, while the moistened rim was touched by the finger. Franklin, in a letter dated July 13, 1762, to Padre Beccaria, at Turin, mentions the history of his invention. An Irishman named Puckeridge was the first to hit on the idea of playing airs on a row of glasses, which he tuned by putting water into each. He performed publicly in London; but he and his glasses were burned in a conflagration in London in 1750. When Franklin finished his invention he found an excellent performer in a Miss Davis, to whom he made a present of his harmonica. Miss Davis, in 1765, performed on the harmonica in Paris, Vienna, and all the large cities of Germany with great effect. The compass of its notes was from C to F, including all the chromatic semitones. All attempts to make the harmonica, through means of keys, easier for amateurs, ended in failure, as no substance was found to act as a substitute for the human finger, which doubtless imparted an expression to the sound which no dead substance could possess.

HARMONIC CURVE. A curve formed by the vibration of a musical string. The curve of sines (q.v.) is a simple harmonic curve. The name harmonic was used in this connection by the Greek geometers in investigating the theory of music.

HARMONIC DIVISION. In geometry, a line-segment AB is said to be *harmonically divided* when two points are taken, one in the segment and the other on the segment produced, as C and D, such that



$$AC : CB = AD : DB$$

Four quantities, a, b, c, d are said to be in *harmonic proportion* when their reciprocals $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}, \frac{1}{d}$ are so related that $\frac{1}{b} - \frac{1}{a} = \frac{1}{d} - \frac{1}{c}$

The 'harmonic mean' of two numbers, a, b, is $\frac{2ab}{a+b}$. It is the reciprocal of the arithmetic mean of the reciprocals of the two numbers.

HARMONICON (Neo-Lat., from Gk. ἁρμονικόν, *harmonikon*, neu. of ἁρμονικός, *harmonikos*, harmonious, musical), CHEMICAL. An apparatus consisting of an open glass tube, the air in which may be made to give a sound resembling a musical note when it is held over a jet of burning hydrogen. The sounds produced arise

from the successive explosions formed by the periodic combinations of the oxygen in the air with the hydrogen. The note depends on the size of the flame and the length of the tube, and with a long tube, by varying the position of the jet in the tube, a series of notes may be produced. This phenomenon, which was discovered by Lampadius, has been investigated by Tyndall and described in his *Lectures on Sound*. Before the jet is lighted, in an actual experiment, the formation of hydrogen must be allowed to go on until the air is completely driven out of the generating bottle; otherwise a dangerous explosion may take place.

HARMONIC PROGRESSION. See SERIES.

HARMONIC PROPORTION. See HARMONIC DIVISION.

HARMONICS (from Lat. *harmonicus*, harmonious, musical). The accessory or concomitant tones produced by any fundamental tone. When a string tuned to C, for instance, is set in motion, it produces not only that one note, but a number of other tones less intense. These secondary tones are so much weaker than the fundamental that it requires even the closest attention of a fine ear to detect their presence. Mersenne, a Franciscan monk who died in Paris in 1648, was the first who discovered this. But it was not until 1701 that Sauveur gave a scientific explanation. Rameau availed himself of Sauveur's investigations, and founded his new system of harmony upon that basis. When the string C vibrates, it swings not only in its entire length, but at the same time smaller oscillations are produced by the two halves, the three thirds, the four fourths, etc., of the string. Tones can be distinguished for every division of such a string up to one-sixteenth. The two halves vibrating produce each the octave; the three thirds each the fifth above the octave; the four fourths each the fourth above the fifth, etc., of the fundamental tone. This is illustrated by the following table (1 denoting the entire length of the string, 2 one-half, 3 one-third, etc.):

						x				x		x	x	x	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
C,	c,	g,	c^1,	e^1,	g^1,	$b\flat^1$,	c^2,	d^2,	e^2,	$f\sharp^2$,	g^2,	$a\flat^2$,	$b\flat^2$,	b^2,	c^3.

The tones marked × are only approximately correct. The eleventh tone, for instance, is neither *f* natural nor *f* sharp, but one between these, and nearer to the latter than the former. As all these tones lie above the fundamental, they are called *overtones;* because they are produced by vibrations of only a part of the string, they are also called *partial tones*, or *aliquot tones*. The name *harmonic tones* is given to them because all the tones that are given in their true pitch, except the ninth (d^2), are elements of the fundamental triad (C, E, G). The intensity of the harmonic tones decreases in inverse ratio to their pitch. The lowest tone, C, is called the *generator*. It will easily be seen how from these overtones the consonance of the major triad is established, for each of the elements occurs more than once in the series. F♯, A♭, B♭, and B are not given in their true pitch, and D occurs only once in the whole series.

Taking a high tone, c^3, for instance, a series of tones lying below, and bearing the same relation to the highest tone as the overtones to the fundamental or generator, is produced. These tones are called *undertones* or *lower partials*. The following table illustrates this (notes produced only with approximate correctness being again marked ×):

						x				x		x	x	x	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
c^3,	c^2,	f^2,	c^1,	$a\flat$,	f,	d,	c,	$B\flat$,	$A\flat$,	$G\flat$,	F,	$E\flat$,	D,	$D\flat$,	C.

In this series D♭, D, E♭, and G♭ are not given in true pitch, and B♭ occurs only once. F, A♭, C occur each more than once. They are the elements of the F minor triad; hence the consonance of the minor triad is established by the series of *undertones* in the same manner as the consonance of the major triad is established by the series of *overtones*. From the consonance of these *chords* the consonance of *intervals* is also determined, for all intervals found in these chords or their inversions are regarded as consonant. The second inversion of either the major or minor triad—i.e. with the fifth as the bass tone (see INVERSION)—yields the intervals of the fourth and major and minor sixth respectively. The only intervals not derivable from the above two series are the second and seventh, which are, therefore, regarded as dissonant, as well as any chord into the formation of which they enter. See INTERVAL.

What has been said about the vibrations of a string applies equally to the vibrations of a column of air. On any stringed instrument harmonics can be produced by lightly touching with the finger-tip any nodal point of the string. (See NODE.) The string then cannot vibrate in its entire length, but only in sections, the length of which is determined by the length of that part of the string lying between the neck of the instrument and the nodal point touched by the finger. For instance, if the lowest string of the violoncello (C) is lightly touched at the middle point between the neck and the bridge, the two sections will vibrate independently, and each half will produce the octave above the tone to which the string is tuned. Thus, instead of C, its next higher octave, c, will be heard. Touching the string at one-third of the distance between the neck and the bridge, it will vibrate in three independent sections, each producing the twelfth (or fifth above the octave) of the fundamental note. All the partial tones given in the above table can thus be produced by touching a point at one-fourth, one-fifth, etc., the length of the string. Tones thus obtained from an open string are called *natural harmonics*. Harmonics can also by obtained by first stopping a string, i.e. pressing it firmly to the finger-board, by one finger and touching it lightly with another finger at some nodal point between the pressed-down finger and the bridge. Tones produced in this manner are called *artificial harmonics*. Harmonics are distinguished from tones produced in the ordinary manner by a peculiarly sweet and ethereal quality. The opening bars of the prelude to *Lohengrin* are a splendid example of the effect produced by harmonics. In musical notation harmonic tones are indicated by a ° placed over the note, or by open square notes □. On wind instruments (both brass and wood) harmonic tones are produced by varying the intensity and direction of the air-current. The pressing down of a valve has the same effect as the pressing down of a finger on a stringed instrument. Consult Hauptmann, *Die Natur der Harmonik und der Metrik* (Leipzig, 1853).

HARMONIC STOP. An organ-stop, having pipes double the usual length, and pierced midway, so that the tone produced is an octave higher than the ordinary pitch. Harmonic stops are composed generally of more than a single rank of pipes, tuned in octaves, double octaves, and double or triple thirds and fifths above the natural pitch of the keys; they comprise the mixture, furniture, cornet, etc. Those which have only a single rank of pipes tuned in thirds, fifths, with their octaves above the pitch represented on the keyboard, are called 'mutation stops.' They were introduced to give additional power to the 'foundation stops,' and also to produce a more brilliant effect in the performance of certain styles of music. See ORGAN.

HARMONIOUS BLACKSMITH, THE. An old tune to which Handel wrote variations, and the composition of which, after his death, was ascribed to him. The composer of the original is unknown.

HARMONISTS. A communistic society, founded by George Rapp, who was born in Iptingen, Württemberg, in 1757. He became convinced that the churches around him were not truly representative of Christ's teachings, and in 1787 began preaching a higher spiritual life. Although Rapp and his followers demeaned themselves as peaceable and law-abiding subjects, they excited jealousy and opprobrium, suffered persecution, and were fined and imprisoned. In 1803 they determined to emigrate to America, where a tract of 5000 acres of land was bought in Butler County, Pa., in the valley of the Connoquenessing. Here the Harmony Society was formally organized, February 13, 1805, and its constitution was adopted, in signing which all the members agreed to throw all their possessions into a common stock, to live and dress simply, to hold all things in common, and to labor for the good of the whole body. In the spring of 1805 the community numbered about 125 families, or not quite 750 persons. In 1807 the society was stirred by a profound religious awakening. The members became convinced that it was their duty to give up marriage and adopt the principle of celibacy as being the higher and holier estate. But no marked formalities of separation were instituted. Those who had been husband and wife continued to occupy the same house, with their children, but thereafter treated each other simply as 'brother and sister in Christ.' At the same time the use of tobacco was given up. Although the settlement on the Connoquenessing prospered, the location in a few years proved unsuitable to the needs of the community, and in 1814 a new tract of 30,000 acres was bought in Posey County, Ind., at the site of the present town of New Harmony (q.v.), to which the Harmonists removed during the ensuing twelve months. At this place they increased and prospered, their enterprises flourished, and their membership rose to about one thousand souls; but they became again dissatisfied on account of unhealthy and other unfavorable local conditions. They sold their property to Robert Dale Owen (q.v.), and removed in 1825 to what became their permanent home in Beaver County, Pa. Here they built the village of Economy, on the Ohio River, about 20 miles north of Pittsburg, a place long celebrated as an example of neatness and industrial thrift. The community has suffered one serious division: In 1832 250 members, having become alienated under the influence of a German adventurer, Bernhard Müller, who called himself the Count de Leon, determined to withdraw, and a separation and apportionment of property were agreed upon.

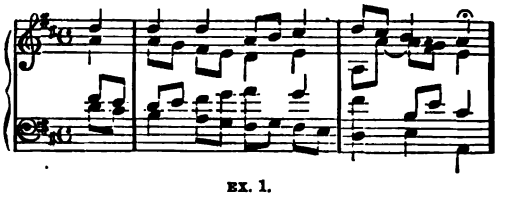
The management of the community was entirely in the hands of Rapp during his lifetime. After his death, in 1847, it passed to a board of elders, of whom Jacob Henrici was most prominent as trustee. Since 1891 John S. Duss has been the active manager. With not a few vicissitudes, throughout much of its career, the society has enjoyed great prosperity. In 1874 its property was valued between $2,000,000 and $3,000,000, and it had then 110 members, besides 25 or 30 children and hired laborers. The United States census in 1890 gave it 340 members. It was about that time heavily indebted, but has since been nearly freed from its obligations. The adoption of celibacy checked the growth of the society, and tended to repel converts. At present (November, 1902) the membership has fallen to eight. Plans for the restoration of the community are said to have been formed. Consult: Aaron Williams, *The Harmony Society at Economy, Pennsylvania, Founded by George Rapp, A.D. 1805, with an Appendix* (Pittsburg, 1876); Charles Nordhoff, *The Communistic Societies of the United States* (New York, 1874); William Alfred Hinds, *American Communities* (rev. ed., Chicago, 1902).

HARMO'NIUM (Neo-Lat., from Gk. ἁρμόνιος, *harmonios*, harmonious). A reed organ with bellows which are operated by the feet of the performer. The tone is produced by free vibrating reeds. The harmonium is a development from the older regal (q.v.). In 1810 Grenié exhibited the first harmonium, which he called *orgue expressif*, because this instrument was capable of greater expression, as well as of producing a crescendo and diminuendo. A. Debain, of Paris, improved it, and first gave it the name of harmonium when he patented his instrument in 1840. A complete revolution in the construction of the harmonium was begun in America when a mechanic who had worked in the factory of Alexandre in Paris emigrated to America. This man conceived the idea of a suction bellows, instead of the ordinary bellows which forced the air outward through the reeds. The firm of Mason & Hamlin, of Boston, in 1860 made their instruments with the suction bellows, and this method of construction soon superseded all others.

HARMONY (Lat. *harmonia*, Gk. ἁρμονία, harmony). The science which treats of chords, their structure, relation, progression, and resolution. As such it forms to-day the fundamental branch of the science of musical composition. All tones are regarded as elements of some fundamental chord, and for this reason the voices lose much of their individual freedom which they have in counterpoint, but are regarded more as affecting the relations of successive chords. As taught to-day, harmony comprises the study of intervals, chords, their structure, inversions, and chromatic alterations; progression of the various voices; suspensions, anticipations, and passing notes; modulation. Harmony, in our acceptation of the term, was unknown to the ancients. Only in the tenth century did a Flemish monk, Hucbald, conceive the idea of setting a second voice a fifth

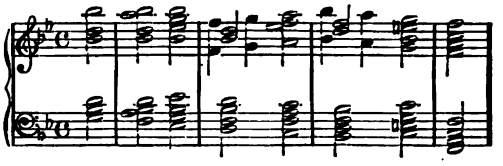
below the original cantus. This crude experiment was the beginning of harmony. In the sixteenth century Zarlino, in his great work *Istituzioni harmoniche*, established the consonance of the third, and also discovered the polarity of major and minor. That this discovery did not bear fruit immediately is due to the invention of figured bass, which determines all intervals from the *bass* tone instead of the *fundamental*. Tartini, in the eighteenth century, tried to develop Zarlino's ideas, but failed because he could not get away from the theories of figured bass. Thus the idea of the polarity of major and minor fell into oblivion, until in 1853 Moritz Hauptmann (q.v.) established this relation on a firm scientific basis. But after the third was once recognized as a consonance, the basis for the construction of chords was given. Still, music could not free itself from the fetters of the church modes (q.v.). Hence the development of music took place along the lines of polyphony (q.v.) or contrapuntal writing. Only after the establishment of the major and minor modes in place of the church modes, and the subsequent introduction of equal temperament (q.v.), which rendered modulation into all keys possible, could music develop harmonically. Thus Bach, while marking the highest development of the polyphonic contrapuntal style, at the same time marks the beginning of homophonic harmonic writing. Since then the progress of harmony has been very rapid. Progressions that startled one generation by their dissonance and boldness were accepted as pleasing and natural by the next, until, in the works of the great masters of the nineteenth century, we have a wealth and variety of harmonies that their predecessors never dreamed of. To-day all music is conceived as resting upon a *harmonic* basis. All tones are regarded on the basis of consonant chords, so that dissonant chords are conceived not as independent formations, but as modifications of a fundamental consonant chord. That this view is the only rational one, and rests upon a natural basis, is conclusively proved by the fact that the works of the greatest writers of the polyphonic style can all be reduced to a simple harmonic basis.

The importance of harmony in modern music cannot possibly be overestimated. Emotional expression depends almost entirely upon the choice of harmonies. The same melody harmonized differently is capable of expressing widely different moods and emotions. This is strongly illustrated by the leading motives in the works of Wagner. The same melodic phrase occurs frequently in a different harmonic garb in accordance with the varying demands of the dramatic situation. The development sections of Beethoven's symphonies and sonatas afford innumerable examples of wonderful and surprising effects produced by different harmonization of the original themes. Simple folk-songs can be invested with a transcendent beauty by a judicious, refined harmonization. For example: The simple German folk-song, *Es ist bestimmt in Gottes Rath*, appeals to every one through its tender melody sustained only by the simplest harmonic chords. Mendelssohn has taken this simple melody, and, without altering even a note, has harmonized it so exquisitely that his version appears like a high-art song. Upon closer examination, we will find that the tender sadness of the original melody has been intensified by Mendelssohn's rich harmonies into sorrowful resignation. It is highly interesting to compare the many harmonic settings of Luther's famous hymn, *Ein feste Burg ist unser Gott*. Bach's wonderful setting cannot be surpassed; (ex. 1) and yet what a different character does



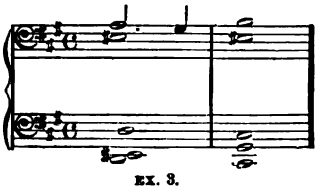
EX. 1.

Wagner impart to this simple melody when he introduces it in his *Kaisermarsch* (ex. 2). The



EX. 2.

three notes constituting the melodic outline of the motive of Fate in the Nibelungen are surely insignificant enough in themselves. This motive derives its solemn and majestic character solely from the rich underlying harmony (ex. 3). One more example to prove the importance of harmony. The principal theme of the allegretto in Beethoven's A major Symphony is almost appalling in its meagre monotonous melody. Yet, by means of the most marvelous harmonic combinations, the master has transformed it into one of the most impressive and deeply emotional phrases to be found in the whole range of music (ex. 4).



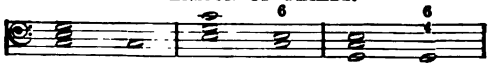
EX. 3.

In the great masters the gift of harmony is inborn. Wagner expressly declares that no melody ever occurred to him apart from its harmonic basis. Yet a talent for harmony can be cultivated to a certain extent. Every thorough musician is capable of harmonizing a given melody in several ways. Besides the choice of the chords there is another important factor, namely, the proper distribution to the different voices of the different tones composing a chord. This has to do with the leading of the voices and the rules to be observed in correct writing. It cannot be the object or purpose of an article like the present to attempt a technical exposition of so broad a subject as harmony. The following is, therefore, intended to give the general reader some idea of the scope and function of the various subjects comprised under the collective title of harmony.

INTERVALS. Under this heading the tones are treated in respect to the distance or difference in the degree of the scale that separates them one from the other. If two tones are sounded simultaneously they form *harmonic* intervals; if sounded successively, *melodic* intervals. All intervals are reckoned from the fundamental tone

of the scale. When the same tone is sounded on two different instruments the interval is called a *prime*, both tones being on the same degree of the scale. The tone upon the second degree forms the interval of the second with the fundamental tone, and so on, until the eighth degree is reached, which is the same as the first, one octave higher. Generally, all intervals are reckoned within one octave; thus C-e^2 is a third, although the two

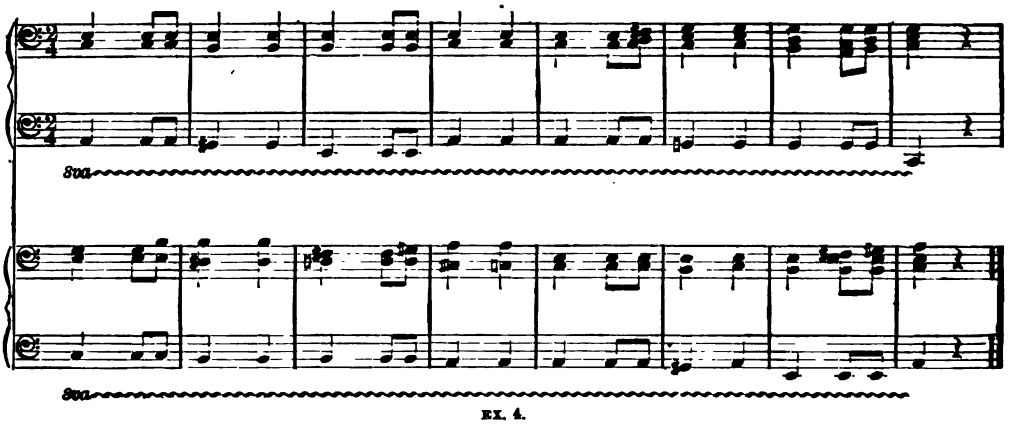
INVERSION OF TRIADS.



Fundamental. First Inversion. Second Inversion.

EX. 7.

tones composing a chord, a distinction is made between *close* and *open, spread* or *extended* har-

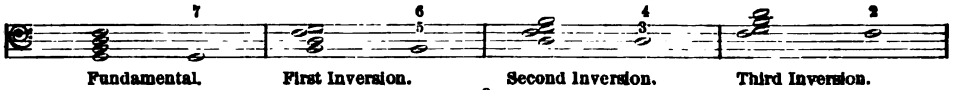


EX. 4.

tones are separated by more than three octaves. For theoretical purposes, however, the intervals of the ninth, tenth, eleventh, and twelfth are recognized. Intervals are classed as *consonant* and *dissonant*, and again as *major, minor, augmented, diminished*, and *perfect*.

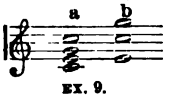
mony. In example 9 the first chord (a) is in *close* harmony because none of its tones can be transposed an octave, and still fall within the other tones of the chord. The second chord (b) is in *open* harmony, because by transposing the E an octave, it falls between the tones C and G of the chord (ex. 9). Likewise, transposing the G an octave lower, it falls between C and E.

INVERSIONS OF CHORD OF SEVENTH.



Fundamental. First Inversion. Second Inversion. Third Inversion.

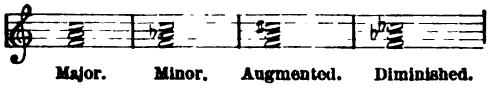
EX. 8.



EX. 9.

Chords. Under this heading are treated the nature and formation of chords. The fundamental chord is the triad consisting of three tones, the prime, third, and fifth. According as the major or minor third is used, the chord itself is major or minor. The presence of an augmented or diminished interval renders the chord likewise augmented or diminished. All chords are constructed by means of thirds (ex. 5). By

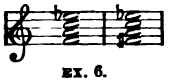
TRIADS.



Major. Minor. Augmented. Diminished.

EX. 5.

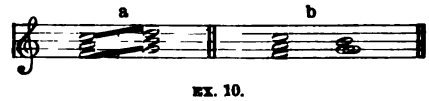
adding the interval of a third to any triad a chord of the seventh is obtained, so called because the last added tone forms the interval of a seventh with the fundamental tone of the chord (ex. 6).



EX. 6.

All chords can be inverted, i.e. any tone of a chord can be in the bass or lowest part. When the fundamental tone is in the bass the chord is said to be in its fundamental position. With the third in the bass we obtain the first inversion; with the fifth in the bass we have the second inversion (ex. 7). Chords of the seventh admit three inversions (ex. 8). With respect to the relative position of the various

Progression of Chords. Each tone composing a chord is regarded as belonging to a distinct voice or part. The rules governing the progression of chords are exceedingly few and simple, yet it requires long and constant practice to acquire the art of leading the voices correctly. (1) Parallel octaves and fifths are strictly forbidden. This means that two tones of one chord forming the interval of an octave or a fifth must not progress in such a manner as to form the same interval in the next chord (ex. 10). The example under (a) is bad because the progressions c-d and f-g produce fifths in both chords. The correct progression is given under (b). Octaves



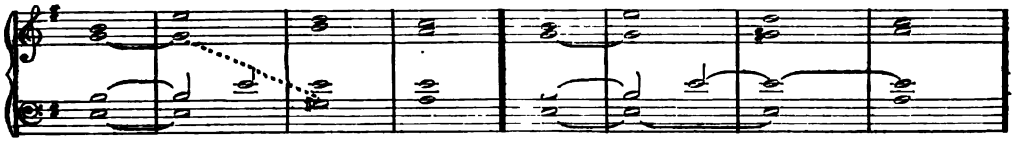
EX. 10.

and fifths may be open or covered. They are open, as in example 10 (a), when the forbidden intervals occur in both chords; covered when they occur only in the second chord as the result of parallel motion, as in the following (a) (ex. 11). These covered fifths can be avoided by leading the

voices, as under (b). (2) The leading tone can never be doubled. As the leading tone always

EX. 11.

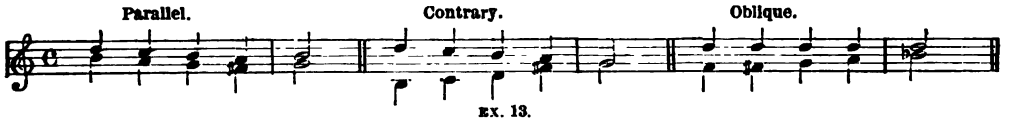
demands the progression of a semistep upward into the octave, it is clear that a doubling of this tone would necessitate the faulty progression of open octaves. (3) Chords must not progress so as to produce an inharmonic relation. This means that a tone of one chord cannot appear chromatically altered in the next chord, except in the same voice. For instance, if *g* appears in one chord in the tenor part, a *g*♯ or *g*♭ can be introduced in the succeeding chord *only* in the tenor part. In the following example the faulty progression under (a) is corrected under (b) (ex. 12). (4)



EX. 12.

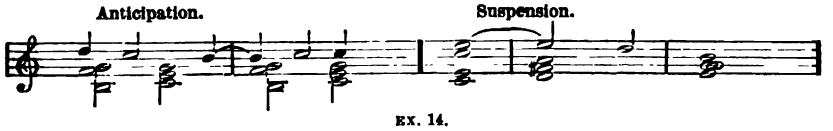
The interval of the seventh is never to be doubled; neither is any augmented or diminished interval to be doubled, for all such intervals are dissonant, and hence are sufficiently prominent if they occur in only one voice.

With respect to one another, the different voices

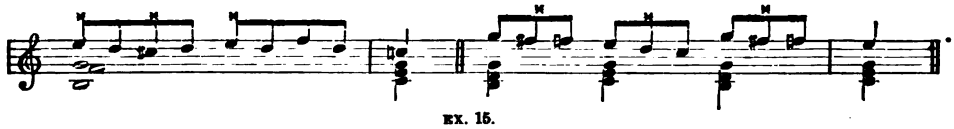


EX. 13.

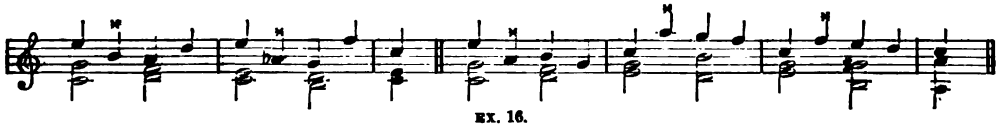
may proceed in *parallel*, *contrary*, or *oblique* motion. The motion is *parallel* if both voices either rise or fall together; *contrary* when one rises and the other falls; *oblique* when one remains on the same tone, while the other either rises or falls (ex. 13). With respect to the number of voices



EX. 14.



EX. 15.



EX. 16.

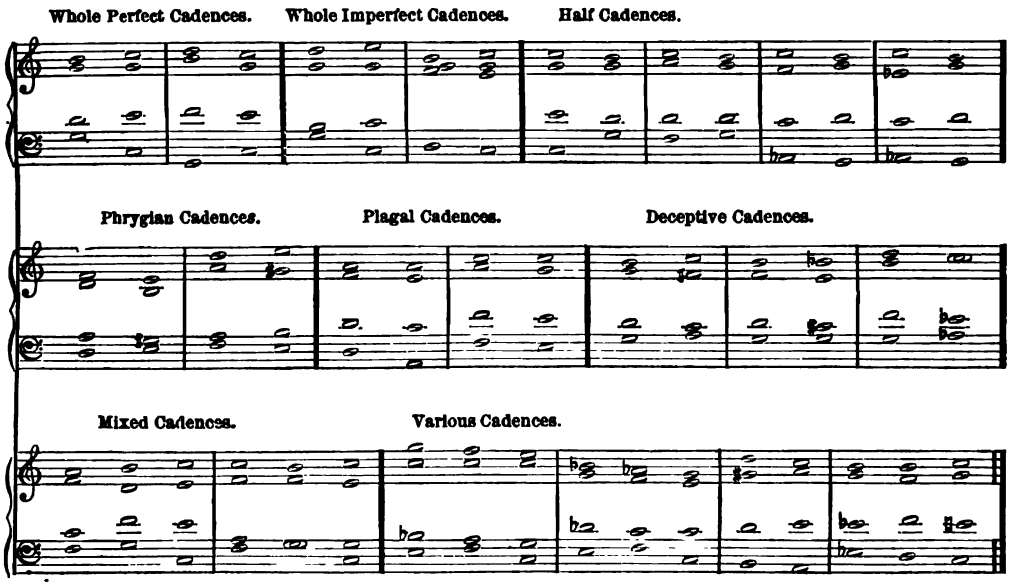
employed, a distinction is made between two-part, three-part, four-part, etc., writing. The kind most generally used is the four-part. As a triad contains only three tones, it is evident that in four-part writing one of the intervals must be doubled. This is generally the fundamental tone, often also the fifth, seldom the third. In two-part writing some interval must be omitted, and this is almost always the fifth. The number of parts is not restricted. There are compositions for as many as twenty-four, and even thirty-two parts. Of course it requires absolute mastery to handle such a number of parts.

ANTICIPATIONS, SUSPENSION, RESOLUTION. Tones may also appear in other chords than the ones to which they belong. When one or more voices proceed to tones of the next chord, while the remaining voices sustain the harmony of the first chord, *anticipation* occurs. *Suspension* takes place when one or more voices hold the tone of the previous chord when the other voices have already proceeded to the harmony of the next chord. As the tones thus held do not belong to the chord with which they are sounded, they cause a dissonance. All dissonances require resolution into consonant chords. Anticipation occurs upon either the strong or weak beat of a bar; suspension only on the strong beat. Suspension, moreover, requires *preparation*, i.e. the tone suspended must occur in the previous chord as an essential element. The preparation takes place upon the weak beat, while the suspension itself occurs upon the strong beat (ex. 14).

PASSING NOTES AND CHANGING NOTES. By passing notes are meant notes of short duration that do not affect the harmony, but only serve as a connective element between chords, as in ex. 15 (passing notes marked*). A changing note is one that lies a second above or below a tone belonging to a chord. Whereas passing notes occur always in passages progressing by steps, changing notes generally proceed by skips, as ex. 16 shows (changing notes marked*).

In the above examples, only the soprano contains the passing and changing notes. It is possible, however, to have more or all voices move in notes of the same value as the soprano. The different tones of the different voices then form chords. All chords containing one or more of the notes marked * would then constitute *passing chords.*

CADENCES. It is important to pay attention to the closing of a piece. The two principal cadences are the *authentic* and the *plagal.* The authentic cadence is the resolution of the dominant chord into the tonic. When the soprano has the fundamental tone of the tonic, and the bass the fundamental tone of both the dominant and tonic chords, the close is called a *whole cadence.* It is at the same time a *perfect cadence.* The *whole cadence* is *imperfect* when the soprano has any other interval than the fundamental of the tonic, or the bass any other than the fundamental tone of the dominant chord. A *half cadence* is the resolution of the tonic into the dominant chord, the reverse of the *whole cadence.* Instead of the tonic chord other triads may be used, especially those of the second, fourth, or sixth degree. A half cadence that occurs very frequently and is very beautiful is the *Phrygian cadence.* It consists of the resolution of the sub-dominant into the dominant in the minor mode. The *plagal cadence* is the resolution of the sub-dominant into the tonic chord. The cadences just mentioned are the ones most frequently used at the close of a composition. But at the end of a phrase or section a close known as the *deceptive* or *interrupted cadence* is frequently found. This consists of the resolution of the dominant into some chord other than the tonic. A *mixed cadence* is the succession of the sub-dominant, dominant, and tonic chords, thus constituting a mixture of the authentic and plagal cadences. Besides the cadences enumerated, others not specially classified also occur. Thus the chord of the diminished seventh sometimes takes the place of the dominant or sub-dominant (ex. 17).



EX. 17.

MODULATION. Although every composition is written in a certain key, wearisome monotony would result were the composer to restrict himself only to chords properly belonging to that key. Chords belonging to other keys are introduced with more or less frequency. Every such departure from the original key is a modulation. To modulate with artistic effect the relation of the keys and the chords belonging to each must be thoroughly understood.

While pursuing the study of harmony the student at the same time is trained in the science of figured bass. It is the rule followed in all modern treatises on harmony to write out the exercises in figured bass notation. This indicates the choice of chords, whereas the leading of the voices and the distribution of the tones is left to the student.

There is no dearth of excellent works on harmony. Among the most famous are: Fétis, *Esquisse de l'histoire de l'harmonie* (Paris, 1840); *Traité complet de la théorie et de la pratique de l'harmonie* (Paris, 1844); Dehn, *Theoretisch-praktische Harmonielehre* (Berlin, 1840); Hauptmann, *Die Natur der Harmonik und der Metrik* (Leipzig, 1853, 1873); Marx, *Die Lehre von der musikalischen Komposition* (Leipzig, 1847, new edition revised by Riemann, Leipzig, 1889); Richter, *Lehrbuch der Harmonie* (Leipzig, 1888; translated into English by Morgan, New York, 1885); Jadassohn, *Harmonielehre* (Leipzig, 1883); H. Riemann, *Skizze einer neuen Methode der Harmonielehre* (Leipzig, 1880); *Die Natur der Harmonik* (Leipzig, 1882).

For detailed information of the various topics introduced in this article, compare the separate articles on ACOUSTICS; AUGMENTATION; ANTICIPATION; CADENCE; CHORD; FIGURED BASS; INTERVAL; KEY; LEADING TONE; LEADING OF VOICES; MAJOR; MINOR; MODULATION; MOTION; PASSING NOTES; PROGRESSION; SCALE; SUSPENSION; TONALITY.

HARMONY OF THE SPHERES, or MUSIC OF THE SPHERES. It was a common belief among

the ancients that the motions of the stars and planets produce a kind of music, which they called the harmony of the spheres. They attributed this music to the various proportionate impressions of the heavenly bodies on one another acting at proper intervals.

HARMS, härms, FRIEDRICH (1819-80). A German philosopher, whose concept of philosophy as the science of the absolute approaches Fichte. He was born at Kiel, and educated there and in Berlin. In 1848 he was appointed professor at Kiel, and in 1867 at Berlin. His writings are critical and historical, rather than constructive, and, although marked by depth of thought, fail in clearness of style. Among them are: *Der Anthropologismus seit Kant* (1845); *Prolegomena zur Philosophie* (1852); *Die Philosophie Fichtes* (1862); *Schopenhauers Philosophie* (1874); *Die Philosophie seit Kant* (1876); *Ueber den Begriff der Wahrheit* (1876); *Die Formen der Ethik* (1878); *Metaphysik* (1885), *Logik* (1886), *Ethik* (1898), *Naturphilosophie* (1895), *Psychologie* (1897), all edited by Wiese; and *Begriff, Formen und Grundlegung der Rechtsphilosophie* (1889).

HARMS, KLAUS (1778-1855). A distinguished German theologian. He was born May 25, 1778, at Fahrstedt. In 1797 he went to the gymnasium at Meldorf, and in 1799 to the University of Kiel. After supporting himself as family tutor from 1802 till 1806, he was appointed Deacon of Lunden, whence he was called in 1816 to Kiel, as archdeacon and afternoon preacher in the Nikolai Church. Next year, shortly before the tricentenary of the Reformation in Germany, he issued, in defense of Protestant orthodoxy, ninety-five theses, under the title, *Das sind die 95 Theses oder Streitsätze Dr. Luthers* (Eng. trans. of most of them in *Lutheran Church Review*, 1889). These produced a deep impression throughout Germany, and brought him a call to be bishop of the consistory about to be instituted for the Protestant Church of Russia. This, as well as a call in 1834 to succeed Schleiermacher in Trinity Church, Berlin, Harms refused. In 1835 he was made chief pastor and provost in Kiel, but was compelled to resign in 1849, in consequence of an attack of almost total blindness. The rest of his life was spent in retirement, devoted to literary activity. He died in Kiel February 1, 1855. Harms's published works are chiefly sermons, which may be reckoned among the best specimens of modern pulpit eloquence in Germany. Of these, the most famous are his *Winterpostille* (1808, 6th ed. 1846), and *Sommerpostille* (1815, 6th ed. 1846), to which a new series was added—*Neue Winterpostille* (1826), and *Neue Sommerpostille* (1827). Consult: Dorner, *Blätter der Erinnerung an das Jubiläum von Harms* (Kiel, 1842); *Harms' Lebensbeschreibung verfasst von ihm selbst* (ib., 1851, 2d ed. 1852); and for his life, Volbehr (Kiel, 1878).

HARMSWORTH, ALFRED CHARLES (1865—). An English editor, born at Chapelizod, near Dublin. He was educated under a private tutor and at the Stamford Grammar School, and in 1882 joined the staff of the *Illustrated London News*. In 1888 he started the weekly journal *Answers;* in 1894 secured control of the *London Evening News;* and two years later founded the *London Daily Mail*. In 1898 he began the publication of *Harmsworth's Magazine*. He is perhaps most widely known in connection with the Jackson-Harmsworth Arctic Expedition of 1894, which he equipped. In December, 1900, he visited the United States, and while there brought out a special issue of a New York newspaper to illustrate his theory of what a paper of the future would be. Its form was that of a 32-page quarto magazine.

HARNACK, här'nâk, ADOLF (1851—). The foremost of living Church historians. He was born at Dorpat, Russia, May 7, 1851; educated at the university there (1869-72); became privatdocent at Leipzig (1874), professor extraordinary of Church history there in 1876; ordinary professor of Church history at Giessen (1879), at Marburg (1886), and at Berlin (1889). He is a man of strong and inspiring personality, and his lectures at Berlin are attended by hundreds of students from both Europe and America. His editorial activity has been great, as is attested by the facts that since 1881 he has edited with E. Schürer the *Theologische Litteraturzeitung*, a semi-monthly critical review (Leipzig, 1876, sqq.), and since 1882 with O. von Gebhardt the *Texte und Untersuchungen zur Geschichte der altchristlichen Litteratur* (Leipzig, 1882-1902), a series of learned monographs (22 volumes) to which he also contributes. He also joined Von Gebhardt and T. Zahn in bringing out *Patrum Apostolicorum Opera* (Leipzig, 1875-77, 3 vols.). But his fame chiefly rests upon his separate publications, some of which are: *Zur Quellenkritik der Geschichte des Gnosticismus* (1873); *Die Zeit des Ignatius* (1878); *Das Mönchtum* (1881, 5th ed. 1901; trans. *Monasticism: Its Ideals and Its History*, 1895; with article on *The Confessions of Saint Augustine*, 1901); *Martin Luther in seiner Bedeutung für die Geschichte der Wissenschaft und der Bildung* (1883, 3d ed. 1901); *Lehrbuch der Dogmengeschichte* (1886-90, 3d ed. 1894-97; Eng. trans., *History of Dogma*, 1895-1900); *Grundriss der Dogmengeschichte* (1889, 3d ed. 1898); *Das apostolische Glaubensbekenntniss* (1892, 27th ed. 1897; trans., *The Apostles' Creed*, 1901); *Geschichte der altchristlichen Litteratur bis Eusebius:* vol. i., *Die Ueberlieferung und der Bestand der altchristlichen Litteratur* (1893); vol. ii., *Die Chronologie der Litteratur bis Irenäus* (1897); *Das Christentum und die Geschichte* (1895, 4th ed. 1897; trans., *Christianity and History*, 2d ed. 1901); *Das Wesen des Christentums* (1900; trans., *What is Christianity?* 1901); *Vorstudien zu einer Geschichte der Verbreitung des Christentums in den ersten drei Jahrhunderten* (1901).

HARNACK, AXEL (1851-88). A German mathematician, son of Theodosius Harnack (q.v.), and twin brother to Adolf Harnack. Born at Dorpat, he studied there (1869-73), and then at Erlangen and Munich. He was privat-docent at Leipzig in 1876, professor in the Polytechnic Institute at Darmstadt, and then at Dresden. Besides several contributions to the *Mathematische Annalen* (vols. ix., x., xii., xiii., xiv., xvii., xix., xxi.), he wrote: *Elemente der Differential- und Integralrechtung* (1881) and *Grundlagen der Theorie des logarithmischen Potentials und der Potentialfunktion in der Ebene* (1888). Consult

the biography by Voss, in the *Mathematische Annalen* (vol. xxxii., Leipzig, 1894).

HARNACK, THEODOSIUS (1817-89). A German Lutheran theologian, father of Adolf and Axel (q.v.). He was born at Saint Petersburg, Russia, January 3, 1817; was educated at Dorpat, and taught there (1843-53); at Erlangen (1853-66); Dorpat again (1866-75), when he retired. He died at Dorpat, September 11, 1889. His specialty was practical theology, and he wrote the well-known *Praktische Theologie* (1877-78), and other books in that department.

HARNED, här'nĕd, VIRGINIA (1868—). An American actress, the wife of E. H. Sothern (q.v.), to whom she was married in 1896. She was born in Boston, and when about sixteen first became a member of a traveling company. Her New York début was in *A Long Lane*, at the Fourteenth Street Theatre (1890). In 1895 she appeared as Trilby, in Paul Potter's dramatization. Prominent among her subsequent parts have been Lady Ursula in *The Adventure of Lady Ursula* (1897); Ophelia, to Mr. Sothern's Hamlet (1900); Alice Rousillon in *Alice of Old Vincennes* (1901); and Iris in A. W. Pinero's play of the same name (1902). Consult Strang, *Famous Actresses of the Day in America* (Boston, 1899).

HARNESS. See SADDLERY.

HARNESS, WILLIAM (1790-1869). An English author and divine, educated at Harrow, where he formed a life-long friendship with Byron, and at Christ's College, Cambridge (B.A. 1812; M.A. 1816). He entered holy orders and became known as one of the most eloquent preachers in London. By his efforts was built the Church of All Saints, Knightsbridge (1849), of which he was perpetual curate till his death. Many of his sermons were published; but he is now remembered chiefly for his edition of Shakespeare (8 vols., 1825). Consult L'Estrange, *Literary Life of Harness* (London, 1871).

HARNESS CASK. A large wooden cask, commonly shaped like the frustum of a cone, flattened at the sides, and used on board ship for the temporary stowage of salt provisions which are intended for issue to the crew within a day or two. Sailors call salt beef *salt horse*, and of course a *harness* is the most natural thing to be around a horse—hence the name.

HARNESSED ANTELOPE. A bushbuck of the genus Tragelaphus, so called because most of them have irregular stripings and spottings of white on a dark ground, suggesting a harness. Most of them belong to the jungles of West and South-Central Africa, and the list includes the bongo and guib (see BUSHBUCK), the nyala and sitatunga (qq.v.). See Colored Plate of ANTELOPES.

HARNETT, CORNELIUS (1723-81). An American patriot, born probably in Chowan County, N. C. He was among the first to oppose the Stamp Act; represented Wilmington in the Provincial Assembly from 1770 to 1771; served in 1774 on the Wilmington Committee of Safety; and was the temporary executive of North Carolina after the departure of the royal Governor. He was a delegate to the Continental Congress from 1777 to 1779, and was a signer of the Articles of Confederation. The proclamation of general pardon, issued by Governor Clinton, excluded Harnett, and in 1780 he was made a prisoner of war, and died in captivity the next year.

HARNEY, JOHN HOPKINS (1806-67). An American journalist, born in Bourbon County, Ky. He graduated at Oxford University, Ohio, was professor of mathematics at the University of Indiana (1828) and Hanover College (1833), and then became president of a college in Louisville, Ky. (1839-43). He published an *Algebra* for school use in 1840. For twenty-three years (1844-67) he was editor of the *Louisville Democrat*, and made himself felt before and during the Civil War, while afterwards he played a conciliatory part.

HARNEY, WILLIAM SELBY (1800-89). An American soldier, born near Haysboro, Tenn. He entered the United States Army, and rose to be lieutenant-colonel of dragoons in 1836. He served in the Black Hawk War, in the Florida War, and in expeditions into the Everglades, and during the Mexican War was brevetted brigadier-general for gallantry at Cerro Gordo. In 1858 he was appointed to the command of the Department of Oregon, and subsequently to that of the Department of the West. In 1861, while journeying to Washington, he was taken prisoner by Confederates and brought to Richmond. Upon his release he issued proclamations to the people of Missouri, describing the evils certain to follow from secession. He was retired in 1863, and in 1865 was brevetted major-general. Consult Reavis, *Life and Military Services of Gen. W. S. Harney* (Saint Louis, 1878).

HAROËRIS, hă'rō-ē'rĭs, or **HARUËRIS** (from *Hor, Horus* + *uêr*, great, adult). An Egyptian god. Originally, he was merely a phase of the sun-god Horus, representing the sun in summer, or taking the daily course as the type of the yearly, the sun at its full height, at noon. He is regularly represented as a hawk-headed king, wearing the two crowns of Egypt. Originally he was the son of Osiris and his sister Isis, conceived while his parents were in the womb of their mother, Nuet (i.e. the sky). Later, however, when the two phases of the young and the adult sun were represented by two distinct deities, he became not only a brother of Harpocrates (q.v.), but even a brother of Osiris and son of Nuet, the sky, and Seb (or Gêb?), the earth (Plutarch: Rhea and Kronos), while other inscriptions make him son of other forms of the old Sun (Rê or Atum). He was specially the god of Southern Egypt. See HORUS; HARPOCRATES.

HAR'OLD I., surnamed HAREFOOT (probably on account of his swiftness). King of England from 1037 to 1040. He is believed to have been the younger of Canute's two sons by his first wife, Ælfgifu. According to agreement on Canute's second marriage to Emma, widow of Ethelred II., his son by Emma was to inherit the English as well as the Danish throne; this son, Hardecanute (q.v.), was, however, in Denmark at the time of his father's death in 1035. Leofric, Earl of Mercia, favored the cause of Harold, while the powerful Earl Godwine espoused that of Hardecanute. Civil war was averted by a compromise, and the kingdom was divided. Harold took London, with all the provinces north of the Thames, while the possession of Wessex was

given up to Emma for Hardecanute. She fixed her residence at Winchester, and established her authority over her son's share of the kingdom. In 1037 the thanes and people of Wessex, disgruntled by Hardecanute's prolonged absence in Denmark, submitted to Harold, and he was crowned King of all England. He is said treacherously to have slain the Ætheling Ælfred, the younger of the two sons of Ethelred and Emma, whom he had invited to England. He died at Oxford, March 17, 1040. Consult Freeman, *The Norman Conquest*, vol. i. (Oxford, 1869).

HAROLD II. (1022?-66). King of England in 1066. He was probably the second son of the powerful Earl Godwine. In 1045 Harold was Earl of East Anglia. In 1051, when Godwine fell into disgrace with Edward the Confessor, Harold raised troops in Ireland, and plundered the English coast until reëstablished in his earldom. After his father's death, in 1053, Harold inherited the Earldom of Wessex, and all his father's property and power, and became the head of the National Party, which sought to counteract the Norman influence at the Court of Edward the Confessor. In 1062-63 with his brother Tostig he invaded Wales, and inflicted such a terrible chastisement on the inhabitants that the English frontier was safe from their raids for three-quarters of a century. It was probably in 1064 that he made his visit to Normandy, and took an oath to assist William in obtaining the English crown. The common legend is that Harold was shipwrecked on the coast of Normandy, and fell into the power of Duke William, who forced him to swear on a chest full of sacred relics that he would aid him in his design. On the death of Edward the Confessor, January 5, 1066, the Witan (q.v.), in the exercise of its rights, set aside the claims of Edgar Atheling, the grandson of Edmund Ironside, and, ignoring the reputed bequest of the late sovereign in favor of the Duke of Normandy, elected Harold to fill the vacant throne. Duke William immediately asserted his claim, which was supported by Harold's brother Tostig, who had been dispossessed of his Dukedom of Northumbria, and Harald Haardraade, King of Norway, his ally. Tostig and the Norwegian King landed on the coast of Yorkshire, and after defeating Eadwine and Morkere, Earls of Northumbria and Mercia, advanced to York, but were met by Harold at Stamfordbridge, and totally routed September 25, 1066. A few days later William landed in England; the contending armies met at Senlac, about seven miles from Hastings (see HASTINGS, BATTLE OF), where Harold's defeat and death, October 14, 1066, made the Duke of Normandy undisputed ruler of England. Consult: Freeman, *The Norman Conquest*, vols. ii. and iii. (Oxford, 1875); Green, *The Conquest of England* (London, 1883). See ANGLO-SAXONS; ENGLAND.

HAROLD I. AND HAROLD III. Kings of Norway. See HARALD.

HAROLD EN ITALIE, ä'rôl'dĕ nē'tä'lē'. The fourth of Berlioz's five symphonies, composed in 1834 and founded on Byron's *Childe Harold.*

HAROLD, OR THE LAST OF THE SAXON KINGS. An historical novel, founded on the life of Harold II. of England, by Bulwer-Lytton (1848).

HAROUN AL-RASHID, hà-rōōn' ăl rà-shēd'. See HARUN AL-RASHID.

HARP (AS. *hearpe*, Icel. *harpa*, OHG. *harpha*, Ger. *Harfe*, Lat. *harpa*, of unknown etymology). A musical stringed instrument, much esteemed by the ancients. In Egypt the figure of the harp is found delineated from the earliest ages in many different forms. The Celtic bards held the harp in the greatest honor. In the Highlands of Scotland the instrument has disappeared, but it is still in use in Wales, and to some extent it lingers in Ireland, where, from its former prevalence, it is adopted as a national symbol. The harp was used as an accompaniment to the psalms sung by the early congregations of Christians. There are three kinds of harps now known. The ordinary Italian harp is strung with two rows of wire strings, separated by a double sounding-board; this kind is now practically obsolete, being very imperfect. The double harp, or, as it is also called, David's harp, is a more useful instrument in the form of a triangle, with a sounding-board and gut strings; it is always tuned in the principal key of the music, while the strings are altered to suit any modulations out of the key, by pressure of the thumb, or turning the tuning-pins of certain notes. These defects led gradually to the invention of the pedal harp, which has seven pedals, by which each note of the diatonic scale, in all the different octaves, can be made a semitone higher. A celebrated harpist, Hochbrucker, in Donauwörth, invented the pedals in 1720; while J. Paul Velter, in Nuremberg, in 1730, added the piano and forte pedal. After numerous attempts at further improvements, the harp at length reached a degree of perfection by the invention of the double-action pedal harp by Erard in Paris in 1820. By means of Erard's invention, each string can be sharpened twice, each time a semitone; so that the C string may be C flat, its full length, C natural by the first movement of the pedal, and C sharp by the next movement. The double-action harp is tuned with all the pedals half-down, and in the key of C natural. It has 46 or 47 strings and a compass of over six octaves from $_1$C-g^4. The music is written on two staves, exactly as for the pianoforte. The instrument is now found in all large orchestras. For producing beautiful arpeggio effects the harp has no rival. In the final scene of *Das Rheingold* (the entrance of the gods into Walhall) Wagner employs no less than eight harps.

HARP, or SADDLEBACK SEAL. A hair-seal of the North Atlantic (*Phoca Groenlandica*) which wanders widely, but usually is numerous off the coasts of Greenland and southward to Newfoundland, gathers in herds about the ice-floes, and is slaughtered by sealers in great numbers. It is yellowish-white when fully adult (when the males have a black head), with an irregular circle of dark marks on the back, inclosing a space which somewhat resembles a harp or a saddle. To the Eskimos these seals are of value for food, and summer clothes as well as tents are made of the skins.

HARPAGON, ärˈpä'gôNˈ. A miser who nearly starves his horses, lets his servants go half-clothed, and begrudges himself even the expense of a decent wedding banquet. He is the principal character in Molière's *L'Avare.*

HARPALUS (Lat., from Gk. Ἅρπαλος) (c.330 B.C.). Kinsman and comrade of Alexander the Great. Made chief of the treasury in the expedition to Asia, he was found guilty of embezzlement. Alexander pardoned him and in 330 made him custodian of the immense Persian treasure at Ecbatana. After squandering enormous sums in the most reckless manner Harpalus fled to Athens (325) with 5000 talents, which he employed in purchasing the good-will of leading citizens, among them, it is said, Demosthenes. From Athens he went to Crete, where he was assassinated.

HARPER, JAMES (1795-1869). An American publisher, born at Newtown, L. I. In 1811 he removed with his brother John (1797-1875) to New York, where they learned the trade of printing and established the firm of J. & J. Harper, printing for booksellers and publishers. James Harper was said to be the quickest and best pressman in New York City, and the proofreading of John Harper had an equal reputation. They published on their own account from 1818 to 1833, when with two younger brothers, Joseph Wesley (1801-70) and Fletcher (1806-77), they formed the firm of Harper & Brothers. The keen business sagacity and sterling honesty of James Harper soon made the firm the largest and most respected publishing house in the United States. He was among the first to issue series of books grouped into so-called 'libraries,' covering topics ranging from juvenile fiction to the classics, and founded *Harper's Magazine* in 1850, which with the two publications suggested by Fletcher Harper, *Harper's Weekly*, established in 1857, and *Harper's Bazar*, established ten years later, soon took high rank in the field of periodical literature. The series was supplemented in 1881 by *Harper's Young People*, afterwards called *Harper's Round Table*. From 1844 to 1846 James Harper was Mayor of New York City, and was subsequently suggested for State Governor, but his distaste for public life led him to discountenance all efforts in his behalf. In March, 1869, he was thrown from a carriage and killed, and for many years after his death the business of the firm was conducted by younger members of the family. After the failure of the firm in 1899, it was entirely reorganized as a stock corporation.

HARPER, JOHN MURDOCH (1845—). A Canadian educationist. He was born at Johnstone, Renfrewshire, Scotland, emigrated to Canada, and graduated at Queen's University. His success as the head of several schools induced the Government of Prince Edward's Island to appoint him in 1887 superintendent of education for the province. Having declined this appointment, he became in 1880 rector of the Quebec High School, and subsequently inspector of superior schools for Quebec Province. His publications include many brochures and editions of textbooks.

HARPER, ROBERT GOODLOE (1765-1825). An American lawyer and politician, born near Fredericksburg, Va. He was early taken by his parents to South Carolina, and at the age of fifteen served in the volunteer militia of South Carolina during Greene's last campaign against Cornwallis in the South. After the close of the war he entered Princeton, where he graduated in 1785. The following year he was admitted to the bar at Charleston, S. C., and removed into the interior of the State to practice. He was an ardent Federalist, and wrote and spoke in favor of the adoption of the Federal Constitution. After several terms in the State Legislature, he was, in 1795, elected to Congress, where he served until 1801. He was a fluent speaker and a ready debater, and his able advocacy of the measures of Washington and Adams won for him a high place in the councils of the Federalist Party. In 1799-1801 he was the recognized leader of his party in the House. After the expiration of his Congressional term he removed to Baltimore, Md., where he married the daughter of Charles Carroll of Carrollton, and became one of the leading lawyers in the country. He served in the War of 1812 as a major-general in the Maryland militia. In 1803 he was the principal counsel for Judge Pickering in the impeachment proceedings brought against him, and in 1806, with Luther Martin and others, successfully conducted the defense of Justice Chase in his impeachment trial. He was elected United States Senator from Maryland in 1816, but resigned in the same year because of his candidature for the Federalist nomination for Vice-President, in receiving which he was unsuccessful. He was one of the principal promoters of the scheme for the colonization of free negroes in Africa which resulted in the establishment of Liberia. He published: *An Address on Observations on the Dispute Between the United States and France* (1797); *Letters on the Proceedings of Congress;* and *Letters to His Constituents* (1801). A collection of his letters, pamphlets, and addresses was published under the title of *Select Works of Robert Goodloe Harper* (1814).

HARPER, WILLIAM RAINEY (1856—). An American educator. He was born in New Concord, Ohio, July 26, 1856, of Scotch-Irish ancestry. He graduated at Muskingum College in 1870, and in 1875 received the doctor's degree from Yale. After teaching in the Masonic College, Macon, Tenn., and in the preparatory department of Denison University, Granville, Ohio, he became professor of Hebrew in the Baptist Union Theological Seminary in Chicago in 1879. While here he perfected a system of teaching Hebrew by correspondence. In 1886 he was elected professor of Semitic languages in the graduate faculty of Yale, and in 1889 also professor of biblical literature. From 1885 to 1891 he served as principal of the Chautauqua College of Liberal Arts, and in 1891 became principal of the Chautauqua system. In the last-mentioned year he was elected to the presidency of the newly founded University of Chicago, where he is also head professor of Semitic languages and literature. His published works include: *Elements of Hebrew* (2d ed. 1890); *Hebrew Vocabularies* (5th ed. 1890); *Hebrew Method and Manual* (1885); *Elements of Hebrew Syntax* (1888). He has been the founder and editor of several publications, among them *The Hebrew Student* and *Hebraica*, and is at present one of the editors of the *Biblical World*, the *American Journal of Theology*, and the *American Journal of Semitic Languages and Literature*—all published by the University of Chicago.

HARPER'S FERRY. A town in Jefferson County, W. Va., 55 miles northwest of Washington; on the Baltimore and Ohio Railroad (Map:

West Virginia, G 2). Its site, in a valley formed by Bolivar, Maryland, and Virginia or Loudoun Heights, and at the confluence of the Shenandoah River with the Potomac, is one of remarkable beauty. The town is the seat of Storer College (Free Baptist), a normal school for negroes. Population, in 1890, 958; in 1900, 896.

Harper's Ferry is chiefly notable from its connection with the raid of John Brown (q.v.), who, at the head of eighteen men, seized the armory here on October 16, 1859, and held it until captured on the following day by United States troops under Gen. Robert E. Lee. On April 18, 1861, immediately after Virginia had seceded from the Union, the small Union garrison, consisting then of only 45 men under Lieutenant Roger Jones, on the approach of a greatly superior force of Virginians under Gen. John Kenton Harper, abandoned the place, and fired the Federal arsenal, destroying about 20,000 rifles and pistols, and other property. The Confederates then gathered here a considerable force, which was first under Colonel Jackson, later known as 'Stonewall' Jackson, and afterwards under Gen. Joseph E. Johnston, both of whom energetically drilled and organized their troops. Johnston withdrew on June 15th, and soon afterwards another Union force took possession. The existence of a garrison here in September, 1862, compelled General Lee to divide the army of invasion which he was about to lead into Pennsylvania, and on the 15th General Jackson, after a prolonged bombardment, captured the place, securing about 12,500 prisoners and considerable material of war. Consult Johnson and Buel (editors), *Battles and Leaders of the Civil War*, vols. i. and ii. (New York, 1887).

HARPIGNIES, är'pē'nyĕ', Henri Joseph (1819—). A French landscape painter. He was born at Valenciennes, July 28, 1819. He was a pupil of Achard in Paris, and made his début in the Salon of 1853. His first picture which commanded attention was "The Edge of a Wood on the Banks of the Allier," which he exhibited in the Salon of 1861. Harpignies was at first but little appreciated, but his seriousness of purpose, true love of nature, and force of drawing at length told on both artists and public. His landscapes evince a fine sense of the structure of the land, and many of his pictures are noted for the justice of their retreating planes. His foreground and distances sustain frankly their relative positions on his canvases. At times he displays a certain hardness of technique, but the observer is repaid by his faithfulness of drawing and his fidelity in both form and color. He is an officer of the Legion of Honor, and has received various medals, among them the medal of honor at Paris in 1897. Among his oils are "View of Capri" (1855); "A Storm" (1859); "Evening in the Campagna" (1866), in the Luxembourg Museum; "The Valley of Egérie" (1870, a decorative panel for the Opera); "Le Saut du loup" (1873), a view on the Allier, and "Moonrise" (1884), both in the Luxembourg; "Banks of the Sarthe" (1892), "Banks of the Rhone" (1897), and "Moonrise," in the Metropolitan Museum, New York. Harpignies is equally excellent in his water-colors, among which may be mentioned: "Garden of the Villa Medici," Rome; "Le Pont-Neuf" (a bridge in Paris); 'L'heure de la bécasse."

HARPIN, är'păn'. An unscrupulous financier in Molière's *Comtesse d'Escarbagnas*. The character is a satire on a notorious class during the age of Louis XIV.

HARPOCRATES (Lat., from Gk. *Ἁρποκράτης, Harpokratēs*). The name given by the Greeks to a form of the ancient Egyptian god Horus. The Egyptian name, *Har-pekhrod*, means 'Horus, the child,' in opposition to Haroëris (q.v.), 'the adult Horus.' Therefore, this god is usually depicted as a naked babe sucking his finger and wearing the plaited side lock, the sign of youth, at the right side of his head. Sometimes an amulet in the shape of a heart hangs around his neck; he usually wears one or both of the crowns of Egypt. Often he is represented as sitting on or emerging from a lotus-flower, the divine flower growing in the primeval, chaotic waters from which the sun-god first arose. Whether he was originally conceived as the young sun rising in the morning, as the sun at the winter solstice, or as the sun appearing in the primeval abyss, cannot well be determined; all three views are maintained. In Greek times the two forms of Horus, Harpocrates and Haroëris, were so strongly differentiated as to become two distinct deities, so that Harpocrates was understood as a posthumous brother of the 'elder Horus,' of weakly, immature form. The Greeks added the strange misconception of taking Harpocrates for a god of reticence, explaining his gesture with the finger as a sign demanding silence. Together with the other divinities of the Osirian circle, Harpocrates became very popular at Rome, but the continued misinterpretations of his cult (from a god of reticence he became a giver of oracles by dreams, etc.) seem to have led to abuses, and his worship was forbidden in the consulship of Gabinius, though it became very popular again in the days of Pliny.

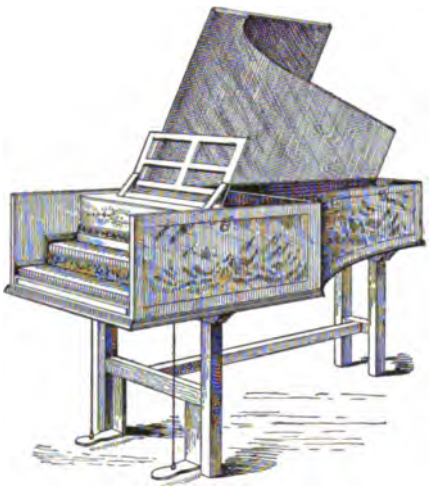
As a distinctive divinity Harpocrates represents one of the youngest personalities of the Egyptian pantheon. He is often identified with *Har-sam-toui*, 'Horus, uniting both countries,' more rarely with Khonsu, Atum, etc. Harpocrates was worshiped at Denderah, Esneh, Thebes; he had seven differentiated forms at Hermonthis. See also Haroëris.

HARPOCRA'TION (Lat., from Gk. *Ἁρποκρατιων, Harpokratiōn*), Valerius. A Greek grammarian and lexicographer of Egypt, respecting whose personal history nothing is known. Some have considered him to be the Greek instructor of the Emperor L. Verus mentioned by Julius Capitolinus, while others suppose that he lived some time later, because several passages are found in his works taken from Athenæus, who is supposed to have flourished about A.D. 200. Harpocration is the author of a valuable lexicon to the ten Attic orators, which contains much information on the law, history, antiquities, and general literature of Athens. The value of this work is enhanced by the fact that all the authorities from which it has been compiled are lost. Harpocration is also the author of a lost work entitled *Collection of Flowery Extracts* (*Ἀνθηρῶν Συναγωγή*).

HARP-SHELL (so called because the ribbing of the shell resembles the strings of a harp). A gastropod mollusk of the family Harpidæ, hav-

ing the last whorl of the shell very large, the shell ribbed longitudinally, the foot of the animal very large. The species, which are not very numerous, are found in the warmer seas, and particularly at Mauritius. The shells are much prized for their great beauty, but must be kept in drawers and not exposed to light, or their delicate and brilliant colors will fade.

HARPSICHORD, härp'sĭ-kôrd (OF. *harpe-chorde*, from *harpe*, harp + *chorde*, chord, cord). A keyed musical instrument, formerly in extensive use, but now little known. In shape it was exactly like a grand pianoforte, to which its internal arrangements were also similar. The sound from the strings was produced by a small piece of crow-quill, or a piece of hard leather, which projected out of a slip of wood, called the jack, that stood upright between the strings, and was pushed upward by the key till the quill, or leather, twitched the string, causing a brilliant but somewhat harsh sound, deficient of any



HARPSICHORD.

means of modification in respect to loudness or softness. Specimens of the harpsichord, although now becoming more rare, are still to be found in good preservation, but rather as articles of virtu or curiosity than as useful musical instruments. Many Italian and Dutch harpsichords were highly ornamented by the most eminent artists with valuable oil paintings on the inside of the lid. The date of the invention of the harpsichord is uncertain. Before the fifteenth century there is no trace of its existence. It was introduced into England early in the seventeenth century. In the eighteenth century Kirkman, and later Broadwood and Schudi, were the famous makers in London. After the invention of the pianoforte the harpsichord and all instruments of the same kind, such as the spinet, were in time entirely superseded. The harpsichord shown in the accompanying illustration was presented to Nelly Custis by George Washington. It was made in London, is eight feet long, three and a half feet wide, and has two banks of 120 keys. See PIANOFORTE.

HAR'PY (Lat. *harpyia*, from Gk. Ἅρπυια, from ἁρπάζειν, *harpazein*, Lat. *rapere*, Alban. *rjep*, to snatch). In Greek legend, a personification of the swift destructive wind-storm, and hence also a symbol of death. In this character they are found on Lycian graves, monuments, and elsewhere, carrying away the departed. In legend they are the daughters of Thaumas (the personification of the wonders of the sea) and Electra, and sisters of Iris. Commonly only two are mentioned, Ælło (Ἀελλώ) and Okypete (Ὠκυπέτη). In Homer the harpy Podarge is by Zephyrus, the mother of the horses of Achilles. Later writers mention other names, as Celæno, who in Vergil is their leader. The later writers also make them loathsome and filthy, bringing pollution to all that they approach. The harpies appear in the Argonautic legend as sent by the gods to punish the blind Phineus, whose food they carry off. They were pursued by the winged sons of Boreas, Zetes, and Calais, and either killed or, in the usual version, forced to promise to cease harassing Phineus. In the earlier art the harpies are represented as winged human beings. Later they appear regularly with the head, breasts, and arms of a woman, but the claws, wings, and tail of a bird. This is their form on the celebrated Harpy tomb from Xanthus in the British Museum.

HARPY BAT. Two different kinds of bats are called 'harpies.' One is a genus of fruit-bats (Harpyia), of which there are two species in the East Indies, one about four inches long, and the other much larger. The fur of both is pale buff in color, and both have the nostrils prolonged into divergent tubes, so that the genus is frequently called 'tube-nosed.' See Plate of BATS.

Another group of 'harpy' bats is found in the insect-catching vespertilionine genus Harpyiocephalus, which is closely allied to our common North American bats. Though so far removed otherwise, this group agrees with the frugivorous genus (Harpyia) above mentioned, in having tubular nostrils—a remarkable similarity in two so divergent groups. These bats, of several species, inhabit India, the Malayan Archipelago, and Japan, and include one, the white-bellied harpy of the Himalayas, remarkable for its brilliant coloration, the fur being golden orange on the head, varying rust-red on the back and outer surface of the membranes, and white on the chin, throat, and abdomen. All have large ears, and numerous and very strong teeth, and they are believed to catch and crush beetles as well as to seize smaller insects.

HARPY EAGLE. A huge, crested bird of prey (*Thrasaëtus harpyia*), allied to the eagles and found in South and Central America and Mexico, occasionally coming as far north as the Rio Grande Valley. See Eagle, and plate of EAGLES AND HAWKS.

HARQUEBUS, här'kwê-bŭs. See ARQUEBUS.

HAR'RADEN, BEATRICE (1864—). An English novelist, born at Hampstead and educated at Dresden, and in Cheltenham, Queen's, and Bedford Colleges, finally taking her degree, with honors in classics and mathematics, at the University of London (1883). She traveled on the Continent and in 1894-95 visited the United States, spending several months on a ranch in California. She created a sensation in 1893 by her novel *Ships that Pass in the Night*. Among her other novels are: *Things Will Take a Turn* (1891); *In Varying Moods* (1894); *Hilda Strafford* (1897); and *The Fowler* (1899).

HARRAR, HARAR, hä-rär', or **HURRUR.** The most eastern province of Abyssinia, bounded on the north and east by French Somaliland and British Somaliland, and on the southeast and south by Italian Somaliland and British East Africa. It is a plateau, reaching an altitude of about 11,000 feet. Nearly all the foreign commerce of Abyssinia passes through this province. (See ABYSSINIA.) Capital, Harrar (q.v.). Harrar belonged to the Egyptian Sudan before the uprising of the Mahdi. Having been taken by Italy in 1891, it became an Abyssinian province in 1896, after the Italian defeat at Adowa.

HARRAR. The capital of the Province of Harrar in Eastern Abyssinia, south of the port Jibutil, and about 180 miles from the coast (Map: Africa, J 4). It is the second city of the country in importance, is surrounded by walls, and has a palace and several mosques and barracks. It is situated in a fertile district which produces principally coffee. The commerce is growing, and includes coffee, cotton, gum, ivory, and fruit. Harrar is connected by telegraph with Addis Abeba. A railroad from Jibutil to Harrar is nearly completed. Population, in 1900, 40,000, nearly all Harraris and Abyssinians. See HARRAR (province), and ABYSSINIA.

HARRARIS, här-rä'rēz. The people of Harrar, in Abyssinia. They are said to have been Himyaritic Semites in race and were formerly Christians, speaking a dialect of Geez. Now the population is greatly mixed with Gallas and Somali, both of Hamitic stock. They are nearly all monogamists, allowing the women to go unveiled and relieving them of much hard work.

HARRIER. See HOUND.

HARRIER (from *harry*, AS. *hergian*, to ravage, from AS. *here*, Goth. *harjis*, OHG. *heri*, *hari*, Ger. *Heer*, army; connected with OChurch *kara*, Lith. *kāras*, war, OPruss. *karjis*, army, OPers. *kāra*, army, people). The English name for the low-flying, meadow-haunting hawks of the subfamily Circinæ, called 'marsh-hawks' in the United States. See MARSH-HAWK.

HARRIER EAGLE. See EAGLE.

HARRIES, hä'rē-ēs, HEINRICH. The author of the Prussian national hymn, "Heil dir im Siegerkranz" (q.v.).

HARRIGAN, EDWARD (1845—). An American actor and playwright, noted for his representations of types of low life. He was born in New York City, and as a young man had a somewhat desultory career, working as a calker in various cities, till finally, in San Francisco, about 1868 he made his appearance upon the stage. Soon afterwards in Chicago with Anthony Cannon (Tony Hart) he won his first theatrical success, and in New York a little later his truthful and amusing sketches of local character were promptly appreciated. These sketches gradually developed into plays, interspersed with songs which were set to music by David Braham, and have been whistled and sung all over the country. Among the best-known of Mr. Harrigan's pieces have been the *Mulligan* series, *McSorley's Inflation*, *Old Lavender*, *Pete*, *The Major*, *Squatter Sovereignty*, *Reilly and the Four Hundred*, *My Son Dan*, and *Marty Malone*. The partnership of Harrigan & Hart lasted till 1884; after which Mr. Harrigan conducted theatres in New York, and made tours in different parts of the country. One of his favorite rôles revived in recent years is that of George Coggswell in *Old Lavender*. Consult McKay and Wingate, *Famous American Actors of To-day* (New York, 1896).

HARRILD, ROBERT (1780-1853). An English inventor, born in London. After learning the trade of a printer, he began the manufacture of printers' materials in 1809, a venture which subsequently was developed into a large and profitable business. He was noted as an inventor and manufacturer of composition rollers for inking type, a process without which the use of cylindrical or machine presses would have been practically impossible. Whether he was the first or exclusive inventor of that process is doubtful; but he seems to have been the first extensive manufacturer of the rollers, which were substituted for the leather balls by which type had been inked for nearly three centuries. The stupidity and obstinacy of workmen temporarily prevented the use of the invention, which, however, soon became almost universal. Harrild established factories in London, and was widely respected as an enterprising and benevolent citizen. He bought the printing-press with which Benjamin Franklin worked in London. In 1841 the press was brought to the United States, and it is now in the Patent Office at Washington.

HARRIMAN. A city in Roane County, Tenn., 50 miles west of Knoxville; on the Emory River, and on the Queen and Crescent Route, the Southern, the Tennessee Central, and other railroads (Map: Tennessee, G 5). It is the centre of a section rich in coal, iron, timber, and agricultural lands, and has farm-implement works, a cotton-mill, iron-works, a foundry and machine shops, a tannery, a flouring-mill, planing-mills, a metal-bedstead factory, and other industrial establishments. The city, which is a temperance town, is the seat of the American University, founded in 1893, and of an industrial school for negroes. Harriman was founded in 1890, and was granted a special city charter in 1891. The government, as provided by the revised charter of 1899, is vested in a mayor, chosen biennially, and a city council, elected on a general ticket. Harriman owns and operates its water-works and electric-light plant. Population, in 1890, 716; in 1900, 3442.

HARRINGTON, JAMES (1611-77). An English political writer, born at Upton, Northamptonshire. He entered Trinity College, Oxford (1629), but left without a degree, and traveled on the Continent. Although a Republican, he was attached to King Charles I., whom, it is said, he accompanied to the scaffold. Resuming his earlier studies, he published in 1656 his famous political romance, *The Commonwealth of Oceana* (i.e. England). Harrington's main principle is that power rests upon property, especially landed property. He further argues that rulers should be elected by ballot for terms of three years. The work led to a lively controversy, in which Harrington took an active part. After the Restoration he was committed to the Tower on the charge of conspiracy. Weakened in mind by his imprisonment, he died insane, September 11, 1677. Consult *Oceana*, in Morley's Universal Library (London, 1887), and Dwight, in the *Political Science Quarterly* for 1887.

HARRINGTON, Mark Walrod (1848—). An American astronomer and educator. He was born at Sycamore, Ill., was educated at Evanston, Ill., graduated at the University of Michigan in 1868, and was a member of the faculty there from 1868 to 1876, with an interval in 1870-71, when, as a member of the United States Coast and Geodetic Survey, he visited Alaska. He studied at the University of Leipzig in 1876-77, and in the latter year proceeded to China as professor of astronomy in the Cadet School of the Tsung-li-Yamen or Foreign Office in Peking. Ill health caused his return to the United States in 1878, and for a year he was professor in the Louisiana State University. In 1879 he was appointed professor of astronomy and director of the observatory at his *alma mater*, a position he held until 1891, when he became director of the United States Weather Bureau at Washington. He resigned in 1895 to become president of Washington State University. In 1897 he retired to private life. He is the author of numerous scientific articles, pamphlets, and works, and until 1892 was editor of the *American Meteorological Journal*, which he founded in 1884.

HARRIOT, or **HARIOT,** Thomas (1560-1621). An English astronomer and mathematician, born at Oxford. He acted for some time as tutor to Sir Walter Ralegh, who, in 1585, appointed him surveyor to the Grenville's expedition to Virginia. Harriot published an account of this expedition in 1588, and the work was afterwards reprinted in Hakluyt's *Voyages*. On his return to England, after an absence of two years, he resumed his mathematical studies with zeal and success, but ill health prevented him from publishing his mathematical discoveries. He had an undoubted genius for algebra, as is shown by his posthumous work, *Artis Analyticæ Praxis ad Æquationes Algebraicas Noua, Expeditâ et Generali Methodo Resolvendas* (1631). In this treatise Harriot did for algebra in England what his friend Vieta, to whom he gives generous praise, had done in France—he put it on its modern basis. In the matter of symbolism he added the signs $>$ and $<$ to those which were just coming to be recognized as part of the universal language of algebra. He asserted the advantage, now fully recognized, of making the second member of an equation zero, although he did this only for particular cases, and he gave in substance the general theorem (often called by D'Alembert's name) that an equation of the nth degree has exactly n roots. Consult *Harriot Papers*, edited by Rigaud (Oxford, 1831). For his life, consult Stevens, *Thomas Hariot, the Mathematician, the Philosopher, and the Scholar* (London, 1900).

HARRIOTT, Mrs. F. C. See Morris, Clara.

HARRIS, Sir Augustus Henry Glossop (1852-96). A noted English theatrical manager, lessee of Drury Lane, Covent Garden (the Opera), and other theatres. He was the son of Augustus Glossop Harris, who was also a well-known manager, and was born in Paris. In 1873 he made his début as an actor at Manchester, and not long afterwards became stage manager at Covent Garden. He leased Drury Lane in 1879. Besides his subsequent productions, especially of melodrama and opera, both there and at Covent Garden, which he took in 1888, he became joint author of a number of plays, most frequently in collaboration with Henry Pettitt; among them were *Pluck* (1882); *A Run of Luck* (1886); *A Million of Money* (1890); and *The Prodigal Daughter* (1892). He was a member of the London County Council, and was sheriff in 1891, when he was knighted. His death, which was ascribed to overwork, occurred at Folkestone.

HARRIS, Chapin A. (1806-60). An American dentist, born at Pompey, N. Y. In 1839 he procured the charter for the Baltimore Dental College, the first separate school of dentistry ever founded, and established the *American Journal of Dental Science*, which he edited for twenty years. Harris wrote: *Principles and Practice of Dental Surgery* (1839); *Diseases of the Maxillary Sinus* (1842); and a *Dictionary of Dental Science* (1849).

HARRIS, Lord George (1746-1829). An English soldier famous in India. Born at Brasted, Kent, he was educated at Westminster School and the Woolwich Military Academy. By 1765 he was lieutenant in an artillery regiment, and in 1774 went as a captain to America, where he fought at Lexington, Bunker Hill, and in many other battles of the Revolutionary War up to 1778, when he went to the West Indies. He had suffered from serious wounds, capture by the French, and shipwreck before he entered on the second stage of his career, which was in India (1790-1800). There he distinguished himself in the campaigns against Tipu Sahib, commanded Fort William as major-general, and was both civil and military Governor of Madras. For his victory at Seringapatam, ending in the conquest of Mysore, Harris was promoted to be lieutenant-general (1801). He was made general (1812), and a peer of the realm (1815), under the title Baron Harris of Seringapatam and Mysore. In 1824 he was made governor of Dumbarton Castle on the Clyde.

HARRIS, George Washington (1814-69). An American humorist, born at Allegheny City, Pa. He was a jeweler's apprentice and afterwards captain of a Tennessee River steamboat, then a political writer for newspapers, and finally the creator of "Sut Lovengood," whose papers, written for Nashville journals (1858-61), appeared as *Sut Lovengood's Yarns* (1867)—one of the raciest of Southwestern books of humor, ranking with J. J. Hooper's *Simon Suggs* (q.v.).

HARRIS, Howel (1714-73). The principal founder of Welsh Calvinistic Methodism. He was born at Trevecca in Wales; was brought up in the Established Church, and matriculated at Oxford in 1735. He was endowed with high oratorical powers, and his energy and enthusiasm carried his audiences by storm. He founded no fewer than 300 societies, and formed a sort of Protestant monastery, in which there lived about 120 persons. Both Wesley and Whitefield were his friends and preaching companions. He raised a regiment at the time when a French invasion of England was confidently expected, and moved about with his men, preaching in every encampment. His *Autobiography* was published in 1791. He also wrote *The Last Message and Testimony of Howel Harris, Esq., late of Trevecca in Wales, Found Among Some of His Papers* (1774), and other works in Welsh.

HARRIS, Isham Green (1818-97). An American politician, born near Tullahoma, Tenn.

After a very limited common-school education, he engaged in business, studied law at night, and was admitted to the bar in 1841. He served in the State Legislature in 1847, was a Democratic member of the House of Representatives from 1849 to 1853, was elected Governor of Tennessee in 1857, and was reëlected in 1859 and 1861. At a special meeting of the State Legislature, called in January, 1861, to consider the condition of the country, he recommended that the question of calling a convention to take action for or against the secession of Tennessee be submitted to a popular vote, and asserted that in his view the existing evils could best be remedied by the adoption of amendments to the Federal Constitution favorable to slavery; and after the people decided on February 9th both in favor of the Union and against the calling of a convention, the secession majority in the Legislature on May 1st authorized him to enter into a military league with the Confederate States, to raise troops for State defense, and to issue State bonds. On May 7th the League, which had previously been negotiated, was formally ratified by the Legislature. At the election held in June a large majority of the people voted in favor of secession and the representation of the State in the Confederate Congress, eastern Tennessee, however, remaining steadfastly loyal. In connection with the election charges of corruption and fraud were brought by the loyalist minority against the Governor and his friends. The Federal generals Grant and Buell soon gained virtual control of the State, Buell occupying Nashville with a considerable force, and in March, 1862, Harris fled to Mississippi. Soon afterwards he joined the Confederate Army, and served as aide successively to Gen. A. S. Johnston, who died in his arms at the battle of Shiloh, and to other Confederate generals in command of the Army of the West. On March 3, 1862, President Lincoln appointed Andrew Johnson Military Governor of Tennessee, and Harris played no further part of any consequence in State affairs during the progress of the war. After the war he lived first in Mexico and then in England, but returned to Memphis in 1867, speedily regained his control of State politics, and was elected to the United States Senate in 1876, 1882, 1888, and 1894, where he was distinguished for his great powers as a debater. He served on important committees, acted as chairman of the Committee on the District of Columbia, and in 1893 was elected President *pro tem.*

HARRIS, James (1709-80). An English philologist and classical scholar, born at Salisbury. He was educated at Wadham College, Oxford, and studied law at Lincoln's Inn, although he never intended to practice that profession. From his father, who died in 1734, he received an inheritance sufficient to enable him to devote himself henceforth to study. Harris's interests were mainly in the classics and especially in Aristotle's philosophy. He also took an active part in political life, serving first as a magistrate for his county, and then from 1761 until his death being the member for Christchurch in the House of Commons. In 1763 he was appointed a lord of the admiralty, and after three months a lord of the treasury. Eleven years later he became secretary and comptroller to the Queen. The works of Harris, which are now of historical interest merely, are a collection of three treatises, one on art, a second on music, painting, and poetry, and a third on happiness (5th ed. 1794); *Philosophical Arrangements* (1775), dealing with the Aristotelian philosophy; *Philological Inquiries* (1781), on style and literary criticism, and the book for which he is chiefly remembered, *Hermes, or a Philosophical Inquiry Concerning Universal Grammar* (1751), an attempt to force language into the forms of logic. He has also been supposed to be the author of *Spring, a Pastoral*, which was produced at Drury Lane in 1762. In 1801 his son, James Harris, first Lord Malmesbury, published a collection of his father's works in two volumes, with a biographical sketch.

HARRIS, James. An English diplomat. See Malmesbury, James Harris, first Earl of.

HARRIS, James Rendel. An English philologist, paleographer, and biblical scholar. He studied at Clare College, Cambridge, and was its fellow and librarian. He held professorships at Johns Hopkins University and Haverford College, and later became university lecturer in paleography at Cambridge University. Among his writings are: *The Teaching of the Apostles and the Sibylline Books* (1885); *The Teachings of the Apostles* (1887); *The Rest of the Words of Baruch* (1889); *The Diatesseron* (1890); *The Acts of Perpetua* (1890); *The Apology of Aristides* (1891); *Codex Sangallensis* (1891); *Popular Account of the Newly Recovered Gospel of Saint Peter* (1892); *Fragments of Ephrem Syrus* (1895); *Hermas in Arcadia* (1896); *Letters from Armenia* (1897); *Homeric Centones* (1898); *The Gospel of the Twelve Apostles* and *The Annotators of the Codex Bezae* (1901).

HARRIS, Joel Chandler (1848—). An American writer of fiction, and journalist, born at Eatonton, Ga. His first occupation was that of a printer's apprentice. He studied law, and practiced at Forsyth, Ga., but also did editorial work, and in 1876 joined the staff of the Atlanta *Constitution*, of which he became editor in 1890. It was to this paper that he contributed the very successful studies of Afro-American folk-lore, collected in 1880 as *Uncle Remus, His Songs and His Sayings*, a volume which has become a classic of its kind, since it appeals alike to scientific students of popular tradition and to the general public, old and young. He continued to work the vein so happily discovered, in *Uncle Remus: His Songs and His Sayings* (1880); *Nights with Uncle Remus* (1884); *Mingo and Other Sketches* (1884); *Free Joe and Other Georgian Sketches* (1888); *Daddy Jake the Runaway and Short Stories* (1889); *Balaam and His Master* (1891); *Tales of the Homefolks in Peace and War* (1898), weaving into fiction frequent touches of folk-lore, as do the juveniles *Little Mister Thimblefinger* (1894), *Aaron in the Wildwoods* (1897), and several other volumes. Mr. Harris also made a memoir of Henry W. Grady (1890), and contributed to the history of his State a volume on *Georgia from the Invasion of De Soto to Recent Times* (1899). No one has more successfully portrayed the humorous side of negro character and imagination, but it would be an injustice to him to think that he has not also given an admirable picture of Georgia life in general, especially of the thrifty as well as the thriftless rural inhabitants.

HARRIS, Joseph (?-?). An English actor. His first recorded appearance was as Alphonso in

The Siege of Rhodes (1681), written by Sir William Davenant, to whose company he belonged. He also played Shakespearean rôles in the same cast as Betterton, was said to be nearly as clever in the creation of character and quite as versatile, his range extending from Romeo to Sir Frederick Frolic in *Love in a Tub*. He is mentioned in Pepys's *Diary* as a very airy gentleman, and it is also on record that he maimed a brother actor for life by fencing without a button on his foil.

HARRIS, JOSEPH (1828-92). An agricultural writer. He was born at Shawbury, England. A descendant of generations of farmers, he early evinced an interest in rural affairs. This led him into the study of agricultural chemistry, which he pursued with Lawes and Gilbert at Rothamsted, and which formed the basis of many of his writings. At the age of twenty-one he came to America and in 1864 began writing for the agricultural press. He continued for twelve years, and after a lapse of eight more years he wrote a series of articles, 171 in all, entitled "Walks and Talks on the Farm," the first of which appeared in the *Genesee Farmer*, of which he was editor, and the remainder in the *American Agriculturist*, to which the *Genesee Farmer* had been sold. Perhaps none of his other writings exercised so wide an influence in paving the way for improved farming and earned for him so high a place in American agriculture. They are actual talks with a neighbor, and not, as many suppose, with an imaginary person. Among his other writings may be mentioned his books: *Harris on the Pig* (New York, 1888); *Talks on Manures* (New York, 1883); and *Gardening for Young and Old* (New York, 1882). The last book, his final volume, is intended mainly to foster a love of plants and gardening in the hearts of a rising generation.

HARRIS, MRS. A mythical personage, frequently mentioned in Dickens's *Martin Chuzzlewit*, by Sairey Gamp (q.v.), who uses her as an authority to give her own opinions additional force.

HARRIS, ROBERT (1849—). A Canadian figure and portrait painter, born in Carnarvonshire, Wales. He began his artistic career by illustrating, and then went to Europe (1877), and studied in London at the Slade School, and in Paris under Bonnat, and exhibited at the Salon and Academy. Afterwards he settled in Montreal, and became a popular portrait painter. His works include "Fathers of the Confederation" (1883) and "Meeting of the School Trustees," the first painted for and the second purchased by the Canadian Government. In 1893 he was elected president of the Royal Canadian Academy of Arts.

HARRIS, SAMUEL (1814-99). An American Congregational theologian, born in East Machias, Maine. He graduated at Bowdoin College in 1836, and at Andover Theological Seminary three years later. He taught, and occupied Congregational pulpits until 1855, when he was chosen professor of systematic theology in the Bangor Seminary. He was president of Bowdoin from 1867 to 1871, and then became professor of systematic theology in the Yale Divinity School. Among his publications the most important are: *The Philosophical Basis of Theism* (1883); *The Self-Revelation of God* (1887); and *God, Creator and Lord of All* (1897).

HARRIS, THADDEUS WILLIAM (1795-1856). An American entomologist, born at Dorchester, Mass. He graduated at Harvard in 1815, and became a practicing physician, but devoted a great part of his time to the study of natural history. In 1831 he became librarian of Harvard. He was a member of the State Commission appointed in 1837 to make a botanical and zoölogical survey of Massachusetts, and devoted himself particularly to the preparation of a *Systematic Catalogue of the Insects of Massachusetts*. He founded the Harvard Students' Natural History Society and the Massachusetts Horticultural Society, and published a valuable report on *Insects Injurious to Vegetation* (1841; new ed. 1852).

HARRIS, THOMAS LAKE (1823—). An American spiritualist, born at Fenny Stratford, England. In 1827 his parents settled in Utica, N. Y. His father failed in business, and the son began to write for the press at an early age. He became a Universalist preacher at Minden, N. Y., in 1844. Soon afterwards he organized a 'Christian Society' in New York; and then embraced spiritualism, and joined a community at Mountain Cove, Va. From the common spiritualistic doctrine he soon broke away, and in 1861 organized a community, which was settled successively at Amenia and Brocton, N. Y., and then at Santa Rosa, Cal. Harris wrote: *Truth and Light in Jesus* (1860); *The Millennial Age* (1861); and an historical sketch, *The Trent Affair* (1896). On his *Brotherhood of the New Life*, consult Allen, *T. L. Harris, the Seer* (London, 1897).

HARRIS, TOWNSEND (1804-78). The first representative of the United States in Japan. He was born at Sandy Hill, N. Y. Educated at home, he moved at the age of fourteen to New York City, and entered upon a business life as a leather-merchant. He was strict and diligent in self-culture, and much interested in popular education. While serving two terms as president of the Board of Education, he succeeded in spite of much opposition in getting established the New York Free Academy, now the College of the City of New York. In 1848 he projected and entered upon a trading and exploring voyage on the Pacific, and during the five years spent in it he gained much information in regard to Orientals and their ways. He served as consul at Ningpo in 1854, and in 1855, on the nomination of William H. Seward and Commodore Perry, he was appointed by President Pierce to be the first Consul-General to Japan, in accordance with the provisions of the treaty which Commodore Perry had made with the Shōgun's Government in 1854. On his way out he negotiated a treaty with Siam. On September 4, 1856, he raised at Shimoda the United States consular flag—the first foreign flag to float over any part of Japan. Refusing to deliver the letter of the President of the United States to the Shōgun, except in personal audience, he succeeded, after eighteen months' parleying, and entering Yedo November 30, 1857, he had audience with the Shōgun in his palace on December 7th. The next four months were spent in treaty negotiations, and after much opposition and many delays, he secured the signature of Premier Ii to a treaty which became the model for twenty subsequent

treaties between Japan and other nations. On July 7th he was made Minister Resident, and at once established his legation at Yedo. Resigning office October 21, 1861, he returned to New York and was active in many societies until his death there.

Consult: Griffis, *The First American Envoy to Japan* (Boston, 1895); and Satoh, *Agitated Japan* (London, 1896).

HARRIS, Sir William Snow (1791-1867). An English electrician, born at Plymouth and educated at Edinburgh. He practiced medicine for a few years, but after his marriage (1824) devoted himself to electricity. His system of lightning conductors for ships, patented in 1820, was introduced in the British Navy after more than twenty years' consideration. He was knighted in 1847, and in 1860 was made Government referee on electrical cases. Besides many publications on his method of fixed conductors, Harris wrote the excellent handbooks: *Electricity* (1848), *Magnetism* (1850-52), and *Galvanism* (1856); and a *Treatise on Frictional Electricity*, edited, with a biographical memoir, by Tomlinson (1867).

HARRIS, William Torrey (1835—). An American educator and philosophical writer, born at Killingly, Conn., and educated at Phillips Andover Academy and at Yale College. In 1857 he began teaching in the Saint Louis public schools, of which he was superintendent from 1867 to 1888. In 1867 he established and became editor of the *Journal of Speculative Philosophy*, the first periodical of its kind in the English language. He was received with distinction at the Paris Exposition of 1878, represented the United States Bureau of Education at the Brussels Educational Conference, and at the Paris Exposition of 1889, where he received from the French Government the honorary title 'Officier de l'Instruction Publique,' and in the same year was appointed United States Commissioner of Education. As commissioner he rendered eminent service in formulating a statement of American educational theories and in giving practical definition to pedagogic principles. He was the founder of the Saint Louis Philosophical Society, and in 1875 was president of the National Educational Association. He was a prominent member of the Concord School of Philosophy, and his writings stamp him as one of the clearest expositors in America of German philosophical thought. He received the degree of LL.D. from Yale (1895); the University of the State of Missouri (1870); the University of Pennsylvania (1894); Princeton (1896); and the University of Jena, Germany (1899). Besides voluminous reports on educational matters, many papers contributed to the *Proceedings of the American Social Science Association*, and various compilations edited by him, his publications include: *Introduction to the Study of Philosophy* (1889); *The Spiritual Sense of Dante's Divina Commedia* (1889); *Hegel's Logic: A Critical Exposition* (1890); and *Psychologic Foundations of Education* (1898).

HARRIS, William Victor (1869—). An American song composer, born in New York. He was a pupil of Charles Blumm, William Courtney, F. K. Schilling, and Anton Seidl. He was a successful organist, and from 1889 to 1895 held important appointments in Tuxedo Park, Brooklyn, and New York. He was for three years a teacher and coach at the Metropolitan Opera, New York; for one season was conductor of the Utica Choral Union, and served as assistant conductor under Seidl at the Brighton Beach summer concerts (1895-96). He afterwards took up his residence in New York, and established himself as a vocal instructor and composer. He published compositions for piano, organ, and chorus, but is principally known for his songs, which have been remarkably successful.

HARRIS BUCK. The sable antelope (q.v.), so called because discovered by Sir W. C. Harris, author of *Portraits of the Game and Wild Animals of Southern Africa*, issued in London in 1840 as a magnificent folio book, with colored plates.

HARRISBURG. A city and the county-seat of Saline County, Ill., 70 miles northeast of Cairo; on the Cleveland, Cincinnati, Chicago and Saint Louis Railroad (Map: Illinois, D 6). It is surrounded by an agricultural district in which are valuable mineral deposits, especially coal, and has flour and saw mills, brick-works, carriage and wagon shops, etc. Population, in 1890, 1723; in 1900, 2202.

HARRISBURG. A city, the capital of Pennsylvania, and the county-seat of Dauphin County, 105 miles west by north of Philadelphia; on the Susquehanna River, the Pennsylvania Canal, and the Pennsylvania, the Philadelphia and Reading, the Cumberland Valley, and the Northern Central railroads (Map: Pennsylvania, E 3). The river, a mile wide at this point, is spanned by five bridges, including three iron and steel railroad bridges and the historic 'Old Camel-Back Bridge,' a wooden structure, one-half of which was burned about forty years ago. The city has a most picturesque location, and there are a number of notable structures. The State buildings are in a beautiful park of 16 acres, the Capitol occupying a conspicuous site. The new Capitol building, the former having been destroyed by fire in 1897, is being built on a more substantial and imposing scale. The structure is of brick and steel, and will be veneered with marble or granite, and the interior finished in marble, the estimated cost being not less than $5,000,000. The State library, founded in 1790, contains over 100,000 volumes. In Capitol Park is a monument to the soldiers who fell in the Mexican War, and also, on the west side of the Capitol, a statue of Gen. John F. Hartranft. The Dauphin County Soldiers' Monument, a shaft 110 feet high in honor of the soldiers of the county who died in the Civil War, stands in State Street. Other prominent buildings besides the Capitol are the court-house, Governor's residence, State arsenal, State Insane Hospital, county prison, Grand Opera House, high school, public library, Conservatory of Music, City Hospital, Home for the Friendless, and the Children's Industrial Home. Harrisburg is the seat of a Roman Catholic bishop.

Owing to its excellent transportation facilities, both by rail and by water, Harrisburg occupies a position of considerable importance in the industrial and commercial world. It has a large trade in lumber; extensive iron and coal mines are in the vicinity; and its iron and steel interests are worthy of particular mention. There are roundhouses and repair-shops of the Penn-

sylvania Railroad; also foundries and machine-shops, tin-mills, rolling-mills, nail-works, furnaces, typewriter-works, boot and shoe factories, breweries, pipe-bending works, and extensive manufactures of beds and mattresses, women's hats, coffins, clothing, silk goods, carriages and wagons, flour, brooms, brick and tile, galvanized iron cornices, marbleized slate, and various lumber products.

The government is vested in a mayor, who holds office for three years, and is ineligible for reëlection, a bicameral council, and administrative officials, who are chosen as follows: by the executive with the consent of the select council—highway commissioner, building inspector, police department, including the chief, fire department, including the chief and assistant, and sanitary officers; by the council—solicitor, board of tax revision and appeals, three water commissioners, city engineer, city clerk, sanitary committee, three members of the board of public works, and five members of the board of park commissioners; by popular election—treasurer, controller, school directors, supervisors, and assessors (ward and city). The municipal income and expenditures amount to about $600,000 and $530,000, respectively, the principal items of expense being $15,000 for the fire department, $30,000 for operation of the water-works, $30,000 for street lighting, $35,000 for the police department, and $185,000 for schools. Public improvements have been begun (1902) involving an expenditure of $1,090,000 for the construction of a new sewer system, for filtration of water, development of parks, and street paving. Population, in 1850, 7834; in 1870, 23,104; in 1880, 30,762; in 1890, 39,385; in 1900, 50,167. Of the total population for 1900, 2500 were foreign born, and 4100 were of negro descent.

In 1726 John Harris, an English trader, settled here, and seven years later secured grants of 800 acres in this vicinity. In 1753 his son established a ferry, and the place was long known as Harris's Ferry. In 1785 a town was laid out and named Harrisburg, but in the following year it was renamed Louisburg, in honor of Louis XVI. In 1791 it was incorporated as Harrisburg; in 1812 it became the capital of the State, and in 1860 it was chartered as a city. The assembling here of the Harrisburg Convention in 1828, which was attended by representatives of the radical protectionists of New England and the Middle States, led to the passage of the high protective-tariff bill of that year. In 1839 Harrison and Tyler were nominated at Harrisburg. Consult Egle, *Centenary Memorial of the Erection of the County of Dauphin and the Founding of Harrisburg* (Harrisburg, 1886).

HARRISON. A town and the county-seat of Boone County, Ark., 45 miles southeast of Eureka Springs; on the Saint Louis and North Arkansas Railroad (Map: Arkansas, B 1). It has a collegiate and normal institute for women, and a Government building ($75,000) in process of construction (1902). The town is in a fertile district adapted to fruit-growing, and interested in lead and zinc mining. There are several flour-mills and other industrial establishments. Population, in 1890, 1438; in 1900, 1551.

HARRISON. A city in Hudson County, N. J., on the Passaic River, and on the Pennsylvania, the Lackawanna, and the Erie railroads (Map: New Jersey, D 2). It is a suburb of Newark, with which it is connected by three steel bridges, and is the seat of the State Soldiers' Home. The city has extensive manufacturing interests, which include a large steel plant, tube-works, marine-engine works, wire-cloth factories, electric works, machine-shops, trunk and refrigerator factories, a tannery, breweries, ink-works, etc. Settled as early as 1668, Harrison was incorporated in 1873, the charter of that date being still in operation and providing for a government vested in a common council, which is elected by wards. The city owns and operates its water-works. Population, in 1890, 8338; in 1900, 10,596.

HARRISON, Benjamin (c.1740-91). An American Revolutionary patriot, one of the signers of the Declaration of Independence, born at Berkeley, Va. As a member of the Virginia House of Burgesses, in 1765, he opposed the Stamp Act Resolutions of Patrick Henry, which he considered to be impolitic and premature. From 1774 to 1777 he was one of Virginia's representatives in the Continental Congress, and was a member of many important committees, though he rendered the greatest service as president of the Board of War. From 1777 to 1782 he was Speaker of the House of Burgesses, and from 1782 to 1785—for two terms—was Governor of the State. In 1788 he was a member of the Virginia convention which ratified the Federal Constitution, though he, along with Patrick Henry and other men of prominence, opposed it—largely because of the absence of a bill of rights. He was the father of William Henry Harrison (q.v.). Consult Sanderson, *Biography of the Signers of the Declaration of Independence*, ed. by Brotherhead (Philadelphia, 1865).

HARRISON, Benjamin (1833-1901). The twenty-third President of the United States, born at North Bend, Ohio, August 20, 1833. His father, John Scott Harrison (1804-78), a son of President William Henry Harrison, represented the Whigs in Congress from 1853 to 1857. Benjamin passed his early years on his father's farm, studied two years at Farmers College, at College Hill, near Cincinnati; graduated at Miami University in 1852 as fourth in his class, and after studying law in Cincinnati, married the daughter of Rev. J. W. Scott, and settled in Indianapolis in 1854. In 1860 he was elected reporter of the Supreme Court of Indiana, and in a political debate with Thomas A. Hendricks soon afterwards acquired reputation as a speaker. He entered the Federal Army as second lieutenant in July, 1862, assisted in organizing the Seventieth Indiana Regiment, was promoted in August, 1862, to be colonel, served in Kentucky and Tennessee, led a charge at Resaca, Ga., May 15, 1864, in which one-third of his command was killed or disabled; commanded his brigade with signal bravery at Kenesaw Mountain, June 29, to July 3, 1864, and at Peachtree Creek, July 20th; took part in the operations around Nashville, and on January 23, 1865, was brevetted brigadier-general of volunteers "for ability and manifest energy and gallantry in command of brigade." Returning to civil life, he resumed his occupation of reporter of the Supreme Court, but in 1868 declined reëlection. In 1876 he was the Republican candidate for Governor of Indiana, but was defeated, though running 2000 votes ahead of his ticket. In 1878

he was appointed a member of the Mississippi River Commission. In 1880 he was elected United States Senator, taking his seat March 4, 1881, and during his term of office opposed alien ownership of large tracts of land and the Blair Educational Bill; favored civil-service reform; and was one of a committee to perfect and report a bill restricting Chinese immigration. In 1888, at the Republican Convention in Chicago, he was nominated for the Presidency, receiving 84 votes on the first ballot, 217 on the fourth, and 544 on the eighth. In the ensuing election he received 233 electoral votes to Cleveland's 168, Levi P. Morton, of New York, being elected Vice-President. His administration was marked by no especially conspicuous features; but during it the Pan-American Congress, the initiation of the policy of commercial reciprocity (q.v.), and the attempt to annex Hawaii to the United States attracted much attention. The industrial situation was altered by the McKinley Tariff (q.v.) of October 1, 1890; the public debt was reduced, and a stable national currency maintained; civil-service reform was extended; the Louisiana Lottery was abolished; the condition of both the army and the navy was improved; and many highly creditable appointments to office were made, especially in the Federal judiciary. In the summer of 1892 Harrison's Secretary of State, Mr. Blaine (q.v.), resigned and became an avowed candidate for the Presidential nomination; but Harrison was again nominated, only to be defeated in the election by his predecessor, Grover Cleveland (q.v.), receiving 145 electoral votes. After leaving office he accepted a professorship of international law at the Leland Stanford University, California. During the remaining years of his life he devoted himself to the practice of law, being retained in several cases of national importance, and in 1899 appearing as counsel for Venezuela before the commission appointed to arbitrate the boundary dispute with England. He was the principal representative of the United States at The Hague Conference (1899). His death occurred after a brief illness, at Indianapolis, March 13, 1901. He wrote numerous magazine articles, made a number of able speeches on public occasions, and published *This Country of Ours* (1897), in which he gave an interesting description of the practical workings of the National Government. Another book, *Views of an Ex-President*, was published posthumously in 1901. Consult: Wilson (editor), *The Presidents of the United States* (New York, 1894); and the campaign biography by Lew Wallace, *Life of General Benjamin Harrison* (Philadelphia, 1888). For an account of Harrison's Administration, see the article UNITED STATES.

HARRISON, CARTER HENRY (1825-93). An American politician. He was born near Lexington, Ky., and, like William Henry and Benjamin Harrison, was a descendant of the Virginia Harrisons. He graduated at Yale in 1845, studied law at Transylvania University at Lexington, and after two years' travel and desultory study in Europe, returned to Kentucky to practice his profession. He soon began to take an active interest in politics, and became an opponent of disunion and the extension of slavery. In 1855 he removed to Chicago, where faith in the future of the city led him to make profitable investments in real estate. In 1871 he was elected County Commissioner of Cook County, and from 1874 to 1878 was a Democratic member of Congress. In 1879 he was chosen Mayor of Chicago, and was reëlected for biennial terms in 1881, 1883, and 1885. In 1884 he was the Democratic candidate for Governor of Illinois, but was defeated by Governor Oglesby by 14,500 votes. In 1891 he was an independent candidate for Mayor, and drew so largely from the vote of the Democratic candidate that the Republican was elected. The year 1893 was the year of the World's Fair at Chicago, and it was deemed by the business community as well as by the reformers and promoters of the great enterprise particularly necessary to have an able, high-minded administrator in the Mayor's office. These elements joined with the Republicans, and secured the nomination of Samuel W. Allerton, a man of acknowledged fitness. Harrison, however, after a long and bitter contest, in which there were frequent charges of fraud and intimidation, secured the Democratic nomination, and in April was triumphantly elected. He was assassinated on October 29th following, one of the closing days of the great Exposition. Although a political demagogue, Harrison differed from the modern political boss in that he relied on his personal popularity rather than machine organizations to win his victories, and despite the fact that his methods of obtaining and maintaining power were somewhat open to question, it was never charged that he himself derived pecuniary gain from his office.

His son, CARTER HENRY (1860—), was born in Chicago. He was educated at Altenburg, Germany, and at the Law School of Yale, where he graduated in 1883. He was elected Mayor of Chicago in 1897, and again in 1899.

HARRISON, CONSTANCE CARY (1846—). An American novelist, born at Vaucluse, Va. In 1867 she married Burton Harrison, a Virginia lawyer and private secretary to Jefferson Davis, and with him removed later to New York City, where she wrote many books and contributed to periodicals. Among her more noteworthy volumes of fiction are: *Golden Rod* (1880); *Helen Troy* (1881); *Bar Harbor Days* (1887); *The Anglomaniacs* (1887); *Sweet Bells Out of Tune* (1893); *A Daughter of the South* (1892); *An Errant Wooing* (1895); *A Merry Maid of Arcady and Other Stories* (1897); *A Son of the Old Dominion* (1897); *Good Americans* (1898). For children she wrote: *Old-Fashioned Fairy Book* (1884); and *Folk and Fairy Tales* (1885). Worthy of mention also is *Externals of Modern New York* (1896). Her dramatic work consists chiefly of adaptations from the French.

HARRISON, FREDERIC (1831—). An able English essayist, born in London. He was educated at King's College School, London, and at Wadham College, Oxford. He became fellow and tutor at Wadham, and was called to the bar in 1858. After practicing in the courts of equity, he was appointed a member of the royal commission upon trades unions (1867-69), secretary of the royal commission for digesting the law (1869-70), and professor of jurisprudence and international law at Lincoln's Inn Hall (1877-89). In 1889-92 he was alderman in the London County Council. In politics he supported the Liberal Party. As a philosopher he is one of the

most brilliant followers of Comte, whose ideas, much modified, he has widely diffused in essays and reviews. Among his works are: *Meaning of History* (1862; enlarged, 1894); *Order and Progress* (1875); *The Choice of Books* (1886); *Oliver Cromwell* (1888); *Annals of an Old Manor House* (1893; new ed. 1899); *Victorian Literature* (1895); *William the Silent* (1897); *The Millenary of King Alfred* (1897); *Tennyson, Ruskin, Mill, and Other Literary Estimates* (1900); *John Ruskin*, in English Men of Letters series (1902); and *Washington* (1902).

HARRISON, GABRIEL (1825-1902). An American author and artist, born in Philadelphia, Pa. For several years he was an actor, and at one time supported Charles Kean. Afterwards he became the manager of several theatres, and produced, among other plays, a dramatization of Hawthorne's *Scarlet Letter* (1878). He is also the author of a *Life of John Howard Payne* (1873), and a number of critical articles, notably *Edwin Forrest, the Actor and the Man, Critical and Reminiscent* (1889). He did much for the encouragement of the free art schools in connection with the Brooklyn Academy of Design, and was also a portrait and landscape painter.

HARRISON, JAMES ALBERT (1848—). An American philologist, born at Pass Christian, Miss., and educated at the University of Virginia. In 1871 he was appointed professor of Latin and modern languages in Randolph Macon College, and in 1876 was chosen professor of English in Washington and Lee University. He left this chair in 1895 to become professor of English and Romance languages at the University of Virginia. He was an editor of the *Century* and the *Standard Dictionaries;* and edited (with W. M. Baskerville) *Dictionary of Anglo-Saxon Poetry* (1883); *Library of Anglo-Saxon Poetry* (1883); *Beowulf* (1883); Mme. de Sévigné's *Letters* (1898); and Corneille's *Nicomède* (1901). Among his other works are: contributions to *Anglia* on "Negro English;" *Group of Poets and Their Haunts* (1874); *Greek Vignettes* (1877); *Spain in Profile* (1879); *Story of Greece* (1885).

HARRISON, JANE E. (1850—). An English archæologist and Hellenist, born in Yorkshire. She studied at Newnham (Cambridge) and at the British Museum, visiting also the museums of Berlin, Munich, Rome, and Athens. Since 1882 she has lectured at the British Museum, South Kensington Museum, Cambridge, and Oxford. She has received the honorary degrees of Litt.D. (Durham) and LL.D (Aberdeen). She has written: *Myths of the Odyssey* (1882); *Introductory Studies in Greek Art* (1885); *Mythology and Monuments of Ancient Athens*, with Mrs. A. W. Verrall (1890); *Greek Vase-Painting*, with D. S. MacColl (1894).

HARRISON, JOHN (1693-1776). An English inventor, who became celebrated as 'Longitude Harrison.' He was born at Foulby in Yorkshire, where his father was the village carpenter and clock-repairer. After the most meagre education, he learned carpentering from his father, and with a natural inclination for mechanics that amounted to genius, in the intervals of his work studied the construction of clocks and watches, with a view to their improvement. His experiments resulted in the invention of the 'gridiron pendulum' for clocks, which, by an arrangement of compensating steel and brass rods, allows for the expansion caused by variations of temperature; a 'recoil escapement' to prevent the constant oiling and clogging of the pallets; and the 'going ratchet' universally used to prevent a timepiece losing while being rewound. When the British Government offered successively £10,000, £15,000, and £20,000 for the discovery of a method for determining the longitude at sea within sixty, forty, and thirty geographical miles, he made four chronometers, now in the Greenwich Royal Observatory, each with a 'compensation curb' to the balance wheel. All qualified for the first prize, the fourth, on a voyage to Barbadoes and return, determining the longitude within ten miles. After much vexatious delay and petitions to Parliament, the prize was paid to him in installments, it being stipulated that he should publish particulars of his invention *pro bono publico*. He wrote *A Description Concerning such Mechanism as Will Afford a Nice or True Mensuration of Time* (1767), and other pamphlets in connection with his discoveries. In 1897 his tomb in Hampstead Church was restored by the London Company of Clockmakers. Consult Smiles, *Men of Invention and Industry* (London, 1884).

HARRISON, JOSEPH, Jr. (1810-74). An American engineer, born in Philadelphia. He was conspicuously successful as a locomotive-engine builder in the early days of that industry, and in 1840 his 'Gowan and Marx' locomotive attracted the attention of two Russian engineers, who had been ordered by Emperor Nicholas to examine the systems of railroads and railroad machinery in Europe and America. As a consequence he and his partner, A. M. Eastwick, together with Thomas Winans, of Baltimore, secured a contract to build the locomotives and other machinery for the railroad from Saint Petersburg to Moscow, and later another contract, which continued until 1862, to repair the rolling stock of the railroad. On the expiration of these contracts he returned to Philadelphia, where he collected a gallery of paintings. In 1869 he published a volume containing a poem entitled *The Ironworker and King Solomon*, his autobiography, and numerous incidents of his life in Russia; and a few years later another, entitled *The Locomotive Engine, and Philadelphia's Share in Its Early Improvements* (1872).

HARRISON, (LOWELL) BERGE (1854—). An American genre and landscape painter, brother of Alexander Harrison. He was born in Philadelphia, November 28, 1854. He was a pupil of Carolus Duran (q.v.) and studied at the Ecole des Beaux-Arts under Cabanel. In 1881 he exhibited at the Salon; and in 1882 he returned to America, spending a year painting and sketching in New Mexico. He received a medal at the World's Fair, Chicago, 1893; and his picture entitled "November," exhibited at the Exposition of 1889, was purchased by the French Government for the Museum of Marseilles. Some of his principal works are: "Waif from the Sea," "Return from the First Communion," "Little Gooseherd," "Motherless," "Summer Idyl," "Calling Home the Cows," "Milkmaid," "Modern Pompeiian," "Friends or Foes."

HARRISON, MARY SAINT LEGER (pen-name LUCAS MALET) (1852—). An English novelist, daughter of Charles Kingsley (q.v.). She was

born at Eversley rectory, and was educated at home and at University College, London. In 1876 she married William Harrison, a young clergyman in whom her father had been much interested, and afterwards settled at Clovelly, in Devonshire, amid the scenes of her father's boyhood. Her husband died in 1897, after which she visited the Continent, America, and India in search of health. Her popular novels of English life are written with an ethical purpose. Among them are: *Mrs. Lorimer* (1882); *The Wages of Sin* (1891); *The Carissima, a Modern Grotesque* (1896); *The Gateless Barrier*, a ghost story (1900); and *Sir Richard Calmady* (1901), a painful but powerful novel.

HARRISON, Susan Frances (pen-name Seranus) (1860—). A Canadian author, born of Irish parents at Toronto. In 1879 she married J. W. T. Harrison, an English musician and musical critic. She contributed numerous sketches, stories, and songs to newspapers and periodicals in Canada, the United States, and England. In her short stories, as *Crowded Out* (1888), she did for French Canada a work similar to that of George W. Cable for the Creoles of Louisiana. Some of her verse was collected in *Pine, Rose, and Fleur-de-Lis* (1891). She also edited a Canadian anthology entitled *The Canadian Birthday Book* (1887). Consult Stedman, *Victorian Anthology* (New York, 1895), and Rand, *Treasury of Canadian Verse* (ib., 1900).

HARRISON, Thomas (1606-60). An English regicide and religious fanatic. He was born at Newcastle-under-Lyme, Staffordshire, and although of humble parentage received a good education. He studied for the law in an attorney's office in Clifford's Inn, London, but at the opening of the Civil War in 1642 joined the regiment of life guards raised by Essex. He distinguished himself in several actions and rose to the rank of major-general. In 1646 he was elected member of Parliament for Wendover. He was in command of the escort that conveyed King Charles from Hurst Castle to London, and was one of the most energetic advocates of the King's trial and execution. In 1650, during Cromwell's absence in Ireland, he was commander-in-chief of the military forces in England, and the following year was elected a member of the Council of State, to which he had been nominated two years previously. His connection with the Fifth Monarchy Men (q.v.) and his conspiracies against Cromwell resulted in imprisonment and the loss of his commission and offices. At the Restoration he refused to save himself by flight, and as one of the seven regicides excluded from the Act of Indemnity was arrested and condemned to death. Justifying his actions and bearing himself bravely on the scaffold, he was executed on October 13, 1660.

HARRISON, (Thomas) Alexander (1853—). An American genre and landscape painter. He was born in Philadelphia, January 17, 1853. He was a pupil of Gérôme (q.v.), at the Ecole des Beaux-Arts, and has been strongly influenced by the works of Cazin and Bernard. His work is characterized by grace of line and by luminous color, delicate in its effect. He is especially noted for his marines, which are rendered with broad surfaces that well express the transparency of the ever-changing color of water and sky. He received medals at the exhibition of the Pennsylvania Academy of Fine Arts in 1887; a gold medal at the Paris Exposition in 1889; the second medal of honor at Brussels and Ghent in 1891; the gold medal of honor at Pennsylvania Academy of Fine Arts in 1894.

His chief works are as follows: In 1881, "Au Bords de la Mer," "Shipwrecked," "Coast of Brittany"; 1882, "Chateaux en Espagne" (Castles in Spain); 1883, "The Amateurs," "Little Slave"; 1884, "Breton Garden," "Twilight," "Seashore"; 1885, "The Wave." He exhibited at Buffalo in 1901, "The Golden Mirror," "Le Crepuscule" (Twilight), "Autumn," "Child with Doll." He was made Chevalier of the Legion of Honor and Officer of Public Instruction by the French Government; is a member of the Society of American Artists, New York; of the Royal Institute of Painters in Oil Colors, London, and a corresponding member of the Societies of Secessionists, Berlin and Munich.

HARRISON, William (1534-93). An English divine and historian, born in London. He was educated in the Saint Paul and Westminster schools, took art courses at Oxford and divinity at Cambridge, became chaplain to Lord Cobham of Kent, and afterwards rector of Radwinter, Essex. He was also canon at Windsor, where he died; but he is most widely known by his work in the *Chronicles* of Holinshed, the source whence Shakespeare drew the material for his historical plays. Harrison's share therein is invaluable for the local color of the sixteenth century, being *An Historicall description of the Iland of Britaine, with a brief rehersall of the nature and qualities of the people of England and such commodities as are to be found in the same comprehended in three books and written by W. H.* The New Shakespeare Society brought out a modern edition of this work in 1877-81.

HARRISON, William Henry (1773-1841). Ninth President of the United States. He was the son of Benjamin Harrison (1740-91); was born at Berkeley, Charles County, Va., February 9, 1773; was educated at Hampden-Sidney College, and although the profession of medicine had been chosen for him, entered the army as an ensign in 1791, became a lieutenant in June, 1792, and served against the Indians as an aide-de-camp on the staff of General Wayne, taking part in the battle of the Maumee and in other engagements, and becoming a captain in May, 1797. Resigning in June, 1798, he was soon afterwards appointed Secretary of the Northwest Territory under Gen. Arthur Saint Clair, but in October, 1799, resigned that position to become a Territorial Delegate in Congress. In 1801 he was made Governor of the so-called Indiana Territory, which then comprised the region later embraced in the States of Indiana, Illinois, Michigan, and Wisconsin, and for a time subsequent to the treaty of 1803 his jurisdiction also extended over that part of the lands then acquired from France by the Louisiana Purchase (q.v.), which was known as the District of Louisiana. Harrison's executive work in the Northwest continued until 1813, and was marked by conspicuous success in a variety of difficult undertakings, in which he secured the hearty appreciation of the people affected by his administration and the marked approval of the National Government. He was largely instrumental in effecting a change of the organization of Indiana from a Federal district to a Territory with representative government and

with a Delegate in Congress, although by this arrangement his own power was appreciably diminished. He rendered effective and important service to the nation by early establishing friendly relations with a number of the Indian tribes, and by thus lessening the possibility of a continuation of British influence in that region. On September 17, 1802, he concluded a treaty at Vincennes, and in July of the following year negotiated the more important treaty of Fort Wayne. But while in some regions the questions of land rights and the allied problems arising from the ill-defined relations between the tribes and the newly organized government were being adjusted amicably, Harrison's force and ability were also tested by the necessity of meeting successfully conditions which required the use of arms. In this branch of the public service he was also active, his most important military campaign being that against Tecumseh's brother, the Prophet, in the region of the Wabash, culminating in his victory at the battle of Tippecanoe (q.v.), November 7, 1811. Upon the outbreak of the War of 1812 he became a major-general of Kentucky militia, and in August, 1812, was made a brigadier-general in the Regular Army, and soon afterwards was appointed to the chief command in the Northwest, in which capacity, with the rank, after March, 1813, of major-general, he was actively engaged during the Western campaigns of the war, becoming again conspicuous by his brave defense of Fort Meigs (q.v.) and by his complete victory over the British at the battle of the Thames, October 5, 1813. Harrison had thus repeatedly shown marked military talent, and the end of the war left him, next to Jackson, the most prominent military figure in American public life. Withdrawing, however, from the army, Harrison entered Congress as the representative of the district embracing Cincinnati, and served from 1816 to 1819, when he was elected to the State Senate, where he remained until 1821. In 1825 he returned to Washington as Senator from Ohio, retaining this position until 1828, when he was sent as Minister to Colombia. Upon returning from that post in the following year, he retired for several years from public life. In 1835 he was nominated for the Presidency by Whig conventions in Indiana, Ohio, and Maryland, and by an Anti-Masonic convention at Harrisburg, Pa., and in the ensuing election succeeded in carrying seven States, Vermont, New Jersey, Delaware, Maryland, Kentucky, Ohio, and Indiana, securing 73 electoral votes, as against 170 given to Van Buren and 51 divided among the three other candidates. Moreover, the popular vote for Harrison in Connecticut, Rhode Island, and Pennsylvania approached very closely, and in Illinois and New York compared favorably with, that of Van Buren. When, finally, the financial policy of Jackson and Van Buren brought such disastrous results as to turn against the Administration a large portion of the people, the situation became particularly favorable for whoever might be nominated by the Whig Party in 1840. Although in many respects Henry Clay appeared as the leader of the party, he could not command its complete support as a Presidential candidate, and, accordingly, in the interest of harmony, he refrained from an active contest and left Harrison as the leading candidate for the nomination. The Whig Convention met at Harrisburg, December 4, 1839, and comprised 254 delegates. The 'unit rule' was introduced, and upon the first ballot Henry Clay received 103 votes, General Harrison 94, and General Scott 57. On the fifth ballot, during the third day of the convention, Harrison received 148 votes, Clay 90, and Scott 16, and Harrison was accordingly declared the nominee of the party. There forthwith began a political campaign which for popular enthusiasm and widespread activity has probably never been equaled in American politics. Throughout the country, meetings, processions, and a great variety of 'demonstrations' were held, and the general public took an energetic share in the contest. New campaign methods were introduced, and the log cabin and hard cider became especial emblems of the party of 'Tippecanoe and Tyler too.' The 'stump speaker' was a prominent feature of this new method of campaigning, even General Harrison himself making a series of addresses. The early State elections in some of the New England States and in Ohio and Kentucky resulted in Whig victories, and in the Presidential election Van Buren carried only seven States, of which only two were Northern States, with a total electoral vote of only 60, as against the 234 votes secured by Harrison. Although in good health at the time of his inauguration, General Harrison was taken ill, and died on April 4, 1841, the whole political situation being thus suddenly altered, and the Whig President being succeeded by John Tyler (q.v.), a former Democrat. William H. Harrison was the grandfather of President Benjamin Harrison. *A Historical Narrative* of Harrison's services was prepared by Moses Dawson (Cincinnati, 1824), a *Memoir* was written by James Hall (Philadelphia, 1836), and campaign biographies by C. S. Todd, S. J. Burr, Richard Hildreth, and I. R. Jackson were issued in 1840; but there is no adequate biography. Consult the sketch by Bostwick, in Wilson, *Presidents of the United States* (New York, 1894).

HARRISONBURG. A town and the county-seat of Rockingham County, Va., 122 miles northwest of Richmond; on the Baltimore and Ohio, the Chesapeake and Western, and the Southern railroads (Map: Virginia, F 3). It is in the picturesque and fertile Shenandoah Valley, is of considerable importance as the commercial centre for this agricultural region, and has foundries and machine-shops, potteries, stave and heading works, saw and planing mills, flouring-mills, etc. The water-works are owned by the municipality. Population, in 1890, 2792; in 1900, 3521.

HARRISONVILLE. A city and the county-seat of Cass County, Mo., 45 miles south by east of Kansas City; on the Missouri Pacific, the Missouri, Kansas and Texas, and other railroads (Map: Missouri, B 3). It has a county building that cost $50,000 and a public school library. There are some manufactures, and considerable trade in grain, agricultural produce, live stock, lumber, etc. Population, in 1890, 1645; in 1900, 1844.

HARRISSE, à'rês', Henry (1830—). A French bibliographer and historian, born in Paris, of Russian-Hebrew parentage. Through long years of investigation in the archives of different European countries, he was enabled to collect material for such works as *Bibliotheca Americana Vetustissima* (1866), a bibliography

of publications about America from 1492 to 1551, invaluable to modern students of that period. M. Harrisse prepared perhaps the best biography yet published of Columbus, made a uniquely important collection of the early maps of America, and while shut up in Paris during the siege of 1870 complied *Notes pour servir à l'histoire, à la bibliographie et à la cartographie de la Nouvelle-France et des pays adjacents* (1872). He published also *Fernand Colomb, sa vie et ses œuvres* (1872); *Les Colombs de France et d'Italie* (1874); *Christophe Colomb, son origine, sa vie, ses voyages, sa famille* (1884-85); *Jean et Sébastien Cabot* (1882); *Les Corte-Real* (1883); *Excerpta Colombiniana* (1887); *Découverte de l'Amérique du Nord* (1892); *Autographes de Christophe Colomb* (1893); *Découverte de Terre-Neuve* (1900).

HARRODSBURG. A city and the county-seat of Mercer County, Ky., 30 miles south of Frankfort; on a branch of the Southern Railway (Map: Kentucky, G 3). It is a summer resort, visited for its mineral springs, and has a public library and Beaumont College for women, opened in 1894. There are a large distillery, flour-mills, planing-mills, and other industrial establishments. Under a general law of 1894 the government is vested in a mayor, elected every four years, and a municipal council. Population, in 1890, 3230; in 1900, 2876. Harrodsburg was founded in June, 1774, by James Harrod, and is the oldest permanent settlement in the State. In 1776, when Kentucky was organized as a county of Virginia, Harrodsburg became the county-seat. It was incorporated in 1875. Consult an article, "Kentucky's Pioneer Town," *New England Magazine*, vol. xiii. (Boston, 1891).

HARROGATE. A fashionable inland watering-place and municipal borough in the West Riding of Yorkshire, England, 19 miles west of York (Map: England, E 3). Its importance dates from the discovery of its chalybeate, sulphur, and saline springs in 1596. The town consists of High and Low Harrogate, connected by rows of handsome residences encircling a public park of 200 acres. The royal baths and springs, with their fine buildings, the electric lighting plant, water-works, markets, and a remunerative sewage farm are the property of the municipality, which maintains a free library, the Royal Spa concert rooms and gardens, a kursaal, winter garden, theatre, and recreation grounds. Population, in 1891, 15,700; in 1901, 28,400. Consult Grainge, *History of Harrogate* (London, 1882).

HARROW. See HARROW-ON-THE-HILL.

HARROW (AS. *hearge*, Dutch *hark;* connected also with Icel. *herfi*, harrow; possibly akin to Skt. *kharj*, to scratch). An agricultural implement, used for smoothing and pulverizing plowed land and for covering seeds previously sown. It consists of a frame of a square or rhombic form, in which are fixed rows of teeth, or tines, projecting downward. The harrow was in use before the dawn of history; but since only the lighter soils were cultivated in ancient times, it often consisted of bushes, or branches of trees, which merely scratched the ground. In the various stages of its development the harrow has consisted of a wooden frame with wooden teeth, a wooden frame with iron teeth, or wholly of iron. The second is still used to a considerable extent, but iron harrows are most commonly employed. Of a very different character from those mentioned above are the chain harrows, which consist of a congeries of iron rings, and the disk harrows, which pulverize the soil by means of a series of obliquely set revolving disks.

HARROWBY, DUDLEY FRANCIS STUART RYDER, Earl of (1831—). An English politician, born at Brighton. He was educated at Harrow and Oxford, and took an Eastern sojourn, followed by military service at home during the Crimean War, but entered Parliament in 1856, and while Viscount Sandon was three times member for Liverpool. He succeeded to his father's title in 1882, and became prominent in matters relating to education and social reform brought before the House of Commons. Under the Conservative Government he held such offices as president of the Board of Trade (1878-80), and Lord Privy Seal (1885-86).

HARROW-ON-THE-HILL. A town in Middlesex, England, 12 miles northwest of London. Its celebrity is derived from its famous school, Harrow. The town is finely situated on a hill 200 feet high, which is conspicuously crowned by the archæologically interesting Church of Saint Mary with its lofty spire. This church, founded by Archbishop Lanfranc in the reign of William I., was rebuilt in the fourteenth century, and has a view of thirteen shires. Population, in 1891, 6200; in 1901, 10,200. Consult: Rimmer, *Rambles Round Eton and Harrow* (London, 1882); Bushell, *The Harrow Octocentenary Tracts* (Cambridge, 1894).

HARROW SCHOOL. One of the great public schools of England, founded in 1571 by John Lyon (q.v.). Its charter was granted by Elizabeth in the same year, and in 1590 the laws to govern its operation were duly framed by Lyon himself, but students were not admitted until the opening of the first building in 1611. Originally intended for the education of thirty poor youth from the parish of Harrow-on-the-Hill, its statutes nevertheless provided for the admission of "so many foreigners over and above the youth of the parish as the whole number may be well taught and the place can contain." The founder bequeathed two-thirds of his property for its maintenance, but the school did not thrive until 1660, when the headmaster availed himself of the statute admitting such as lived beyond the parish. This act assured its prosperity, though the enrollment has at times been very low. Now there are more than six hundred in attendance. Long purely classical, the curriculum was extended by the introduction of mathematics in 1837, of modern languages in 1851, of English history and literature in 1869, and subsequently of drawing, music, and science. The school was formerly administered by six prominent parishioners, themselves empowered to fill any vacancies, but by the Public Schools Act of 1868, though the survivors of the old board remained, an additional six were elected, severally, by the Lord Chancellor, the universities of Cambridge, London, and Oxford, the Royal Society, and the under-masters. Students are admitted at the age of twelve to fourteen. Though free tuition was originally intended, there is now no gratuitous instruction, but the foundationers have some slight advantage of the foreigners in rates. There are about six entrance

scholarships varying from £30 to £80, and the best of the exhibitions are the three by Baring, of a value of £100 each for five years, to Hertford College, Oxford. To the first building have been added a chapel (1839, replaced by another in 1857), the Vaughan Memorial Library (1861-63), and the hospital (1865). The Tercentenary Lyon Fund has provided a gymnasium, laboratories, and a new speech-room (1877). Among the names associated with Harrow the most noteworthy are James Bruce, the African traveler, Charles Buller, Colonel Burnaby, Byron, Calverley, Theodore Hook, Sir William Jones, Cardinal Manning, Merivale, Palmerston, Dr. Parr, Sheridan, Archbishop Trench, Anthony Trollope, and Sir George Trevelyan. Consult: Rimmer, *Rambles Round Eton and Harrow* (London, 1882); Thornton, *Harrow School and Its Surroundings* (ib., 1885); *Harrow School Register, 1801-93* (ib., 1894); Minchin, *Old Harrow Days* (ib., 1898); and Williams, *Harrow* (ib., 1901).

HARRY AL'LIS. The pseudonym of the French author Jules Hippolyte Percher (q.v.).

HARRY, BLIND. See HENRY THE MINSTREL.

HARRY LOR'REQUER. Charles Lever's first novel, and one of his most successful works. It appeared in the *Dublin University Magazine*, and was published in 1840. It is a rollicking tale of adventure.

HARSDÖRFER, härs'dĕr-fĕr, GEORG PHILIPP (1607-58). A German poet and scholar. He studied law at Altdorf and Strassburg, and, in 1644, with Johann Klaj, founded at Nuremberg a poetical society called the *Pegnitzorden*. He was a prolific writer, publishing about fifty volumes in German and Latin. His style is ornate and artificial; his material shows strong influence of Italian and Spanish literature. He made a strong effort to purify his native tongue. His works include: *Frauenzimmergesprächspiele* (second edition, 1642-49), a sort of encyclopædia in dialogue of curious knowledge; *Nathan, Jothan, und Simson*, a collection of fables and allegories; and *Poetischer Trichter, die deutsche Dicht- und Reimkunst, ohne Behuf der latcinischen Sprache in sechs Stunden einzugiessen* (1647-50). Selections from his poems are in Müller, *Bibliothek deutscher Dichter des 17. Jahrhunderts* (Leipzig, 1826).

HAR'SHA, or **SRĪ-HARSHA-DEVA.** The name of a renowned King of India, known also as Harsha-vardhana, or Harsha-Silāditya. He reigned over Thaneuar and Kansnj (A.D. 606-648), and was monarch of all Northern India, as we know from the Chinese pilgrim Hiouen Thsang (q.v.). He was a noted patron of literature, and is named as the author of three Sanskrit dramas: the *Ratnāvalī*, or Pearl Necklace; the *Priyadarśikā*, or Lost Princess; and a play with a Buddhist plot, the *Nāgānanda*, or Joy of Serpents. The question of his actual authorship has often been discussed. It was under his royal favor that Bāna wrote the historical romance *Harsha-carita*, or *Adventures of Harsha*, translated into English by Cowell and Thomas (London, 1897). There are English, French, and German translations of the three dramas: *Ratnāvalī*, by Wilson (London, 1871) and Fritze (Chemnitz, 1878); *Priyadarśikā*, by Strehly (Paris, 1888); *Nāgānanda*, by Boyd (London, 1872) and Bergaigne (Paris, 1879). Consult also: S. Lévi, *Théâtre Indien* (Paris, 1890); Lévi, *Une poésie inconnue du roi Harsha Çilāditya* (Leyden, 1895); Jackson, "Time Analysis of Harsha's Play," in the *Journal of the American Oriental Society*, xxi. (New Haven, 1901).

HARS'NETT, SAMUEL (1561-1631). An English ecclesiastic, Archbishop of York. Born in the parish of Saint Botolph, Colchester, Essex, he was educated at Cambridge, and began his career as a preacher in 1584, with a sermon at Saint Paul's Cross, London, directed so strongly against the doctrine of predestination that he was then and afterwards accused of leaning toward Popery. He was archdeacon at Essex from 1602 until 1604, and the following year was made master of Pembroke Hall, Cambridge, Bishop of Chichester (1609), and of Norwich (1619). He was undoubtedly an extreme high churchman, most arbitrary in his dealings with the subordinate clergy and Puritan laity, but when summoned to appear before the House of Lords and refute the charges of Romanism brought against him, his defense was so eminently satisfactory that he was made Archbishop of York (1628). He is the author of *A Discovery of the Fraudulent Practices of John Darrell* (1599), and *Declaration of Egregious Popish Impostures*, etc. (1603).

HART (AS. *heort, heorot*, OHG. *hiruz, hirz*, Ger. *Hirsch*, hart; connected with Lat. *cervus*, Welsh *carw*, Lith. *kárve*, stag, OChurch Slav. *krava*, cow, Gk. κεραός, *keraos*, horned; also related to Lat. *cornu*, Ir., Welsh *corn*, Galatian κάρνον, *karnon*, horn, and to Gk. κέρας, *keras*, Skt. *śṛnga*, horn). A stag or male of the red deer, from the age of six years, when the crown or *surroyal* of the antler begins to appear. Great importance was formerly attached to the distinction of names proper to deer at different ages. See ANTLER; DEER.

HART, ALBERT BUSHNELL (1854—). An American historian, born at Clarkesville, Mercer County, Pa. He prepared for college in Cleveland, Ohio, and in 1880 graduated at Harvard. He continued his historical studies in Paris, at the Ecole des Sciences Politiques, at the University of Berlin, and at the University of Freiburg, where he received his Ph.D. degree in 1883. In the fall of that year he returned to America to accept an appointment as an instructor in history at Harvard, and a year later became an assistant professor. In 1897 he was appointed a full professor. He has been particularly identified with the introduction and development of the method of studying history from the original sources, both in secondary schools and in colleges, and his influence has been felt, not only at Harvard, but in other universities as well. He is an editor of the *Harvard Graduates' Magazine* and the *American Historical Review*, and has been a frequent contributor to magazines and reviews. He has published: *Introduction to the Study of Federal Government* (1890); *Epoch Maps, Illustrating American History* (1891); *Formation of the Union* (1892), in "Epoch Series;" *Practical Essays on American Government* (1893); *Studies in American Education* (1895); *Revised Suggestions on the Study of History and Government of the United States* (1895); *Guide to the Study of American History* (with Edward Channing) (1897); *American History Told by Contemporaries* (4 vols., 1898-

1901); *Source Book of American History* (1899); *Life of Salmon P. Chase* (1899, in the "American Statesmen Series"); *Foundations of American Foreign Policy* (1901). He was a member of the committee of seven of the American Historical Association, appointed to consider the subject of history teaching in the secondary schools, and was one of the authors of their *Report* (1899). In 1902 he was chosen editor-in-chief of the coöperative history of the United States projected under the auspices of the American Historical Association.

HART, CHARLES HENRY (1847—). An American author, born in Philadelphia. He was admitted to the bar in 1868, and graduated at the University of Pennsylvania the next spring. He practiced law until 1894, when he met with an accident, after which he gave his attention entirely to literature. In 1884 he was elected director of the Pennsylvania Academy of Fine Arts, and afterwards chairman of the committee on retrospective American art at the World's Columbian Exposition (1893). His publications include: *Bibliographia Lincolniana*, reprinted under the title *Biographical Sketch of Abraham Lincoln* (1870); *Life Portraits of Great Americans; Gilbert Stuart's Portraits of Women;* and *Engraved Portraits of Washington.*

HART, ERNEST ABRAHAM (1835-98). An English physician and reformer, born of Jewish parentage at Knightsbridge, London. He became a student at Saint George's Hospital, receiving part of his medical education at Lane's School of Medicine in Grosvenor Place, where he was appointed a demonstrator in his third year. He was admitted to the Royal College of Surgeons in 1856, and was house surgeon at Saint Mary's Hospital after being associated with William Coulson in general practice. In 1860 he became surgeon to the West London Hospital, but returned to Saint Mary's in 1863 first as ophthalmic, then as aural surgeon, and finally as dean of the medical school.

In 1863 he became coeditor of the London *Lancet*, and in 1866 he was made the editor of the *British Medical Journal*, a position which he filled until his death. He also edited the *Medical Record* from 1873, and the *Sanitary Record* from 1874. He was president of the Harveian Society of London in 1868 and 1893. Hart was above all a reformer. In 1854 he led the agitation which compelled the Admiralty to remove naval assistant surgeons from the cockpit to more fitting quarters; in 1888 he made strenuous efforts to ameliorate the position of military medical officers; and in 1892 he called attention to the grievances of Irish dispensary doctors. Sanitary reforms occupied him throughout all his life. His earliest sanitary investigations were carried out in connection with the *Lancet* commission for the nursing of the sick poor in the Metropolitan Workhouse infirmaries. His exposure in 1872 of the evils of the system of baby-farming was instrumental in leading to the passage of an act for the protection of infant life. Coffee-taverns, the National Health Society, and the abatement of the smoke nuisance in large towns had his strong support. In 1894 he engaged in a campaign against the system of barrack schools, where hundreds of pauper children herded together till they became subject to chronic diseases, and were drilled until they were little better than automata.

His most important publications include: *On Diphtheria* (London, 1859); *On Some of the Forms of Diseases of the Eye* (London, 1864); *A Manual of Public Health* (London, 1874); *Hypnotism, Mesmerism, and the New Witchcraft* (London, 1893 and 1896); *Essays on State Medicine* (London, 1894). He also originated the series of biographies known as *Masters of Medicine.*

HART, JAMES MCDOUGAL (1828—). An American landscape painter. He was born at Kilmarnock, Ayrshire, Scotland, May 10, 1828, and came to America in 1831. He was a pupil of his brother, William Hart, also of Schirmer, at Düsseldorf, in 1851. He established a studio in New York, and was elected member of the National Academy in 1859. His favorite subjects are American forests with autumnal effects. Among his principal works are: "On the Croton;" "Summer on the Bouquet River;" "Morning in the Adirondacks;" "Summer Memory of Berkshire;" "Adirondacks" (1858), Walters Collection, Baltimore; "Through Dust Clouds" (1879); "Princess Lily" (1882); "Boughs for Christmas;" "In the Old Orchard;" "Oaks in Autumn;" "Landscape with Cattle," Metropolitan Museum, New York.

HART, JAMES MORGAN (1839—). An American scholar and educator, born at Princeton, N. J. He studied at Princeton University, where he graduated in 1860, and further at Göttingen, Germany; was assistant professor of modern languages at Cornell from 1868 to 1872, and at the University of Cincinnati, Ohio, held the chair of modern languages and English literature in 1876-90. In the latter year he returned to Cornell as professor of rhetoric and English philology. His publications include translations from the German and French; very serviceable editions, with brief notes, of Goethe's *Hermann und Dorothea* (1875) and *Faust* (part i. 1876), and Schiller's *Piccolomini* (1875); an informing and interesting work on *German Universities* (1874); and a *Handbook of English Composition* (1895).

HART, JOEL (1810-77). An American sculptor. He was born in Clark County, Ky. He received but little education, and at the age of twenty he worked with a stone-cutter. The talent which he displayed in clay-modeling attracted attention, as did especially his marble bust of Cassius M. Clay, and in 1849 he went to Florence to execute a commission for a statue of Henry Clay, given him by the Ladies' Clay Association of Virginia. His first model was lost during the voyage by shipwreck, and the statue itself, which is now in Richmond, Va., was not completed till 1859. Hart executed two other statues of the same statesman—one of marble, in the court-house at Louisville, Ky., and a colossal bronze statue at New Orleans. He resided at Florence, producing many statues and busts. The most important of these are: "Angelina," "Il Penseroso," and "Woman Triumphant." He also invented a mechanical device for obtaining the outlines of a head from life, the application of which gave some vogue to his portrait busts. He died at Florence, Italy, March 2, 1877.

HART, JOHN (1708-80). A signer of the Declaration of Independence, born in New Jersey.

His father raised and commanded the company known as 'The Jersey Blues,' which he led to Quebec just in time to share in Wolfe's victory. John took an active part in the pre-Revolutionary agitation, and was several times elected to the Provincial Legislature. In 1776 he was elected to the Continental Congress. During the British invasion of New Jersey his farm was ravaged, and he himself became a fugitive until the battle of Trenton, when the British withdrew and he was able to return to his home.

HART, JOHN SEELEY (1810-77). An American educator. He was born in Stockbridge, Mass.; graduated at Princeton in 1830, and four years later became adjunct professor of ancient languages there. From 1836 to 1841 he was in charge of the Edge Hill School, Princeton. He was principal of the Philadelphia High School from 1842 to 1859, and of the New Jersey State Normal School from 1863 to 1871. In 1872 he became professor of rhetoric and the English language at Princeton. He founded the *Sunday-School Times* in 1859, and edited it until 1871, and for a time edited the publications of the Sunday-School Union. He also prepared several text-books, including a *Manual of Composition and Rhetoric* (1870); *Manual of English Literature* (1872); and a *Manual of American Literature* (1873).

HART, JULIUS (1859—). A German author. He was born at Münster, and was educated at Berlin. In addition to translations from English, American, Spanish, and Persian poets, his publications include: *Sansara*, poems (2d ed. 1887); *Homo Sum*, poems (1888); *Don Juan Tenorio*, a lyrical tragedy (1881); *Der Sumpf*, a tragedy (1885); *Geschichte der Weltlitteratur und des Theaters* (1894-96). The last-mentioned work is profusely illustrated, and embraces the history of literature from its earliest beginning to the present day.

HART, Sir ROBERT (1835—). An Englishman, inspector-general, and director of the Chinese Imperial Customs Service. He was born at Portadown, Armagh, Ireland; was educated at Queen's College, Belfast, where he graduated in 1854, and in the same year entered the British consular service in China. In 1858 he was secretary to the Commission of the Allies at Canton, and in the following year entered the Chinese Maritime Customs service as a deputy commissioner. Advanced in 1863 to the post of Inspector-General, he reorganized the service practically on the lines on which it is now administered. He also organized and maintains in connection with the service a large fleet of steamers for the suppression of piracy and smuggling, and established a splendid system of lighting the coast. A fine postal system, which is now being extended to all parts of the country, was also inaugurated by him. In 1885, when Sir Harry Parkes, British Minister at Peking, died, Sir Robert was asked to succeed him; but, yielding to the entreaties of the Empress Dowager, he declined. He received the highest honors from the Chinese Government, among them the Red Button, and the decorations of the Double Dragon and the Peacock's Feather. His ancestors have been ennobled for three generations, and after the settlement of the Boxer troubles he was appointed to high office in the Imperial Government, and the whole Customs Department, native and foreign, was placed under his control. He was also decorated by all the European governments; was made a C.M.G. by the British Government in 1880, K.C.M.G. in 1882, G.C.M.G. in 1889, and in 1893 was created a baronet. In 1900 he had about 5000 men under his control, of whom about 900 were foreigners, all chosen and governed in accordance with the strictest civil-service rules. He was with the other foreigners in the British Legation when it was besieged by the Boxers and the Imperial troops.

HART, SAMUEL (1845—). An American clergyman, born at Saybrook, Conn. He graduated at Trinity College in 1866; after 1868 taught at that institution, and was made professor of Latin in 1883. He was ordained priest of the Protestant Episcopal Church in 1870, and in 1893 he was elected Bishop of Vermont, but declined the office. In 1886 he became custodian of the *Standard Prayer-Book* of his Church, and in 1892 secretary of the House of Bishops. In 1899 he became vice-dean and professor of doctrinal theology and the Prayer-Book at the Berkeley Divinity School. His publications include editions of Juvenal (1873), of Persius (1875), and of Bishop Seabury's *Communion Office* (1874), and *Historical Sermons of Bishop Seabury* (1883-86).

HART, SOLOMON ALEXANDER (1806-81). An English painter, of Jewish origin. He was born at Plymouth, Devonshire. He studied at the Royal Academy, London, and exhibited his first oil picture, "Instruction," in 1828. In 1830 he exhibited the "Elevation of the Law," originally called the "Interior of a Polish Synagogue," which brought him reputation, and is now in the National Gallery. Among his other works are: "Isaac of York in the Donjon of Front-de-Bœuf" (1830); "English Nobility Privately Receiving the Catholic Communion" (1831); "Lady Jane Grey on Tower Hill;" "Milton Visiting Galileo in Prison" (1847); and "The Three Inventors of Printing" (1852). In 1835 Hart became an associate; in 1840, an Academician; in 1854 professor of painting in, and in 1865 librarian of, the Royal Academy. His last paintings show decline. He died in London, June 11, 1881. Consult his *Reminiscences* (London, 1882).

HART, WILLIAM (1823-94). An American landscape and animal painter, born in Paisley, Scotland, March 31, 1823. He came to New York in early youth, and was apprenticed to a coach-maker, for whom he painted carriage decorations. He was self-taught, and first exhibited at the National Academy in 1848. His work being favorably received, he went to Scotland in 1849, studying and painting for three years; on his return to New York he opened a studio, and was elected a member of the National Academy in 1858. In 1865 he was elected president of the Brooklyn Academy of Design, and he was also president of the American Society of Water-Colorists from 1870 to 1873. He died at Mount Vernon, New York, June 17, 1894. Among his principal works are: "Peace and Plenty" (1855); "Close of Day," Mount Desert (1856); "Lake in the Hills" (1858); "White Mountains," owned by C. B. Warren, Philadelphia; "Joy of Autumn" (1865); "Golden Hour" (1872); "Morning in the Mountains" (1874); "Keene Valley" (1875); "Jersey

Cattle" (1879); "Hillside Pasture" (1880); "Landscape and Cattle;" "Path by the River;" "Group of Cattle;" "After a Shower."

HARTBEEST (Boer Dutch *hartebeest*, hartbeast, from *harte*, Dutch *hart*, hart + *beest*, beast). A large antelope of South Africa, the type of a genus (Bubalis or Alcelaphus) containing several similar species, all African except one, the titel (see BUBALIS), which also inhabits Arabia and Syria. The genus is characterized by its long, pointed head terminating in a narrow muzzle, ringed, compressed, and often lyrate horns, and a comparatively short, cow-like tail. As is the case with most antelopes of the plains, the fore quarters are heavy and higher than the hind quarters, which are narrow and drooping. The reverse is the case with the bushbucks and others inhabiting a bushy or forested country.

The typical or common hartbeest (*Bubalis cama*) formerly ranged from Cape Colony to Mashonaland, and gathered in great herds; but it has been slaughtered until now it is found only in remote regions. It stands about four feet high at the withers, and is grayish-brown, with a yellowish patch on the buttocks and black markings on the face. The heavily ringed, divergent horns are bent sharply back at the tips. The animal was noted among hunters as one of the swiftest of African antelopes, and easily distanced greyhounds. Near the Victoria Nyanza lives a similar but pale-faced species (*Bubalis Jacksoni*). German and British East Africa and Western Abyssinia are the home of three reddish species, having widely expanding horns, and these are still fairly numerous there on the bushy plains. One is the red or Cooke's hartbeest (*Bubalis Cookei*), another the tora (*Bubalis tora*), and the third Swayne's, or the 'sig' (*Bubalis Swaynei*). Sir H. Johnston found the first-named extremely numerous in the plains about Kilimanjaro in 1885.

The konzi (*Bubalis Lichtensteini*) of all the Zambezi region and Nyassaland; Hunter's hartbeest (*Bubalis Hunteri*) of the Tana River Valley, marked with a conspicuous white chevron on the forehead; the black-faced korrigum (*Bubalis Senegalensis*) of the whole Sudan; and the large Tunisian hartbeest (*Bubalis major*) of the western Sahara, are allied species of the North. In South Africa there formerly ranged in great herds, and still sparingly exist, three other well-known species. One, the sassaby, or bastard hartbeest (*Bubalis lunata*), was one of the most numerous and well-known antelopes of the plains of Cape Colony and northward; it is about three feet ten inches high, and dark purplish red, nearly black on the face and along the spine. Like all of this group, their flesh is excellent food. The blesbok (*Bubalis albifrons*) and bontebok (*Bubalis pygargus*) are smaller, and remarkable for their brilliant purple-red color and white legs, and each has a white blaze on the face. In the bontebok this mark continues to the base of the horns, while in the blesbok it is divided by a dark cross-bar between the eyes. See ANTELOPE; and Plate of ANTELOPES.

HART'-DYKE', Sir WILLIAM (1837—). An English landowner and politician, born in Kent. He was educated at Harrow and Oxford, was elected to Parliament for his native shire in 1865, was Chief Secretary for Ireland (1885-86), and vice-president of the Council on Education (1887-92).

HARTE, FRANCIS BRET (1839-1902). An American humorous poet and novelist, born at Albany, N. Y., August 25, 1839. At fifteen he wandered to California, where he spent three years digging for gold and teaching school. In 1857 he entered the office of the *Golden Era* as a compositor, and presently began to write for that paper sketches which attracted favorable notice. He became its assistant editor, and soon afterwards editor-in-chief of the *Weekly Californian*, in which he published his parodies of novels. Meanwhile, from 1864 to 1867, he was secretary of the United States Mint in San Francisco, and was writing for newspapers poems that won him great popularity, e.g. "The Society upon the Stanislaus." His first book of verse, *The Lost Galleon and Other Poems*, was gathered in 1867; his first prose book, *Condensed Novels*, appeared in 1867. From 1868 till 1870 he edited the *Overland Monthly*, which he had helped to organize, and in it he published *The Luck of Roaring Camp* (1868) and *The Outcasts of Poker Flat* (1869)—perhaps his best short stories—and also many others. His most popular poem, "Plain Language from Truthful James," better known as "The Heathen Chinee," made Bret Harte famous in 1870. In this year he was made professor of recent literature in the University of California, but he went to New York in 1871 to continue writing. After 1878 he held consular appointments at Crefeld in Germany (1878-80), at Glasgow, Scotland (1880-85), and after 1885 he dwelt in England. During the last years of his life he had his home near London, and a new volume, chiefly of short stories, appeared nearly every year. He died in Camberley, near London, May 5, 1902.

Most of Bret Harte's works depict life on the Pacific Slope in the early days, but he describes life also in the Atlantic States and in England. The more noteworthy among his works are: *Poems* (1870); *East and West Poems* (1871); *The Luck of Roaring Camp and Other Sketches* (1871); *Poetical Works* (1873); *Tales of the Argonauts* (1875); *Gabriel Conroy* (1876); *Two Men of Sandy Bar* (1876); *The Story of a Mine* (1878); *The Twins of Table Mountain* (1879); *Flip* (1882); *In the Carquinez Woods* (1883); *On the Frontier* (1884); *By Shore and Sedge* (1885); *Snowbound at Eagle's* (1886); *A Millionaire of Rough and Ready* (1887); *The Argonauts of North Liberty* (1888); *A Sappho of Green Springs* (1891); *Sally Dows* (1893); *In the Hollow of the Hills* (1895); *Clarence Barker's Luck* (1896); *Bulger's Reputation* (1896); *The Three Partners* (1897); *A Protégée of Jack Hamlin's* (1899); *From Sandhill to Pine* (1900); *Under the Redwoods* (1901). Bret Harte's collected works appeared in London (1881) and in Boston (1891), with supplementary volumes up to 1902.

Of those American authors whose charm lies mainly in their manner of emphasizing the characteristics of a highly flavored community, Bret Harte is one of the best. He was open-eyed and sympathetic in his delineation of adventurers. His story of the gambler who sacrificed himself for his snow-bound companions bears witness to Harte's first-hand acquaintance with perverse humanity. All his strongest tales of the Forty-

niners and of their followers give a view of early California that, in spite of an exaggeration perceptible to contemporary Californians, supplies an interesting supplement to formal history. Whether he tells of the rough Caucasian or of the mysterious Asiatic, Bret Harte has the knack of catching representative traits so admirably that we can see the whole of an almost lawless society. His stuff was romantic, melodramatic, and mostly disreputable. He handled it with humor, irony, pathos, or with a cynical lack of a superior point of view. He was imaginative in that he could cull the essence of things, but he was neither a dreamer nor a deep or far-seeing thinker. What was close to him he saw marvelously, and few writers have ever given a more distinct impression of being a part of what they have described. But Bret Harte is as impersonal as Maupassant. He assumes no responsibility, preaches no sermon, for his whole mind is absorbed in the portrayal of facts. The facts he coördinates with the genius of a born story-writer. Visible physical nature, wild cañons and mountains furnish him a setting. But Bret Harte admits nature only as a background. He delights in what is dazzling, spectacular, or dreadful. Yet his characters never pose. Many of them are even epically molded; but they are no heroes, or sorry ones at best. What one remembers most vividly is the gambler, the adventurer, the desperado, or the bedraggled woman. And these characters constitute a gallery of vagrants, sordid unfortunates, or downright rogues. Bret Harte wrote and wrote abundantly till the end. In his early work one may feel a quick intelligence, keenly interested in a new world. He is, through his subjects, and perhaps through his manner, an American author otherwise than by mere birth. His American qualities endeared him not only to his readers at home, but to many in Europe; for Europeans found and still find in him what in much American literature is too often faint or absent—an artistic portrayal of a phase of American life. Consult Pemberton, *Bret Harte* (London, 1901).

HARTE, WALTER (1709-74). An English poet and historian. Educated at Marlborough and Oxford, he entered the Church, was preacher and teacher at his alma mater, and became vice-principal of Saint Mary Hall. His first poems, published at the age of eighteen, brought him the notice of Pope, whose stanch friend he afterwards became, and also his imitator in an *Essay on Reason* (1735). From 1745 to 1749 he was traveling tutor to the recipient of the famous Chesterfield Letters, and on his home-coming was made canon at Windsor, and afterwards rector in a Cornwall parish. His most pretentious work, a mine of information, *Life of Gustavus Adolphus, King of Sweden* (2 vols., 1759), was pronounced a very good book—in a German translation—but Harte's English was much better in his *Essays on Husbandry* (1764), approved both by Lord Chesterfield and Dr. Johnson.

HARTEL, härˈtel, WILHELM VON (1839—). An Austrian philologist. He was born at Hof, in Moravia, and studied at the University of Vienna. He was appointed professor of classical philology at Vienna in 1872, made a member of the Vienna Academy in 1875, of the Berlin Academy in 1893; and became a life member of the Austrian House of Peers in 1890. In 1899 he was for a short time Minister of Education and Public Worship, to which post he was reappointed in 1900. His principal works are: *Homerische Studien* (1871-74; 2d ed. 1873); *Demosthenische Studien* (1877-78); *Studien über attisches Staatsrecht und Urkundenwesen* (1878); and various editions of classical authors, including the *Breviarium* of Eutropius (1872); Cyprian's *Opera Omnia* (3 vols., 1868-71); and Ennodius's *Opera* for the *Corpus Scriptorum Ecclesiasticorum*, published by the Vienna Academy of Sciences. He was made editor of the *Zeitschrift für Oesterreichische Gymnasien* in 1874; and with Schenkl founded the *Wiener Studien*, a journal on classical philology, in 1879.

HARTENSTEIN, härˈten-stīn, GUSTAV (1808-90). A German philosopher and author, born at Plauen, Saxony, and educated at Grimma and Leipzig, where in 1834 he was appointed professor of philosophy. He was one of the most gifted followers of Herbart, to whose philosophical views he gave wide extension in the works entitled *Die Probleme und Grundlehren der allgemeinen Metaphysik* (1836), and *Die Grundbegriffe der ethischen Wissenschaften* (1844).

HARTFORD. A city and port of entry, the capital of Connecticut, and the county-seat of Hartford County, 124 miles west by south of Boston, 32 miles north-northeast of New Haven, and 111 miles northeast of New York; on the Central New England, the New York, New Haven and Hartford, and the Connecticut Valley railroads (Map: Connecticut, E 2). It is situated at the head of navigation for large vessels on the Connecticut River, 50 miles from Long Island Sound, and at the mouth of Park River, a narrow stream that flows through the city, being crossed by several bridges. Hartford has a fine site, its more elevated sections commanding grand views of the Connecticut Valley, and is regularly laid out over an area of about 17 square miles. Much historical interest attaches to the city, the memory of its prominence in Colonial as well as in later times being preserved in several of its churches and houses, in its localities, and in its interesting collections of relics. The old State House, in which the Hartford Convention (q.v.) met, now serves as the city hall; and the new Capitol is a large and beautiful structure of white marble, with portraits and statues of famous persons. Several of the insurance companies for which Hartford is noted occupy fine offices, and among other pretentious buildings are the high school, Young Men's Christian Association building, State Arsenal, post-office, Wadsworth Athenæum, and Saint Joseph's Cathedral, the seat of the Bishop (Roman Catholic) of Hartford. Among the charitable institutions are Hartford and Saint Joseph's hospitals, Hartford Orphan Asylum, Old People's Home, Retreat for the Insane, American Asylum for the Deaf, and Asylum for the Blind. Hartford is the seat of Trinity College (q.v.) and of the Hartford Theological Seminary (Congregational) founded in 1834. Besides the libraries of these educational institutions, there are the State, Public, Watkinson, and Historical Society libraries. The city has a number of parks: Bushnell Park (46 acres), the site of the State Capitol, and Charter Oak Park, famous for its fair-grounds and trot-

CAPITOL

CONNECTICUT CAPITOL AT HARTFORD; SOLDIERS' MEMORIAL ARCH ON LEFT

ting track; also Keney, Elizabeth, South, Riverside, Pope, and other parks.

In 1887 Hartford was made a port of entry. It has considerable commercial importance, but is most widely known as the centre of vast insurance interests and for its manufacturing concerns. The principal manufactures are bicycles, firearms, Gatling guns, woven wire, mattresses, screws, nails, pins, envelopes, steam boilers and engines, machinery, car-wheels, hosiery, knit goods, furniture, carriages, and electric vehicles. The city also controls an extensive trade in Connecticut tobacco. The government, as provided by the charter of 1856, revised in 1880, is vested in a mayor, elected biennially, a bicameral council, and subordinate administrative officials, as follows: Fire, street, health, charity, police, and water commissioners, building inspector, and city attorney, appointed by the executive with the consent of the board of aldermen, and city clerk, collector, auditor, treasurer, marshal, and school board, chosen by popular election. The park commissioners make appointments to fill vacancies on their own board. The annual income and expenditures of the city amount to about $2,390,000 and $2,215,000 respectively, the principal items of expense being $55,000 for street-lighting, $95,000 for charitable institutions, $100,000 for the fire department, $125,000 for the police department, and $315,000 for schools. The city owns its water-works, which are operated at a yearly cost of $55,000. Population, in 1800, 5347; in 1850, 17,966; in 1870, 37,180; in 1880, 42,015; in 1890, 53,230; in 1900, 79,850, including 23,800 persons of foreign birth, and 1900 of negro descent.

In 1633 the Dutch built on what is still known as Dutch Point a fort which they called the 'House of Hope.' A number of Massachusetts colonists, mostly from Newtown (Cambridge), left their homes in 1635 and 1636, partly because of a dispute over the civil rights of non-church members, and, led by their pastors, Thomas Hooker (q.v.) and Samuel Stone, settled at Hartford. The name Newtown was at first adopted, but in 1637 it was discarded for Hartford—Hertford, England, being the birthplace of Stone. On January 14, 1639, the freemen of Windsor, Hartford, and Wethersfield met at Hartford and, influenced by Hooker, adopted the famous 'Fundamental Orders of Connecticut,' the first written constitution adopted by a people that ever organized a government. For this reason Hartford is frequently called the 'birthplace of American democracy.' On September 19, 1650, Peter Stuyvesant and commissioners from the 'United Colonies' signed a treaty at Hartford by which boundary disputes were adjusted, and the Dutch confirmed in possession of their fort. In 1654, however, this fort was seized, and the Dutch expelled from Connecticut. In 1687 Governor Andros came to Hartford and made an attempt to seize the Connecticut charter. (See CHARTER OAK.) Washington and Rochambeau met here in 1780 to plan the Yorktown campaign, and in 1814-15 the Hartford Convention (q.v.) was in session here. Until 1701 Hartford was the capital of Connecticut; from 1701 to 1873 it shared that honor with New Haven; and since 1875 it has been sole capital. Noah Webster, Henry Barnard, John Fiske, Richard Burton, and Frederick Law Olmsted were born in Hartford, and among the notable writers who have made it their home are Harriet Beecher Stowe, Whittier, Lydia Huntley Sigourney, John Trumbull, Joel Barlow, Horace Bushnell, Charles Dudley Warner, and Samuel L. Clemens. Consult: Trumbull, *The Memorial History of Hartford County* (Boston, 1886); and sketches in Powell, *Historic Towns of the New England States* (New York, 1898), and *Connecticut Magazine*, vol. v. (Hartford, 1899).

HARTFORD, THE. The flagship in which Admiral Farragut made his attack on New Orleans, in April, 1862. She was also his flagship in the attack on Mobile.

HARTFORD CITY. A city and the county-seat of Blackford County, Ind., 72 miles northeast of Indianapolis; on the Lake Erie and Western and the Pittsburg, Cincinnati, Chicago and Saint Louis railroads (Map: Indiana, D 2). It is supplied with natural gas, and oil interests are being developed; there are manufactures of paper and pulp, strawboard, glass, iron, flour, hubs and spokes, etc. The water-works are owned by the municipality. Population, in 1890, 2287; in 1900, 5912.

HARTFORD CONVENTION. In American history, a political assembly representing the Federalists of New England States, which met at Hartford, Conn., December 15, 1814, and adjourned *sine die*, January 5, 1815. Its members numbered twenty-six, twelve coming from Massachusetts, seven from Connecticut, four from Rhode Island (all appointed by the Legislatures of their respective States), two from counties in New Hampshire, and one from Windham County, Vt. The convention grew out of the opposition of the Federalists in New England to the War of 1812, and its members all belonged to that party. George Cabot, of Massachusetts, was elected president, and Theodore Dwight, of Connecticut, secretary. The members were as intelligent and as high-minded men as could have been found in the country, but Federalism was exceedingly unpopular, and the fact that the sessions were held with closed doors, and that the members were pledged to secrecy, gave rise to a report that the secession of the New England States was contemplated. The extreme stand thus attributed to the leading Federalists (q.v.), as well as their pronounced opposition to the war, hastened the movement which resulted in the complete overthrow of the Federalist Party. The object of the convention was to devise means not only of security and defense against foreign nations, but also for safeguarding the privileges of the separate States against the alleged encroachments of the Federal Government; and no treasonable intention could be proved. The act of Massachusetts calling the convention stated that the steps taken by the consulting body were to be "not repugnant to their obligations as members of the Union;" and the resolutions of Connecticut and Rhode Island were to the same effect. The main propositions were stated in the form of amendments to the Federal Constitution, which the convention recommended to the several States. The suggested changes were that direct taxes and representatives be apportioned among the States according to the number of free persons therein; that no new State should be admitted to the Union except upon a two-thirds vote in each House of Con-

gress; that Congress should have no power to lay an embargo on ships of American citizens for more than sixty days; that Congress should not interdict foreign commerce or declare offensive war except by a two-thirds vote; that no person thereafter naturalized should be capable of sitting in Congress or of holding any Federal civil office; that no person should serve as President more than one term; and that the President should never be chosen twice successively from the same State. The delegates further resolved that, if their recommendations should not be heeded and if the defense of their respective States should still be neglected, a further convention should be created "with such powers and instructions as the exigency of a crisis so momentous may require."

The war was practically over before the convention finished its work, the Treaty of Ghent (q.v.) having been concluded on December 24th, though the fact was unknown to the members of the convention. The battle of New Orleans, January 8, 1815, and the ratification of the Treaty of Ghent (February 17th) increased the popularity of the Government and hastened the downfall of the Federalist Party; and 'Hartford Convention Federalist' was for many years a term of reproach. The controversy over the absolute obligation of a Governor to respond to the President's call for the militia presented a problem in constitutional law, and in the relations of the States to the Union, which was not fully settled even at the outbreak of the Civil War. For an authoritative and complete work, consult the *History of the Hartford Convention* (New York, 1833), by Theodore Dwight, secretary of the convention; also consult: Lodge, *Life and Letters of George Cabot* (Boston, 1877); and Henry Adams, *Documents Relating to New England Federalism* (Boston, 1877). See FEDERALIST PARTY.

HARTFORD THEOLOGICAL SEMINARY. A Congregational institution, founded in 1834 at East Windsor Hill, Conn., under the name of the Theological Institute of Connecticut, and removed in 1865 to Hartford, with a change of name. The legal constitution of the seminary vests its control in a board of trustees, who are elected by the Pastoral Union—an association of nearly 200 ministers, all of whom give assent to the creed of the Union, a statement of doctrine drawn up in 1834, with singular breadth of view. Although the seminary was established at a time of theological controversy, the occasions of dispute then have long ago ceased to exist, and the institution now is concerned simply with the problem of training ministers for present-day work on the broadest lines of intellectual and spiritual development. In the reconstruction of theological pedagogy in America during the last twenty-five years, the seminary has been often the pioneer and always abreast of the most enterprising progress. The faculty in 1903 numbered twelve professors and twelve regular lecturers, and the student body was about eighty-five. At that time the library contained over 81,000 volumes and nearly 45,000 pamphlets—being unsurpassed in this country in several of its special collections. The main buildings are Hosmer Hall, valued at $150,000, erected in 1880 by James B. Hosmer, and the Case Memorial Library, erected in 1902 by Newton Case at a cost of $100,000. Since 1890 the faculty has issued *The Hartford Seminary Record*, a quarterly magazine.

HARTIG, härʹtĭk, FRANZ, Count (1789-1865). An Austrian statesman. He held a number of important posts under the Government until the appearance of his book, *Genesis der Revolution in Oesterreich* (3d ed. 1851), describing the beginning of the liberal movement in Austria, forced him into retirement. In 1860 he was elected to the Reichsrat, where he played a prominent part as a member of the Liberal Centralist Party. In 1861 he was called to the Austrian House of Lords, of which he remained a member until his death.

HARTIG, GEORG LUDWIG (1764-1837). A German forester. He was born at Gladenbach, and was educated at Giessen, where he studied mathematics, political economy, geodesy, and physics. While in the service of Prince Solms-Braunfeld at Hungen, Hartig established a school of forestry which became the model for future institutions of this kind. In 1811 he was appointed chief of the department of forestry at Berlin; and it was due to his firmness that a large part of the German forests was not sacrificed to meet the financial exigencies of the time. He wrote in all thirty-one works, such as: *Anweisung zur Holzzucht für Förster* (8th ed. 1818); *Lehrbuch für Förster* (11th ed. 1877); *Lehrbuch für Jäger* (11th ed. 1884); and *Kubiktabellen* (10th ed. 1871).

HARTIG, ROBERT (1839—). A writer on forestry, born at Brunswick, a son of Theodor Hartig (q.v.), and educated at the Collegium Carolinum, of Brunswick, and at Berlin. In 1878 he was appointed professor of botany at Munich. The scientific labors of Hartig in the department of vegetable pathology have contributed greatly to the development of that branch of science. Prior to his investigations on the progressive stages of disease in trees, little or nothing had been done in this department of scientific inquiry; so that Hartig may be considered the founder of arboreal pathology. His more important works include: *Die Unterscheidungsmerkmale der wichtigern in Deutschland wachsenden Hölzer* (3d ed. 1890); *Lehrbuch der Baumkrankheiten* (2d ed. 1889; Eng. trans. by W. Somerville, 1894). In this work the author reviews the development of the study of vegetable pathology; the causes of vegetable disease; the injuries induced by such plants as cryptogams, fungi, and phanerogams; and wounds, and diseases due to conditions of the soil.

HARTIG, THEODOR (1805-80). A German forester and naturalist. He was born at Dillenburg, was educated at Berlin (1824-27), and was successively lecturer and professor of forestry at the University of Berlin (1831-38) and at the Carolinum, Brunswick. His works include: *Die Aderflügler Deutschlands* (2d ed. 1860); *Vergleichende Untersuchungen über den Ertrag der Rotbuche* (2d ed. 1851). In collaboration with his father, Georg Ludwig Hartig, he also published the work entitled, *Forstliches und naturwissenschaftliches Konversationslexikon.* The eleventh edition of his father's *Lehrbuch für Förster*, the later reprints of which he had revised, was published in 1877.

HARTINGTON. A city and the county-seat of Cedar County, Neb., about 20 miles south by

east of Yankton, S. D.; on the Chicago, Saint Paul, Minneapolis and Omaha Railroad (Map: Nebraska, G 1). It is the centre of a farming and stock-raising district, and has some manufactures. Population, in 1900, 971.

HARTINGTON, MARQUIS OF. See DEVONSHIRE, EIGHTH DUKE OF.

HARTLAUB, härt'loup, GUSTAV (1814-1900). A German ornithologist, born in Bremen, and educated at Berlin, Bonn, and Göttingen. In addition to his contributions on ornithology to Troschel's *Archiv der Naturgeschichte* during a period extending from 1846 to 1871, he published several valuable scientific works chiefly on the birds of Africa. These include: *System der Ornithologie Westafrikas* (1857); *Beitrag zur Fauna Centralpolynesiens* (jointly with Finsch, 1867); "Die Vögel Ostafrikas" (also with Finsch, in vol. iv. of Decken's *Reisen in Ostafrika*, 1870); and *Die Vögel Madagaskars und der benachbarten Inselgruppen* (1877).

HARTLEBEN, härt'lâ-ben, OTTO ERICH (1864—). A German writer, born in Clausthal. He studied at Berlin, Tübingen, and Leipzig, and in 1889-90 was in the Government service as referendary successively in the district court of Stolberg-am-Harz and the criminal court of Magdeburg. His literary work includes some earlier verse, but consists of dramas principally, ranging from the satiric to the tragic. Of these *Rosenmontag* (1900) was perhaps best received. Some of them have found presentation in the United States.

HARTLEPOOL, här't'l-pōōl. An ancient seaport, market-town, and municipal borough, in Durham County, England, on a small peninsula in the North Sea, 18 miles east-southeast of Durham (Map: England, E 2). Sea fisheries, iron shipbuilding, marine engineering, cement manufacture, and coal trade are its chief industries. Its principal buildings are the borough hall, and Saint Hilda's Church of the thirteenth century, with its lofty embattled tower. Its lighthouse is visible 15 miles. A substantial sea-wall and esplanade are attractive features on the seaward side. The town maintains cemetery, markets, and free public library. It grew up around a monastery of which Saint Hilda was abbess, and its harbor was of importance in 1171. Its first charter was granted by King John. Population, in 1891, 21,300; in 1901, 22,700. Consult Sharpe, *History of Hartlepool* (1806; new ed. 1851).

HARTLEPOOLS, THE. A Parliamentary borough and port of Durham County, England, comprising the municipalities of Hartlepool (q.v.) and its extension, West Hartlepool (q.v.).

HART'LEY, Sir CHARLES AUGUSTUS (1825—). An English engineer and railroad-builder. He served through the Crimean War as captain of engineers in the Turkish contingent; was made engineer-in-chief of the European Commission of the Danube in 1856, and in 1862 was knighted. In 1867 he drew up plans for the enlargement of the harbor of Odessa, and won with them the competitive prize of 8000 silver rubles offered by the Emperor of Russia. In 1875 he was a member of the board of engineers appointed by the President of the United States to report on the practicability of J. B. Eads's plan for improving the south pass of the Mississippi River by means of jetties. The British Government named him a member of the International Technical Commission on the Suez Canal in 1884. As a consulting engineer he was employed by several governments, notably on the harbor and river improvements of the Hugli, the harbor of Triest, the Nile Barrage below Cairo, and the harbor of Varna. Among his published works are: *Delta of the Danube; Public Works in the United States and Canada; Inland Navigation in Europe;* and *History of the Engineering Works of the Suez Canal.*

HARTLEY, DAVID (1705-57). A celebrated English philosopher. His father was Vicar of Armley, in Yorkshire. At fifteen he entered Jesus College, Cambridge, and afterwards became a fellow of the college. He studied at first for the Church, but dissented from some points in the Articles, and in consequence had to abandon his original intention. He finally chose the profession of medicine, in which he attained considerable eminence. He practiced as a physician successively in Newark, Bury Saint Edmunds, London, and Bath, where he died. His chief work, entitled *Observations on Man, His Frame, His Duty, and His Expectations,* was begun when he was about twenty-five, and occupied him for sixteen years. It was published in 1749, and was translated into French and German. The first part relates to the constitution of the human mind, and is the really important and original part. The second part treats of religion and morals.

His handling of the mind turns throughout upon two theories. The first is called the doctrine of vibrations, or a theory of nervous action analogous to the propagation of sound, the suggestion of which he owed to Newton, of whose writings he was a student. The second theory was that the higher activities of the mind might be explained to a very wide extent by the principle of the association of ideas (see ASSOCIATION OF IDEAS)—a principle far from new in the statement of it, but never before appreciated in anything like the range of its bearings upon the phenomena of mind.

The doctrine of vibrations supposed that when any one of the senses was affected by an outward object, the effect was to set the particles of the nerve in a vibratory motion, which ran along to the brain, and produced corresponding vibrations in the cerebral substance. In like manner, when an active impulse proceeded outward to the muscles, the manner of communication along the nerves was of the same kind. He even extended these molecular vibrations to the other tissues. All conscious processes were regarded as having physiological correlations in brain processes. The opposition that immediately manifested itself against this part of Hartley's speculations arose from a mistaken notion that it favored materialism.

As regards the second doctrine of Hartley, the doctrine of association, he has the right to be regarded as the founder of the English school of association, although thinkers before him, among whom were Locke and Hume, had used the principle of association to explain many of the more developed mental contents. But it seems that Hartley was the first to make association a principle for the explanation of all complex psychical phenomena. He maintains that it is involved in the conversion of our sensations into ideas, and

also in the first origin of voluntary power, which he truly regards as essentially an acquired power. He then treats of the commonly recognized intellectual faculties, memory, imagination, reason, etc. Lastly, the emotions, which he classifies under six heads, imaginative emotions, ambition, self-interest, sympathy, theopathy (the religious sentiment), and the moral sense, may, according to him, be readily seen to be the products of association of certain elementary feelings that unite among themselves, and pass into new connections, and give birth to complex feelings, under the general law. Many of those explanations would be considered now as faulty or defective; but at the time Hartley's attempt was a great step in advance. In logic he seems to have been the forerunner of the algebraical theory of that science. (See LOGIC.) In addition to the work mentioned above, Hartley published in 1746 *Conjecturæ Quædam de Motu, Sensus et Idearum Generatione*. Consult: Bower, *Hartley and James Mill* (London, 1881); Schönlank, *Hartley und Priestley, die Begründer des Associationismus in England* (1882).

HART'LEY, DAVID (1732-1813). An English politician. He studied at Corpus Christi College, Oxford, and afterwards entered politics as a Liberal. Among his friends was Benjamin Franklin, whom he met during Franklin's stay in London, and with whom after his departure began a correspondence which continued through the years of the Revolution. He strongly opposed the policy of Lord North's Ministry in forcing a war with America, and labored to effect an exchange of prisoners, believing that any amelioration of hardships or acts of generosity would tend to lessen the bitter feelings of the combatants. He was a zealous supporter of Rockingham; and this, together with his friendship for Franklin, probably led to his selection as Plenipotentiary to sign the treaty of peace with the United States (Paris, September 3, 1783). His writings were nearly all of a political character, such as: "Two Letters from David Hartley, Esq., M.P.," in *Tracts Concerning County Petitions* (1780); and *An Address to the Committee of Association of the County of York* (1781). Consult: *The . . . Memoirs of Sir Nathaniel William Wraxall, 1772-84* (1884); *The Complete Works of Benjamin Franklin*, edited by John Bigelow (New York, 1887-88); and Hale, *Franklin in France* (Boston, 1888).

HARTLEY, JONATHAN SCOTT (1845—). An American sculptor, born in Albany, N. Y. He was educated at Albany, and afterwards went to England, where he studied at the Royal Academy, London. From 1876 to 1884 he was professor of anatomy at the schools of the Art Students' League, and from 1879 to 1889 president of the League. His works include the bas-relief on the monument at Saratoga erected to commemorate the defeat of Burgoyne, a statue of Miles Morgan at Springfield, Mass. (1882), and a number of ideal figures, among them the "Young Samaritan" and the "Whirlwind."

HART'LIB, SAMUEL (c.1600-c.1670). An English social reformer. He was born at Elbing, West Prussia, of Polish ancestry, and went to London in 1628. He is said to have introduced the earlier writings of Comenius into England (1637 and 1639), and to have taken an active part in the movement for the unification of the various Protestant sects. He was an intimate friend of Milton, and is said to have been very charitable. His publications, which are devoted chiefly to educational and economic reforms, include: *Considerations Tending to the Happy Accomplishment of England's Reformation in Church and State* (submitted to Parliament in 1647); *Macaria* (1641), containing the outlines of an ideal State; and *The Reformed Husbandman* (1651).

HARTMANN, härt'mân, JAKOB, Freiherr von (1795-1873). A German soldier, born at Maikammer, in the Palatinate. He was trained in the French military institutes of Bonn and Saint Cyr; in the campaigns of 1814-15 served in the French ranks against the Allies, and, having entered the Bavarian Army in 1816, rose to be lieutenant-general in that organization (1861). As such, he fought against Prussia in 1866. Promoted to be general (1869), he commanded the Second Army Corps of Bavaria in the Franco-German War, during which he captured the fortress of Marsal, and took a noteworthy part in the battle of Sedan. Subsequent to the war he retained command of the corps, with headquarters at Würzburg.

HARTMANN, JOHAN PEDER EMILIUS (1805-1900). A Danish composer, born at Copenhagen. He was one of a family of German-Danish musicians, a grandson of Johan Hartmann, the composer, and the son of August Wilhelm Hartmann, who was an organist at Copenhagen (1800-50), and the teacher of his more distinguished son. Young Johan became a teacher in the Conservatory in 1827, director in 1840, and royal chapel-master in 1849. He composed a number of works, among which are the operas: *The Raven, or Brotherly Proof* (1832); *The Golden Horns* (1834); *The Corsairs* (1835); *Little Christina* (1846); music for dramas by Anderson, Oehlenschläger, and Heiberg; song cycles, and instrumental music for piano and violin, etc. From 1839 to 1892 he was president of the Musical Association of Copenhagen. He ranks among the first of Danish composers.—His son, EMIL HARTMANN (1836—), born at Copenhagen, was at first an organist, and afterwards gave himself entirely to composition. His works consist of ballets, overtures, songs, several operas, and much instrumental music.

HARTMANN, Sir JULIUS VON (1774-1856). A German general, born in Hanover. He served in the Hanoverian artillery against France in the Netherlands (1793-94), and from 1803 in the German Legion, in which, as commander of artillery, he fought under Wellington in the Peninsular campaign and at Waterloo. In 1833 he was appointed to the command of the entire Hanoverian artillery, which he efficiently organized, in 1836 was promoted to be lieutenant-general, and in 1850 was retired.

HARTMANN, KARL ROBERT EDUARD VON (1842—). A German philosopher. He was born in Berlin, February 23, 1842, educated at the school of artillery, and held a commission from 1860 to 1865, when he resigned it because a serious knee trouble, brought on by an accident, made it impossible for him to perform his duties. In 1867 he took his degree at Rostock and returned to Berlin, where he has lived ever since, devoted to literary pursuits, and doing most of

his work in bed, while suffering great pain. This circumstance has, however, not diminished his literary activity. The titles of some of his works will show his versatility: *Aphorismen über das Drama* (1870); *Shakespeares Romeo und Juliet* (1875); *Die Selbstzersetzung des Christenthums und die Religion der Zukunft* (1874); *Wahrheit und Irrthum im Darwinismus* (1875); *Zur Reform des höheren Schulwesens* (1875); *Beiträge zur Naturphilosophie* (1876); *Zur Geschichte und Begründung des Pessimismus* (1880); *Die Krisis des Christenthums in der modernen Theologie* (1880); *Der Spiritismus* (1885); *Aesthetik* (1886-87); *Zwei Jahrzehnte deutscher Politik und die gegenwärtige Weltlage* (1888). But these are not his most important works. His first book, *Philosophie des Unbewussten* (1869; Eng. trans. by E. C. Coupland, under the title *The Philosophy of the Unconscious*, London, 1884), went through edition after edition, and gave rise to a very copious controversial literature. Höffding says that between the years 1870 and 1875 fifty-eight works appeared treating of Hartmann's philosophy. Its peculiar combination of optimism with pessimism is no doubt the cause of its popularity.

In opposition to Schopenhauer (q.v.), Hartmann maintains that idea is indispensable to will. "No one can in reality merely *will*, without willing *this* or *that:* a will which does not will something, is not; only through the *definite content* does the will obtain the possibility of existence, and this content is *idea*. Therefore *no volition without mental object*, as Aristotle said long ago." Against Hegel, whom Hartmann mistakenly conceives as advocating a doctrine of non-willing idea, he maintains that it is necessary "to recognize will in the idea, whenever the latter displays an outward causality." The world, as being a process, must therefore be the product of will; and as will implies idea, it must be the product of will realizing an idea. But, according to Hartmann, an idea need not be conscious. Indeed, consciousness "cannot at all lie in the idea as such, but must be an accident; which comes to the idea from elsewhere. The action of unconscious will is clearer in itself, and appears less paradoxical;" indeed, will must be unconscious if the idea is unconscious. The term 'the Unconscious' is used by Hartmann to "designate the united unconscious will and unconscious idea," or the subject of which unconscious will and unconscious idea are the two attributes inseparably united. Will and idea "are not two drawers in the Unconscious, in one of which lies the irrational will, in the other the powerless idea, but they are two poles of a magnet with opposite qualities, on whose opposition the world rests." They "contradict one another as little as say the redness and the perfume of the rose." But though thus compatible, "the one is what the other is not (the will is not logical, and the idea not endowed with will)." 'The Unconscious,' thus defined, is an individual, "an unconscious world-soul," which is "simultaneously present and purposively efficient in all organisms and atoms, the bodily life and the human mind." It is one in all space and in all time, space and time being its creations, not its conditions. It can properly be defined as "pure, unconscious (impersonal but indivisible, therefore individual) Spirit," and in accordance with this definition Hartmann says that "our Monism may be more precisely characterized as spiritualistic Monism." Consciousness arises out of the 'unconscious' by "the emancipation of the idea from the will." "The essence of the consciousness of the idea is the extrication of the same from its native soil, the realizing will, and the opposition of the will to this extrication." The conscious idea "is idea preëminently free from every effort at self-realization, but without prejudice to the possibility of afterwards becoming itself again content of will." This emancipation of idea from will arises when organized matter suddenly breaks in upon this self-contained peace of the Unconscious and thrusts upon the astonished individual spirit an idea which falls upon it as from the skies, for it finds in itself no will to the idea. "The idea has been sent from the will, to confront it in future as independent power, in order to bring under subjection to itself its former lord." The will endeavors to negate the idea but cannot, and this failure is the cause of pain, which is "the vexation of the unconscious individual mind at the interloping idea." This break-up of the original unity of will and idea is itself the work of 'the Unconscious,' which "can never err—nay, not even doubt or hesitate;" it "occurs precisely at the most suitable moment, when the whole purpose frame of the world requires it." Indeed, "the world is contrived and guided as wisely and as well as is possible." "The existing world is the best of all possible ones," and yet "it may still be thoroughly bad," its non-existence may be preferable to its existence. An empirical examination of the facts proves this to be the case. The contrary belief is an illusion of which there are three stages. The childhood of the individual and the race is spent in the illusion that the individual can attain happiness now; the youth of the race (mediævalism) is spent in the belief that happiness is attained by the individual in a transcendent life after death; and the manhood of the race is spent in the illusion that happiness is attainable by others in this world in the remote future. The true view is that of "the final redemption from the misery of volition and existence into the painlessness of non-willing and non-being." But this redemption can be won only by making "the ends of the Unconscious ends of our own consciousness." And the end of the unconscious is the elimination of misery. Positive happiness is unattainable. But "only in complete devotion to life and its pains, not in cowardly renunciation and withdrawal, is anything to be achieved for the world-process. This devotion to life is necessary for the time being, since only by contributing to the advance of intelligence can we hope to bring about a state of affairs in which the major part of the actual volition or of the functioning Unconscious Spirit shall be under the control of intelligence. When this consummation is achieved, then volition will resolve upon its own non-continuance, seeing that continuance involves a surplus of misery. This resolve will be a simultaneous common resolve of individuals in whom the larger half of the active Spirit of the universe is manifest." For a survey of the controversial literature on Hartmann's teaching, consult: Plumacher, *Der Kampf ums Unbewusste* (2d ed., Leipzig, 1890); also in general Kober, *Das philosophische System Eduard von Hartmanns* (Breslau, 1884); Drews, *Eduard*

von Hartmanns Philosophie und der Materialismus in der modernen Kultur (Leipzig, 1890).

HARTMANN, MORITZ (1821-72). An Austrian poet and novelist, born of Jewish parents at Duschnik, Bohemia. He studied at Prague and Vienna, traveled in Italy, Switzerland, and Germany, and afterwards taught in Vienna till 1844, when he felt it wise to leave his native country in order to publish *Kelch und Schwert* (1845), radical in its religious and patriotic sentiment. *Neuere Gedichte* (1847) followed a residence in Belgium and France. He then returned to Austria and was imprisoned, but was freed by the Revolution of March, 1848. He became the leader of the German Party at Prague, was chosen Deputy to the National Assembly at Frankfort, fled from Vienna in time to escape imprisonment, and took part in the 'Rump Parliament' at Stuttgart. From 1849 to 1868 he lived in voluntary exile in Switzerland, England, Ireland, and the East, residing longest in Paris, Geneva, and Stuttgart. He was Paris correspondent of the *Kölnische Zeitung*, and represented it in the Crimea during the Russo-Turkish War. In 1865 he settled in Vienna as one of the editors of the *Neue Freie Presse*. One of his best-known works is a political satirical poem, the *Reimchronik des Pfaffen Maurizius* (1849). He also published volumes of tales (1863-66), under the titles *Novellen* and *Nach der Natur*. Hartmann's select poems were edited in 1874; his *Works*, in 10 vols., 1873-74. Consult Brandes, *Das junge Deutschland* (Leipzig, 1891).

HARTMANN, ROBERT (1832-93). A German anthropologist, born at Blankenburg. He was educated at Berlin, and was made professor of anatomy there in 1867. He wrote: *Reise des Freiherrn A. von Barnim durch Nordafrika* (1863), a description of an expedition in which he had taken part in 1859 and 1860; *Naturgeschichtlich-medizinische Skizze der Nilländer* (1865); *Die Völker Afrikas* (1879); *Handbuch der Anatomie des Menschen* (1881); *Der Gorilla* (1881); *Die menschenähnlichen Affen* (1883); and the anthropological part of the report of the cruise of the man-of-war *Gazette*. With Bastian he founded the *Zeitschrift für Ethnologie*.

HARTMANN VON AUE, fôn ou'e. A German poet. See AUE, HARTMANN VON.

HARTNACK, härt'nâk, EDMUND (1826-91). A German optician, born at Templin. He worked under Ruhmkorff in Paris, and with Oberhäuser, whose establishment he bought. After 1870, when he was forced to leave Paris, he sold the factory and established a new one at Potsdam. He made many improvements in the microscope, especially by his extension of Amici's system of immersion, and by his work on the Nicol prism.

HARTO'GIA (Neo-Lat. nom. pl., named in honor of John *Hartog*, an early traveler). A genus of trees, or shrubs, of the natural order Rutaceæ. *Hartogia capensis*, now known as *Agathosma hispida*, a native of the Cape of Good Hope, is only 10 or 15 feet high, but the trunk is a foot to a foot and a half in diameter. The wood, which is hard, fine-grained, close, and tough, is much valued as veneer, and when polished is equal to the finest mahogany. The Dutch colonists call it ladlewood, probably from one of the first uses to which they found it convenient to apply it.

HART'RANFT, JOHN FREDERIC (1830-89). An American soldier and politician, born in Pennsylvania. He graduated at Union College in 1853, and was admitted to the bar in 1859. He was among the first to answer President Lincoln's call for volunteers in the spring of 1861, and took part in the first battle of Bull Run as aide-de-camp on the staff of Gen. William B. Franklin. He then raised the Fifty-first Pennsylvania Regiment, which he led in a brilliant and successful charge at Antietam. He commanded a brigade at Vicksburg, and afterwards was with Sherman in the advance to Jackson, Miss. He recaptured Fort Stedman before Richmond, displaying great bravery, for which he was brevetted major-general. After the war he was twice chosen Auditor-General of Pennsylvania, and served as Governor for two terms, during which he reorganized the militia of the State and put it upon a strictly military basis.

HARTSHORN. The name given in pharmacy to the antlers of the *Cervus elaphus*. Its composition is very different from that of persistent horns, as those of the ox, for example, and is identical, or nearly so, with that of bone. The products of its distillation were formerly much used in medicine, under the titles of oil of hartshorn, volatile salt of hartshorn, spirits of hartshorn, etc.; but they are now replaced by simpler preparations of the active ingredients of these substances, namely, ammonia and carbonate of ammonia. See also AMMONIA.

HARTS'HORNE, EDWARD (1818-85). An American physician, born in Philadelphia. In 1843, and again in 1844, he published reports in favor of the separate system of prison discipline, which attracted considerable attention, as they were the first written by one who had had experience with the practical workings of the system. In 1847 he was the secretary of the first prison discipline convention which met in Philadelphia, and ten years later acted in the same capacity to the first sanitary convention in the United States.

HARTSOEKER, härt'sōō-kĕr, NIKLAAS (1656-1725). A Dutch physicist and histologist, born at Gouda. He early showed a taste for mathematics and physics; studied these subjects without the permission or knowledge of his father, a Reformed clergyman, who wished his son to become a clergyman; and at the age of eighteen made a powerful microscope, with which he made striking discoveries regarding spermatozoa. His father finally consented to his going to Leyden, and later to Amsterdam, where he met Huygens, and confided to him his discoveries. In 1678 he went to Paris and studied under Cassini; from 1684 to 1696 he lived in Paris, and then returned to Holland to become the instructor of Peter the Great. He went to Düsseldorf, in 1704, on the urgent invitation of the Elector of the Palatinate, and was appointed honorary professor at Heidelberg. In 1717, after the Elector's death, he moved to Utrecht, where his continued application to work broke his health. His works include: *Essai de dioptrique* (1694), in which his independent discovery of many of Newton's observations on light appeared, as well as a well-defined theory of general physics; *Principes de physique* (1696), developing this theory; *Conjectures physiques* (1707-08); and *Cours de physique* (1730).

HART'S-TONGUE FERN. A name applied to ferns of the genus Scolopendrium, or Phyllitis, as it is sometimes designated. They are large ferns with oblong, strap-shaped leaves or fronds. *Scolopendrium vulgare* is common in Europe and Asia, but, so far as is known, is rare in America. It occurs in damp ravines or under limestone cliffs in a few localities in New York, Tennessee, and Canada. The fronds are 10 to 15 inches high and 1 to 2 inches broad, with heart-shaped bases, and entire or undulate margins. The fruit-dots are linear and occur by twos almost at right angles to the midrib, one occurring on the upper side of a veinlet and its mate on the lower side of the next veinlet; thus they appear to be arranged in pairs.

HART'SUFF, GEORGE LUCAS (1830-74). An American soldier, born at Tyre, N. Y. He graduated at West Point in 1852, and served on the frontier and in Florida, where, during a fight with the Seminole Indians, he received a wound which eventually caused his death. In March, 1861, he was appointed assistant adjutant-general with the brevet rank of captain, and was assigned to duty under Rosecrans in West Virginia. Later he was severely wounded at Antietam, and immediately after the battle was made brevet colonel for gallant and meritorious services. On March 13, 1865, he was given the brevet rank of major-general in the Regular Army, and from April 3d to May of the same year was in command of City Point and Petersburg. He was mustered out of the volunteer service on August 24, 1865, and resigned from the Regular Army on June 29, 1871, because of disability resulting from wounds received in battle.

HARTT, CHARLES FREDERICK (1840-78). An American geologist, born at Fredericton, N. B. He studied under Agassiz for a number of years, and then accompanied him as geologist on an expedition to Brazil in 1865. After his return he was appointed professor of geology and physical geography at Cornell University, but interrupted his university duties to make three more expeditions to Brazil, where he finally settled in 1875 to enter upon his great work as chief of the geological commission appointed to make a survey of the entire empire. Scarcely more than two years later, however, he contracted a fever and died. His principal publication is *The Geology and Physical Geography of Brazil* (1870). Consult Hay, "The Scientific Work of Prof. Charles Frederick Hartt," in the *Proceedings and Transactions of the Royal Society of Canada*, series 2, vol. v. (Ottawa, 1899).

HARTWICH, härt'vĭk, EMIL HERMANN (1801-79). A German engineer, born at Bensdorf, near Brandenburg. He was inspector of waterworks in Steinau and commissioner of buildings at Danzig, where he undertook the completion of the moles in the Baltic near Neufahrwasser. He built the bridge over the Rhine at Coblenz, and introduced many English methods in German railroads, especially a central switch apparatus. Among his writings are: *Erweiterungsbauter der rheinischen Eisenbahn* (1864-67); *Denkschrift, betreffend die Herstellung einer Eisenbahn welche Berlin durchschneidet* (1872); *Aphoristische Bemerkungen über das Eisenbahnwesen* (2d ed. 1874); and many contributions to the *Zeitschrift für Bauwesen.*

HARTWIG, härt'vĭk, or **HARTWICK,** JOHN CHRISTOPHER (1714-96). A German-American Lutheran clergyman. He was born in Saxe-Gotha, and is said to have studied at the University of Halle. In 1745, after having been ordained in the German Lutheran Church in London, he came to America to take charge of several churches in Albany and Dutchess Counties, N. Y. Two years later he assisted at the organization of the First Lutheran Synod in Philadelphia. Besides his work in New York, his clerical labors extended also to Pennsylvania, Maryland, Virginia, and New England. In 1761 he obtained the title to 21,500 acres of land in Otsego County, N. Y., which he had bought from the Indians. This was employed, in accordance with his directions, to establish a theological and classical seminary. This institution, known as the Hartwick Seminary, was opened at Hartwick, N. Y., in 1815.

HARTWIG, OTTO PETER KONRAD (1830—). A German historian, born at Wichmannshausen. He studied theology and linguistics at Marburg, Halle, and Göttingen, and in 1867 became a member of the staff of the Marburg University library, from which he went to the University of Halle as librarian-in-chief, a post he resigned in 1898. In 1884 he founded, with Schulz, the *Centralblatt für Bibliothekswesen.* Among Hartwig's works are: *Henricus de Langenstein* (1857); *Aus Sicilien* (1867-69); *Sicilianische Märchen*, with the notes of Pauli, and a biographical sketch of him (1870); *Die Uebersetzungslitteratur Unteritaliens in der normannisch-staufischen Epoche* (1886); *Sulla data degli sponsali di Arrigo VI. con la Costanza*, etc., with Amari (1878); *Quellen und Forschungen zur ältesten Geschichte der Stadt Florenz* (1875-80); and *Festschrift zum 500 jährigen Geburtstage Gutenbergs* (1900).

HARTZENBUSCH, härts'en-bush, JUAN EUGENIO (1806-80). A Spanish dramatist of the Romantic movement, born at Madrid, of a German father and a Spanish mother. He first studied theology, and then took to painting, but was forced by his father's illness to follow for some years his profession, that of a cabinet-maker, training himself meanwhile for the work of a playwright by preparing versions of domestic and foreign dramas. His success was assured from the time of the first performance of the *Amantes de Teruel*, his best-known production, and one of the most important plays of the Romantic period of Spanish literature in the nineteenth century. Highly sentimental, it brings once more upon the boards a story of sad loves which had already been treated by Artieda, Tirso de Molina, and Montalvan. Later dramas of Hartzenbusch, most of them of an historical nature, are: *Doña Mencia; Alfonso el casto* (1841); *La jura en Santa Gadea* (1845), dealing with the history of the Cid; *La madre de Pelayo* (1846); *La ley de raza*, relating to the history of the Visigothic Empire; *Vida por honra* (1858), a statement of the tragic love of the Conde de Villamediana; *El mal apóstol y el buen ladrón* (1860), a play with some of the characteristics of the *Auto sacramental;* his comedies of a Moretinian type are: *Un sí y un no; La visionaria; Juan de las Viñas; La redoma encantada; Los polvos de la madre Celestina; Las Batuecas.* Hartzenbusch also published *Ensayos poéticos y artículos en prosa*, etc. (1843), and *Cuentos y fábulas* (1861). He was a lyric poet of but modest pretensions. As editor

of the dramas of Lope de Vega, Calderon, and other masters of the *siglo de oro*, he did not possess the proper scientific and critical ability. Associated with the staff of the *Biblioteca Nacional* at Madrid, after 1844, he became chief librarian in 1862, and retained this post till his death. He was a member of the Academy since 1847. Consult his works in the *Colección de escritores castellanos* (Madrid, 1887 et seq.); Fernández-Guerra's essay on Hartzenbusch in Novo y Colsón, *Autores dramáticos contemporáneos*.

HARTZ (härts) **MOUNTAINS.** See HARZ MOUNTAINS.

HARUGARI, hä'rōō-gä'rē. A German order in the United States, named after an old Teutonic tribe. It was founded in 1847 as a protest against the anti-German sentiment then existing in the country, and had as its special objects the preservation of the German language, customs, and traditions. It was also a social, benevolent, and altruistic organization. It has at present some 300 lodges, with a total membership of about 30,000.

HARUN AL-RASHID, hà-rōōn' ăl rà-shēd' (?-809). The fifth of the Abbasside caliphs. He was born either on the 20th of March, A.D. 763, or the 15th of February, A.D. 766, and in 786 succeeded his elder brother, Al-Hadi in the caliphate. The administration during a considerable part of the brilliant reign of Harun was intrusted to the Grand Vizier Yahya, head of the powerful Barmek or Barmecide family; and the energy of the administration, the enforcement of order, and the general prosperity of the country proved that Harun's confidence was not misplaced. Rebellions were suppressed, and the integrity of the Empire was preserved, saving the loss of a portion of North Africa occasioned by the rise of the Idrisites (q.v.). The capital, Bagdad, became the most flourishing city of the period. Tribute was paid to Harun from all quarters, and splendid edifices were erected by him at an enormous cost. Harun loved luxury and pleasure, was a patron of learning, poetry, and music, and his Court was the resort of the most eminent Mohammedans of the age. He was celebrated in countless songs and narratives; and is perhaps best known in the West as the caliph around whom centre the tales of the Arabian Nights. Toward the end of his reign he conceived a hatred toward the Barmecides (q.v.), due, perhaps, to jealousy of their growing influence and power; yet he suffered the reins of government to remain in their hands for some years. In 803 he caused the Vizier, his four sons, and all their descendants, one only excepted, to be executed, not even excepting his favorite Jačafar, who had been his companion in his nocturnal rambles through the streets of Bagdad. The affairs of the Empire felt the change; disorders broke out in every part of the caliphate, and treason and rebellion led to civil war. A formidable insurrection broke out in Khorassan, and Harun marched in person against the rebels. But an attack of apoplexy obliged him to remain behind in Tus, where he soon afterwards died in the month of March, 809. While Harun was an enlightened monarch, he was a thorough Oriental despot, who has been somewhat idealized in popular tradition. Consult: Muir, *The Caliphate* (London, 1891); Osborn, *Islam Under the Khalifs of Bagdad* (London, 1878); Palmer, *Haroun Alraschid* (London, 1881); Weil, *Geschichte der Chalifen* (Mannheim and Stuttgart, 1846-62).

HARU NO MIYA, hä'rụ nō mē'yà, YOSHIHITO (1879—). The Crown Prince of Japan. He was named heir apparent on November 3, 1889, and in 1900 married the Princess Sada Fudshiwara.

HARUSPICES (Lat., 'inspectors of entrails'). Roman soothsayers. They seem to have come originally from Etruria, whence the Romans derived many of their religious institutions. Their art, *haruspicina*, which in many respects was like that of the augurs (see AUGURIES AND AUSPICES), consisted in interpreting the will of the gods by inspecting the entrails of the animals offered in sacrifice (hence they are also called *extispices*), and by observing other circumstances connected with the offerings, such as the willingness or unwillingness of the victim to come to the altar, the flame, the smoke, etc. They took indications also from earthquakes, lightning, and all other extraordinary phenomena of nature called *portenta*. The haruspices did not equal the augurs in dignity and respect; they were regarded rather as media of communication with heaven than as possessing any independent religious authority. They had no organization, like the augurs; they did not, in earlier times, at least, form a *collegium*, nor had they a *magister*. They were, however, at one time considered of great importance; but in later times their art fell into disrepute with the more intelligent portion of the Roman citizens. Some of the later emperors, especially Alexander Severus, endeavored to revive and encourage the art of the haruspices, but it was finally abolished by Constantine. Their sacred books were called *libri haruspicini*, *fulgurales*, and *tonitruales*. Consult Bouché-Leclercq, *Histoire de la divination dans l'antiquité* (Paris, 1879-82).

HARVARD, JOHN (1607-38). An English clergyman in New England, the principal founder of Harvard College, born in Southwark, London. His father, Robert Harvard, was a butcher. His mother, who married twice after her first husband's death, became possessed of considerable property, which enabled her to give John Harvard a good education, and he was accordingly sent to Emmanuel College, Cambridge University, where he graduated in 1631, studied theology, and took his master's degree in 1635. In 1637 he married Ann Sadler, the daughter of a clergyman of Sussex, and removed to New England. There he settled at Charlestown, on Massachusetts Bay, where he was admitted a freeman in August, and where he became an assistant pastor of the First Church, of which the Rev. Z. Symmes was in charge. His health soon gave way, however, and he died of consumption on September 18, 1638, after a residence in the Colony of little more than a year. By his will he left his library of 260 volumes and a sum of about £400 to the college at 'New Towne,' later Cambridge, for which the General Court of the Colony had made an appropriation of £400 in 1636. A year after the young clergyman's death, in commemoration of his benefaction, the name of Harvard was conferred upon the institution. Consult Rendle, *John Harvard* (London, 1885).

HARVARD UNIVERSITY. The oldest institution of higher education in the United States, situated at Cambridge, Mass. It had its incep-

tion in a desire of the early settlers of the Colony of Massachusetts Bay to preserve and perpetuate in their new home the classical and theological learning acquired by many of them at the University of Cambridge, and to educate the "English and Indian youth in knowledge and godliness." To this end the General Court of the Massachusetts Bay Colony voted £400 in 1636, and in the following year appointed twelve eminent men of the Colony, including Governor John Winthrop, "to take order for a college at Newtowne," which was afterwards renamed Cambridge, in honor of Cambridge University. While the organization of the institution was in progress, Rev. John Harvard, an English non-conforming clergyman, died in 1638, bequeathing to the new school his library, consisting of 260 volumes, together with half of his estate, valued at about £400. In recognition of this gift—munificent in those days—the new school was named Harvard College. The Colonial magistrates and many private persons, emulating Harvard's generosity, also contributed books, funds, and gifts in kind. The first building was erected in 1637 by Nathaniel Eaton, who also taught until 1639, when he was dismissed for misconduct. The Rev. Henry Dunster was elected president in 1640, and in 1642 the first class, consisting of nine students, was graduated. The government of the college was the same year vested in a board of overseers, consisting of the Governor, the Deputy Governor, the magistrates, the teaching elders of the "six next adjoining towns" (Cambridge, Watertown, Charlestown, Boston, Roxbury, and Dorchester), and the president of the college. In 1650 the college was formed into a corporation, consisting of the president, five fellows, and the treasurer, for the immediate administration of the financial and educational affairs of the institution, and in 1657 the charter of the corporation was so amended as to dispense with the positive assent of the overseers in matters relating to the internal management of the college, leaving, however, final jurisdiction to that body if necessary. These two governing bodies acted as checks upon each other throughout the earlier history of Harvard, and though at times their antagonism was productive of some good, restraining the too rapid advances proposed by the liberal corporation on the one hand, and preventing the overseers from using the college for partisan purposes, yet the progress of the college was much retarded by these controversies. The character of the board of overseers has been fundamentally changed by successive legislative acts, concurred in by the corporation and overseers. According to the State Constitution of 1780 it was composed of the Governor, Lieutenant-Governor, Council and Senate of the Commonwealth, the president of the college, and the ministers of the Congregational churches of the towns mentioned above. In 1810 fifteen laymen and fifteen Congregational ministers, with the president of the Senate and the Speaker of the House, all inhabitants of the State, were substituted in place of the Senate and the ministers of the six towns. In 1814 the members of the Senate were restored to membership; the act of 1834 made clergymen of all denominations eligible for membership on the board; but it was not ratified by the corporation and overseers until 1843; the act of 1851 secularized the board by containing no reference to clergymen; the act of 1865 transferred the election of members of the board from the State Legislature to persons holding the B.A., M.A., and honorary degrees from the college, who were to vote on commencement day at Cambridge; in 1880 eligibility to election as overseer was extended to non-residents of the State. Nominations are made by postal ballot, while the election is held in Cambridge on commencement day. Thus Harvard was successively freed from Church, State, and sectional control.

The administrations of Presidents Dunster, Chauncy, Hoar, and Mather, covering a period of nearly seventy years, were characterized by a constant struggle for existence on the part of the college, due to the parsimony of the government, and to the religious controversies of the liberals and orthodox. Rev. Increase Mather, who was president of the college for fifteen years, actually secured, in 1692, the passage of an act granting a new charter, placing the institution under control of the Calvinists, but the royal sanction to the instrument was withheld. In 1707 the struggle for the control of the college culminated in the confirmation of the charter of 1650, the liberals gaining control of the corporation, while the orthodox retained their influence in the board of overseers. In 1721 Thomas Hollis, an English merchant, endowed a divinity chair, expressly stipulating that the incumbent should not be subjected to any particular religious tests. The overseers at first refused to accept the gift; and when, at the instance of the corporation, they finally did accept it, the founder's wishes were disregarded by the exaction of a number of confessions from the first appointee. In 1762 an attempt was made by the orthodox party to establish a rival college in the Colony, but this was stoutly resisted by the overseers, and they succeeded in dissuading Governor Bernard from granting a charter. Fire destroyed, in 1764, the first Harvard Hall, containing the library and apparatus. The greatest loss was the founder's library, one book being rescued out of his entire collection. Sympathy for the college was awakened throughout the Colonies, which generously aided to repair the loss.

The liberal tendencies of Harvard manifested themselves on the political as well as on the religious side. The class of 1768 voted to take their degrees dressed in homespun, and the degree of LL.D. was conferred upon George Washington in 1776. Throughout the critical period of the Revolution, Harvard loyally supported the patriotic cause by converting its funds into currency, whereby its finances greatly suffered. In 1780 the new State Constitution confirmed the college charter with slight modifications, and by 1793 the college had partially recovered from its financial difficulties, its funds being then estimated at $182,000. The college after the close of the Revolution assumed its normal growth; the standard of scholarship was somewhat raised, and in 1782 a medical department was established. Under President Kirkland's vigorous administration, 1810-28, the college grew considerably. At the instance of Prof. George Ticknor, who had studied at Göttingen, a committee, with Hon. Joseph Story as chairman, was appointed to inquire into the methods of discipline and instruction at the college. The committee reported in 1824, recommending the division of the college into departments and the instituting of two classes of studies: those necessary for a degree and those which

might be taken by students merely wishing "to pursue particular studies to qualify them for scientific and mechanical employment and the active business of life." These suggestions met with strong opposition from the conservatives. A new code of laws was nevertheless drawn up the following year, organizing the 'faculty of the university,' systematizing the college administration, creating departments, and admitting special students. This marks the transition period of Harvard from a classical college modeled after the traditions of Oxford and Cambridge to a university based on the principles of European universities. The attempt at expansion, which involved an increase in expenditure, received a temporary check when, in 1824, the Legislature refused to renew the grant of the bank tax, which had netted the college, since 1814, about $10,000 annually. In 1825 the disbursements exceeded the income by about $4000, and the attendance, owing to the enforced economy and the withdrawal of aid from needy students, decreased from over 300 in 1824, to about 200. Nevertheless, the policy of expansion was continued under President Josiah Quincy, private benefactions, as usual, supplying the want of State aid. The law department, which had been established in 1817, was greatly strengthened by Mr. Nathan Dane's endowment of an additional chair, to which Joseph Story, whose works on equity and constitutional law form such an important part of the legal literature of this country, was appointed. In the modern-language department Professor Ticknor and his successor, Henry W. Longfellow, successfully offered a number of elective courses, but in other departments the attempt gradually to introduce electives did not meet with equal success. It has always been Harvard's tendency to encourage freedom of thought, and on that account it was formerly considered the nursery of Unitarians. The Harvard authorities, however, were timorous, and although some of the leading thinkers of that sect in the United States, as, for example, Emerson and Channing, were graduates of the college, yet when the former addressed the divinity students in 1838, exception was taken to some of his remarks as being too liberal. Harvard's attitude toward the slave question was decidedly conservative. Charles Sumner and Wendell Phillips, leading advocates of the abolition movement, had, however, been educated at the college, and when the final call to arms was issued, its sons were among the first to respond. To the memory of those who fell in the Civil War, Memorial Hall, one of the finest buildings of the university, and erected by the alumni at a cost of over $300,000, was fittingly dedicated in 1874. The administrations following President Quincy's resignation in 1845 were distinguished for their conservatism. The only notable additions to the university during that period were the Lawrence Scientific School and the Dental School. The struggle between the humanities and sciences, the rigid curriculum and the more liberal elective system, was about to come on in earnest, and Harvard's position in the educational world was largely decided when the great organizer and educational reformer Charles William Eliot was elected in 1869 as its president.

At the beginning of President Eliot's administration Harvard consisted of the college, wherein the courses were largely required, and a number of semi-independent professional schools, having no entrance requirements or correlation of studies. The total attendance, which was largely from New England, was, in 1869-70, 1107, including 615 college students and 13 graduates. The resident faculty numbered 78, including Lowell, Holmes, Agassiz, and Gray. The elective question was as yet in a chrysalid state, and the few elective courses offered were still in ill repute and not considered as on a par with required work. The funds of the university aggregated $2,257,989.80, and the income $270,404.63. The total value of university property was estimated at about $10,000,000. The library contained about 192,000 volumes. President Eliot reorganized and consolidated the several schools, and in 1903 Harvard University comprised eleven correlated departments as follows: (1) Harvard College, the Lawrence Scientific School, established in 1847, and which grew slowly until 1885, and the Graduate School, organized in 1872 for students pursuing original research. These have, since 1890, been under the immediate charge of the Faculty of Arts and Sciences, and include fourteen departments, offering elective courses in the sciences, mechanical and fine arts, and humanities, which lead to the degrees of B.A., B.S., M.A., M.S., Ph.D., and S.D. In 1902-03 the attendance in the college was 2109; in the Scientific School, 584; and in the Graduate School, 316. In addition to the regular courses offered by the faculty, persons holding the Ph.D. or S.D. degree are authorized to give courses either gratuitously or at a stipulated fee, in the same manner as the docents at the German universities. Evening readings, lectures, and concerts, including those of the Boston Symphony Orchestra, have become a permanent feature at the university. For graduates engaged in original research, 41 fellowships, yielding from $300 to $1000, are available. There are also 205 scholarships open to all students under this faculty, besides several special funds for the assistance of needy students. (2) The Law School, established in 1817, and reorganized in 1872 by Professor Langdell, who first introduced the inductive or case method, confers the LL.B. degree, and had, in 1903, an attendance of 640. (3) The Medical School, established in 1782, and the Dental School, founded in 1867, united since 1899 under the faculty of medicine, and located at Boston. They confer the M.D. and D.D.S. degrees, and had, in 1903, an attendance of 445 and 112, respectively. (4) The Divinity School, formally organized in 1819, is non-sectarian, and confers the degree of S.T.B. Under certain specific conditions, its students may also earn the M.A. and Ph.D. on recommendation of the faculty of arts and sciences. Its attendance is small. (5) The Bussey Institution, a scientific school of agriculture and horticulture, the only school to which there are no formal entrance requirements, was organized in 1871, and is situated at Jamaica Plain, about five miles from Boston. It confers the degree of Bachelor of Agricultural Science. (6) The Arnold Arboretum was founded in 1872 under the will of James Arnold, for scientific research in arboriculture, forestry, and dendrology, and has a museum for Massachusetts trees and shrubs. It occupies about 220 acres in West Roxbury. (7) The University Library, including the separate libraries of the several schools and

departments, aggregates 576,900 volumes and 250,000 pamphlets, the largest collection being at Gore Hall, which contains 387,100 volumes. (8) The University Museum, situated at a short distance from the main buildings, consists (a) of the Museum of Comparative Zoölogy, founded in 1859 by private subscription and by the State, and greatly enriched by the collections of Prof. Louis Agassiz and the gifts of his son; (b) the Peabody Museum of American Archæology and Ethnology; (c) the Botanical Museum; and (d) the mineralogical and geological sections. The Semitic, the Fogg Art, and the Germanic Museums are each located in separate buildings. (9) The Botanic Garden, founded in 1807, occupies about seven acres, on which are cultivated about 5000 species for scientific purposes. (10) The Gray Herbarium includes the famous collection of Prof. Asa Gray, presented to the university in 1864. (11) The Astronomical Observatory, established in 1843, maintains a station near Arequipa, Peru, and a series of meteorological stations crossing the Andes at elevations varying from 100 to 19,200 feet.

In 1879 the solution of the question of higher education for women was partially begun by Harvard professors and instructors, with the organization of the Society for the Collegiate Instruction for Women. In 1894 the name of the society was changed by the General Court of Massachusetts to Radcliffe College (q.v.), and permission was given it to confer the ordinary collegiate degrees subject to the approval of a board of visitors, composed of the president and fellows of Harvard College, under whose direction and control Radcliffe was then placed. Its immediate government is in charge of a council and an academic board, of which bodies the president and dean of Harvard College are members. Instruction is given mainly by the faculty of Harvard College, and sixteen scholarships are available for worthy students. Its attendance is approximately 450. The government of Harvard University is vested in (1) a board of overseers, of which the president and treasurer are members ex-officio, and five of whom are elected annually for a term of six years; (2) the corporation, composed of the president, treasurer, and five fellows—a self-perpetuating body, having charge of the management of the material and educational interests of the university; (3) the university council, composed of the members of the several faculties, with jurisdiction on educational questions that concern more than one faculty; and (4) the faculties of the several schools.

Students under any of the faculties may register in any course in the university, a provision which tends to bind more closely the interests of the several schools. The entrance requirements were gradually raised, until 1890, when the limit was practically reached; and sciences and modern languages are now accepted at the college in lieu of one ancient language. These changes have had a very wholesome effect in forcing preparatory schools in turn to raise and broaden the standard of their courses of study. The professional schools, with the exception of the Dental School, now require matriculants to hold a collegiate degree. The question of shortening the college course has not been definitely settled. Industrious students may, however, so arrange their work as to complete the college course in three years.

The university maintains a summer school under the faculties of arts and sciences, theology, and medicine, with courses designed mainly for teachers. In the summer of 1902, 945 students were enrolled. The schools issue a number of important publications, partly independent journals and partly stated reports in scientific periodicals. Important work is done by students in clubs connected with the various departments. Athletic sports are regulated by a committee representing the faculty, the graduates, and undergraduates. Physical training is provided by the Hemmenway Gymnasium, built in 1878, and by two athletic fields, containing twenty-four acres. The Harvard Union, an elaborate students' clubhouse, the gift of Henry Lee Higginson, was opened in 1901. In 1886 attendance at chapel was made voluntary, and, contrary to expectations, the religious side of the university has not suffered thereby. Five eminent preachers are annually appointed, without regard to sect, to conduct daily services at the chapel, and seats also are provided for students at the local churches at the expense of the university. Religious societies find ample accommodations for their meetings at the Phillips Brooks House. The grand total attendance of the university in 1903 was 5206, with a faculty numbering 534. The university property, in 1902, was estimated at $20,914,541, and consisted of grounds and buildings valued at $5,300,000, scientific apparatus, etc., valued at $1,500,000, and productive funds of $14,114,541. The income, exclusive of gifts and bequests to the amount of $1,095,737, was $1,436,292.

The publications of the university, issued officially or indirectly, are: *Harvard Oriental Series; Harvard Studies in Classical Philology; Studies and Notes in Philology and Literature; Harvard Historical Studies; Quarterly Journal of Economics; Harvard Law Review; Annals of the Observatory of Harvard College; Annals of Mathematics, New Series; Contributions from the Cryptogamic Laboratory; Publications of the Museum of Comparative Zoölogy; Contributions from the Zoölogical Laboratory; Publications of the Peabody Museum of Archæology and Ethnology; The Harvard Graduates' Magazine.*

The presidents of Harvard since its inception have been: Henry Dunster, 1640-54; Charles Chauncy, 1654-72; Leonard Hoar, 1672-75; Urian Oakes, 1675-81; John Rogers, 1682-84; Increase Mather, 1685-1701; Samuel Willard, 1700-07; John Leverett, 1708-24; Benjamine Wadsworth, 1725-37; Edward Holyoke, 1737-69; Samuel Locke, 1770-73; Samuel Langdon, 1774-80; Joseph Willard, 1781-1804; Samuel Webber, 1806-10; John Thornton Kirkland, 1810-28; Josiah Quincy, 1829-45; Edward Everett, 1846-49; Jared Sparks, 1849-53; James Walker, 1853-60; Cornelius Conway Felton, 1860-62; Thomas Hill, 1862-68; Charles William Eliot, 1869—.

Consult: Pierce, *History of Harvard University, 1636-1766* (1833); Quincy, *The History of Harvard University* (1840); Eliot, *A Sketch of the History of Harvard University* (1848); Thayer, "Historical Sketch of Harvard University," in the *History of Middlesex County* (1890); Hill, *Harvard College by an Oxonian* (1895); *Annual Report of the President and Treasurer of Har-*

vard College; and *The Harvard University Catalogue.*

HARVEST AND HARVESTING (AS. *hærfest*, OHG. *herbist*, Ger. *Herbst;* probably connected with Lat. *carpere*, to pluck, Gk. *καρπός*, *karpos*, fruit). The season and the process of gathering ripened crops. Formerly the terms were applied to the time of reaping and garnering cereals, but with the growth and extension of other branches of agriculture, especially in the fruit industry in America, they are more loosely applied, as 'hay harvest,' 'cherry harvest,' 'potato harvest,' etc. As in other agricultural lines, the development of the methods of harvesting has been marked, and during no period so strikingly as during the last half of the nineteenth century. In former times the single-handed sickle and two-handed scythe, which appeared somewhat later, seem to have been the sole implements for cutting the stalks of grain. In using the sickle the operator would catch the severed stems with his free arm, and when he had obtained enough for a sheaf, would either stop to bind the bundle or would leave it to be tied by another; in using the scythe he would leave the stalks somewhat disarranged in a more or less uniform row for the sheaf-maker to work upon; in using the cradle—a much more recent invention, which consists of a scythe to the handle of which is fastened a set of three or more fingers of light but strong wood as long as the blade and parallel with it—the skillful operator would leave the stalks all parallel as they were caught by the cradle-fingers when the blade severed them. A feature of primitive methods of harvesting was the gleaner, who went over the field to pick up the heads of grain overlooked by the reapers. Methods of separating the grain from the straw and the chaff were not less crude than those of cutting. The sheaves were spread upon a floor, which was often the bare rock or even the earth, and animals yoked to heavy planks studded with flints or iron were driven across it until the separation of the grain from the stalk seemed complete. Then the straw was removed with crude forks, and the chaff blown away by the wind or by hand fans.

In contrast with this picture of primitive agriculture the present stands out boldly. The slow, laborious, uncleanly methods of the ancients have mostly disappeared among civilized peoples, but there are countries where the traveler may find them still in vogue, though perhaps somewhat modified. Even in sections of enlightened lands many of the modern implements and methods are unknown. Even within fifty miles of the city of New York there are farms upon which the grain is still reaped with the cradle. But such cases are exceptional. The cradle has given place to the mower, which was at first used only in cutting grass for hay, but which genius soon adapted to cut grain and lay it in piles of convenient size for binding into sheaves. The same inventive spirit produced the self-binder, a still more highly modified mower which not only does all the work of the reaper, but ties the sheaves with twine or wire. Yet more recently has appeared the heading-machine, which, drawn by a score or more of horses or propelled across the field, severs only the heads of the plants, and threshes and winnows the grain and places it in sacks ready for market. On many of the Western wheat farms, more especially of the arid districts, this machine has supplanted not only the reaper, but the threshing-machine, since it performs the office of each. Yet the threshing-machine is still popular where grain must be allowed to stand in the shock to dry for a few days after cutting. This machine has long since replaced the flail and the fanning-mill, combining as it does the purpose of both. Formerly it was operated by horse-power, but is now generally driven by a portable engine which, in many instances, has also traction gearing, and takes the place of horses in drawing the machine from farm to farm. A revolution has also taken place in hay-making. Hand labor has been reduced to a minimum. The mower has supplanted the scythe in cutting; the hay-tedder, which tosses the grass as it lies in the field, has replaced the hay-fork in curing; the hay-loader, drawn behind the wagon to be loaded, has largely taken the place of loading by hand forks, and the horse-power hay-fork, which will dispose of a large load of hay in three or four forkfuls, has become a common implement on farms where stock-raising or dairying are leading features. In fact, throughout the whole domain of agriculture the methods of harvesting, so far as has been possible, have been improved to a remarkable extent. Corn, beets, beans, indeed, nearly every important crop has its special harvesting machinery. Cotton is the most notable exception; machines adapted to its method of ripening seem impossible.

No less remarkable have been the developments in methods of fruit-harvesting. It is highly probable that in all countries methods were at first crude and wasteful. In America, during the first half of the nineteenth century, apples rarely arrived in market except in bulk by the wagon-load, and peaches at first were treated no better. During the last half, reform has taken place; the former rarely arrive, except in local markets, in any other package than the barrel, and the latter, it is probable, never in bulk as formerly, but almost always in baskets. In olden times when there was little or no market for fruits, except in the towns and their immediate neighborhood, the tree-fruits were shaken or beaten to the ground, a method still popular with those apples the chief end of which is cider. But with the development of a fresh-fruit market, increased care was taken to avoid bruising. With increasing prosperity the demand for fine specimens increased, and the grower was compelled not only to produce a superior article, but he was forced to present it for sale in an attractive package. All details of modern fruit harvest depend upon the peculiar demands of the market, the distance the product must be shipped, the means of transportation, and the shipping qualities of the kind or the variety of fruit. These four factors determine the time of picking, which, with perishable fruits, especially when sent to distant markets, is several days before maturity, a stage learned only by experience with the individual kind or even variety. In general, for shipping to distant markets, strawberries are gathered when they have colored well; red raspberries when they become soft; peaches when an experienced picker detects, with the ball of his thumb, a very slight softness of the tissue; plums while still too green to be pleasantly edible; pears when, upon lifting the fruit, the twig and the stem separate without either one breaking; apples when they readily

part from the stem by a twist of the fruit. For local markets the fruit may be allowed to become riper. Again, these factors determine the style and size of the package and many other details which, since they properly belong to the sale of fruit rather than to harvesting, will be found discussed under the title MARKETS AND MARKETING. See also HORTICULTURE; FRUITS, CULTIVATED; and articles upon individual fruits.

HARVEST-FISH (so called from the time of its annual appearance). An edible fish of the rudder-fish family (Stromateidæ), also called 'butter-fish' or 'dollar-fish,' and 'lafayette.' The common Northern species (*Rhombus triacanthus*) is about seven inches in length; is related to and resembles in its compressed oval shape the pompano; and when first taken from the water displays brilliant shifting, iridescent colors. They are an excellent pan-fish, tasting like mackerel,

HARVEST-FISH, OR BUTTER-FISH (*Rhombus parv*).

and are extensively caught off New Jersey and New England in midsummer (at harvest-time). A Southern species (*Rhombus alepidatus*) ranges from Chesapeake Bay to Brazil, and is a favorite in the Virginia coast markets under the name 'whiting.' See BUTTER-FISH; and Plate of HARVEST-FISH, ETC.

HARVEST-FLY. The popular name in the United States for several species of cicada, because they make their appearance in harvest. See CICADA.

HARVEST-MAN, DADDY-LONG-LEGS, or GRANDFATHER GREYBEARD. An arachnidan of the order Phalangidæ. These creatures are of world-wide distribution, and are very common in most parts of the United States and in South America. One blind form inhabits Mammoth Cave, Kentucky. The majority of the family may be recognized by their short bodies and long, stilt-like legs, bowed or elevated in the middle, so that the body of the insect is almost on the ground. They have a very characteristic and disagreeable smell. The eyes are two in number, and the mandibles are pincer-like. There is only one pair of spiracles on the lower side of the body at the junction of the cephalothorax and abdomen. The crane-flies of the dipterous family Tipulidæ are called 'daddy-long-legs' in Europe, and should not be confused with these arachnida. The harvest-men are said to feed on small insects, especially aphids; but C. M. Weed states that they are much more apt to feed on insects found dead than to kill living ones. They are abundant in woods and fields from middle summer until late autumn, and are likely to collect in sheds, outhouses, barns, and even houses, or on bare rocks or tree-trunks. Very few species survive the winter as adults. Most of them lay their eggs in the ground in the autumn.

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HARVEST-MITE. See MITE.

HARVEST MOON. The moon does not rise at the same time every night, on account of her changing position in the sky caused by her orbital motion around the earth. Each night the rising is later; and the *retardation*, as it is called, averages about 50 minutes. In the latitude of New York the maximum retardation is 1 hour 17 minutes, and the minimum, 23 minutes. In higher latitudes the range of the retardation may be even greater, and the minimum retardation may descend to *nil*. When the retardation is a minimum at the time of full moon, farmers have the advantage of strong moonlight almost all night on several successive nights; for, the retardation being small, the moon rises at nearly the same time each night as she does on the night of full moon. As this state of affairs is very favorable to harvesting, this full moon is called the harvest moon. It is always the full moon occurring nearest the date of the autumnal equinox (q.v.), September 22d.

HARVEY. A city in Cook County, Ill., 20 miles south of the Chicago court-house, on the Illinois Central, the Cleveland, Cincinnati, Chicago and Saint Louis, and other railroads (Map: Illinois, D 1). It is a residential suburb of Chicago, and also an industrial centre with manufactures of mining and ditching machinery, gas stoves, automobiles, and railroad supplies. Harvey, founded in 1891, and incorporated the succeeding year, is governed by a mayor elected every two years, and a council. Population, in 1900, 5395.

HARVEY, GABRIEL (?-1545-1630). An English author. He was born at Saffron Walden, and educated at Cambridge, where he took his B.A. degree in 1570, and was elected fellow of Pembroke Hall a few months later, and master of Trinity Hall in 1585. He passed most of his life at the university. He was involved with Robert Greene and Thomas Nash in one of the most notorious personal controversies of the time, to which his own contributions are specimens of the most abusive style of Elizabethan prose. He is best known as the friend of Sidney and of Spenser, who has celebrated him under the name of Hobbinol in the *Shepheard's Calendar*, and as a leading member of the school which vigorously endeavored to enforce upon Englishmen the strict rules of classical metre and dramatic construction. He asserted that he was the first English poet to naturalize the dactylic hexameter, and he induced Spenser to abandon for a time the use of rhyme. Consult: his *Works*, ed. A. B. Grosart, privately printed in eight volumes (London, 1884-85), and *Letter Book*, ed. Scott (ib., 1884).

HARVEY, Sir GEORGE (1806-76). A Scottish historical and landscape painter. He was born at Saint Ninians, near Stirling, in February, 1806. Displaying a taste for drawing, he was at the age of eighteen placed in the school of the Trustees' Academy, Edinburgh, where he made rapid progress. In 1826, when the Royal Scottish Academy was instituted, he was elected an associate, and in 1829 an academician. He was a constant contributor to the Academy's exhibitions, and many of his works are well known through the medium of engravings. The principal of these are: "Covenanters Preaching," "Battle of Drumclog," "The First Reading of the Bible in Old Saint Paul's," "The Curlers," "Columbus Discovering America," and "Quitting the Manse." Harvey did not confine himself to historical art, some of his most successful works being representations of Scotch scenery. Among the finest of the landscapes are: "The Enterkin," "Ferragon," "Sheep-Shearing," "Glen Dhu Arran," and "Inverarnan, Loch Lomond." They are remarkable as representations of pastoral peace. Harvey was elected president of the Royal Scottish Academy in 1864, and knighted in 1867. He died in Edinburgh, January 22, 1876. Compare his *Notes on the Early History of the Scottish Academy* (London, 1873); his *Recollections* (London, 1888).

HARVEY, Sir JOHN. A Colonial Governor of Virginia. He first visited the province as one of the commissioners sent out by James I. in 1623 to get evidence which would justify him in suppressing the Virginia Company. Appointed Governor after Yeardley's death, he began his administration in 1629, and soon made himself thoroughly detested by the colonists, for he not only favored the interests of individuals, such as Lord Baltimore, at the expense of Virginia, but filled his own pockets by imposing unusual fines on the settlers, all fines being by royal warrant a perquisite of the Governor's. In 1635 an assembly was called to hear complaints against him, and on April 28th the council met and decreed "Sir John Harvey thrust out of his government, and Capt. John West acts as Governor till the King's pleasure known." Sir John went at once to England and appealed to Charles I., who reinstated him, and refused even to listen to the delegates who had been sent over to present the case of the colonists. Two years after his return to Virginia, however, the King relieved him and appointed a new Governor in his place.

HARVEY, Sir JOHN (1778-1852). A British soldier. He entered the army at a very early age, and saw service in many parts of the world. In 1812 he was appointed deputy adjutant-general of the army in Canada, and was received with great favor by Sir George Prevost, who asked his advice on the defense of the wide frontiers of Canada against the United States forces. He was present at the unsuccessful defense of Fort George (May 27, 1813), but escaped with General Vincent and most of the British troops. On June 6th he led an attack on General Dearborn's forces at Stony Creek, and later in the year was adjutant-general of the British army at the battle of Chrystler's Farm. Upon the close of the War of 1812 he returned to England, and at the battle of Waterloo was on the staff of the Duke of Wellington. In 1836 he was once more in America, this time as Governor of Prince Edward Island. From 1837 to 1841 he was Lieutenant-Governor of New Brunswick, and in 1846 was appointed Governor and commander-in-chief of Newfoundland, but remained there only a short time before he was made Lieutenant-Governor of Nova Scotia, which office he held until his death.

HARVEY, MOSES (1820—). A Canadian author, born near Armagh, Ireland, and educated at Belfast College in arts and theology. In 1852 he left his charge in Maryport, Cumberland, England, and became pastor of the Free Presbyterian Church of Saint John, Newfoundland, from which he retired in 1878. Harvey made special studies of the geography and history of Newfoundland, contributed to the *Encyclopædia Britannica* (9th ed.) articles on "Seal Fisheries," "Newfoundland," and "Labrador," and published: *Poetry and Literature of the Bible* (1852); *Lectures, Literary and Biographical* (1864); *Comack's Journey Across Newfoundland* (1873); *Across Newfoundland with the Governor* (1879); *Newfoundland, the Oldest British Colony* (1883); *Text-Book of Newfoundland History* (2d ed. 1890); *Newfoundland as It Is* (1894); and *Newfoundland in the Jubilee Year* (1897).

HARVEY, WILLIAM (1578-1657). An English anatomist, celebrated as the discoverer of the circulation of the blood. He was born at Folkestone, in Kent, of a London family of great respectability. When he was fourteen years old he was sent to Caius College, Cambridge, where he was admitted as a pensioner in 1593. After five years' study at the university he traveled through France and Germany, and decided to study medicine at Padua. Here he came under the influence of some of the best teachers of the time, notably Fabricius (q.v.). From this master the young student learned of the existence of the valves in the veins. Having obtained his medical degree in 1602, he returned to England, and began to practice his profession in London. He was admitted a candidate of the London College in 1604, and was elected a fellow in 1607. Two years later he was appointed physician to Saint Bartholomew's Hospital, and in 1615 was made professor of anatomy and surgery. His discovery of the circulation of the blood he perfected in 1616. He was appointed physician extraordinary to James I. in 1618, and was physician to Charles I. from 1632 to 1646. He accompanied the King in the battle of Edgehill in 1642, and during this engagement the Prince and the Duke of York were intrusted to his care. In 1645 he was, by the royal mandate, elected warden of Merton College, succeeding Dr. Nathaniel Brent. During his residence at Oxford he made many experiments, and pursued researches connected with the subject of generation. In 1646, upon the surrender of Oxford to Parliament, he went to practice his profession in London. In 1651 the results of his investigations on the development of the chick, in which he was assisted by Rev. George Bathurst of Trinity College, were given to the world. In 1653 Harvey built a library and museum, which he presented to the members of the College of Physicians. He resigned his professorship of anatomy and surgery in 1653, at the age of seventy-five, and he died on June 3, 1657, of paralysis, which succeeded several years of suffering from gout.

Harvey's description of the course and circu-

lation of the blood met with great opposition, founded perhaps upon jealousy, and the ridicule and unwarranted attacks resulted in a great diminution of his practice. In time, however, he had the satisfaction of seeing his doctrine accepted entire; but the labor and devotion of twenty-five years were requisite for the attainment of the final result. Six diagrams giving views of the circulatory system of the human body, life-size, with which Harvey illustrated his lectures, are still preserved in the museum of the Royal College of Physicians. Previous to Harvey's time, it was believed that the blood was constantly in motion, but the arteries were believed to contain air only, because they were found to be empty after death. Others were close to the discovery of the course of the blood, but it was reserved for Harvey to comprehend and elucidate the whole matter. Although he communicated his discovery to his pupils as early as 1619, it was not till 1628 that his work *Exercitatio de motu Cordis et Sanguinis in Animalibus* was published at Frankfort, as a small quarto of 72 pages, called by Haller *Opusculum aureum*. The best edition of it was published at Leyden (1739). Among other works are his *Exercitationes de Generatione Animalium, quibus accedunt quædam de Partu, de Membranis ac Tumoribus Uteri, et de Conceptione* (cir. 1651; also Leyden, 1737); and *Exercitationes Duæ Anatomicæ de Circulatione Sanguinis* (Oxford [?] cir. 1645). A complete edition of Harvey's works in Latin was published in 1766 by the College of Physicians of London, including his *Treatise on the Circulation*, with the prefaces of the first edition of 1628; his *Exercitations* addressed to Riolan; his work on the *Generation of Animals;* the *Account of the Dissection of Thomas Parr;* and *Nine Epistles of Harvey* addressed to various persons; together with a copy of the diploma of doctor of medicine conferred upon Harvey by the University of Padua. Prefixed to this collection of his works is a *Life of Harvey*, by Lawrence. Consult Willis, *Life of Harvey* (London, 1881). See CIRCULATION; PHYSIOLOGY.

HARVEY, WILLIAM HENRY (1811-66). An Irish botanist, born at Summerville, near Limerick. He received the bent toward his specialty from the schoolmaster with whom he studied in Kildare. A field naturalist, he began his researches in his native land, but they extended to South Africa (1835-42), and for the last ten years of his life he was professor of botany in Dublin University. Travels in America, India, Australia, and the South Seas had augmented his botanical knowledge, and he was an authority especially in algæ, though he disputed the Darwinian hypothesis. He published: a *Manual of British Algæ* (1841); *Phycologia Britannica, a History of British Seaweeds* (1846-51); *Nereis Boreali-Americana* (1852-58); *Phycologia Australica* (1858-63); and other works.

HARVEYIZED STEEL, HARVEY PROCESS. See ARMOR PLATE; IRON AND STEEL.

HARWICH, här'ij. An ancient seaport, market-town, and municipal borough in Essex, England, at the mouth of the Stour, on the North Sea, 70 miles northeast of London (Map: England, H 5). Its important industries are fisheries, ship-building, and cement and manure manufacturing. Its coasting and foreign trade with Germany, Denmark, and Holland is considerable. It exports cement, fish, manure, ironware, machinery, leather, etc., and imports grain, silk, woolen and cotton goods, timber, and tobacco. The harbor is commodious, safe, and strongly fortified. An average of 3500 vessels enter and clear a gross tonnage of 1,800,000 annually. The total annual value of its imports and exports during the five years ending in 1900 was £22,000,000 ($110,000,000). The town is pleasantly situated on an elevated promontory, and is a favorite sea-bathing resort. It has tramways, and is supplied with water, gas, and electric lighting. Harwich was a Roman station, and a great Danish military depot. In 885 it was the scene of a great naval conflict between the Danes and King Alfred's fleet, and in 1666 of another between the Dutch and English. It was made a Parliamentary and municipal borough by Edward II. in 1318. Population, in 1891, 8200; in 1901, 10,019.

HARWOOD, ANDREW ALLEN (1802-84). An American naval officer, born at Settle, Pa. He entered the United States Navy, and in 1828 was appointed to the receiving-ship *Philadelphia*. In 1835-37 he served in the Mediterranean Squadron, in 1848 was promoted to be commander, and in 1855 to be captain. In 1862 he was appointed chief of the Bureau of Ordnance and Hydrography, and in 1863 commandant of the Washington Navy Yard, with rank of commodore. In 1869 he was retired with rank of rear-admiral. He published *Law and Practice of United States Navy Courts-Martial* (1867), and edited *Summary Courts-Martial*.

HARZER, härt'sĕr, PAUL HERMANN (1857—). A German astronomer, born at Grossenhain (Saxony). After study in Leipzig, Berlin, and Rome, he was assistant at the Leipzig Observatory from 1878 to 1881; was appointed observer there in 1882, and in the same year became a lecturer in the university. From 1887 to 1897 he was director of the Archducal Observatory at Gotha, and in the latter year was appointed director of the Kiel Observatory. In theoretical astronomy he made numerous investigations of importance, results of which appeared at various times in scientific journals, particularly in the *Astronomische Nachrichten*, his contributions to which include: "Eine neue Methode die negativen und ungeraden Potenzen der Entfernungen der Himmelskörper zu entwickln" (vol. cii., 1882) and "Untersuchung über die astronomische Strahlenbrechung auf Grund der Differentialgleichungen der elastischen Lichtbewegungen in der Atmosphäre" (vols. civ., cvii., 1882, 1883).

HARZ (härts) **MOUNTAINS.** An isolated mountain range in Northern Germany, extending between the rivers Saale and Leine, through Prussia, Brunswick, and Anhalt (Map: Germany, D 3). Its length from Mansfeld on the southeast to Seesen on the northwest is about 60 miles, and its total area about 900 square miles. The range, formed by a flatly arched uplift, rises sharply from the surrounding plain, and is dissected by numerous stream valleys. The Upper Harz, comprising the northwestern section, has an elevation of from 1000 to 3000 feet, and culminates in the Brocken, 3747 feet. In the southeastern or Lower Harz region, the elevations rarely exceed 1000 feet. The mountain slopes are heavily wooded with pine, oak, and

beech, but the summits, owing to the raw climate, support only a stunted growth of vegetation. The higher peaks are enveloped in fog during a large part of the year, and the rainfall is heavy. Geologically, the range consists of Devonian and Carboniferous strata, which have been broken through by eruptive granites, diabase, and porphyry. The mineral resources are of great importance, copper, silver, lead, and iron being produced at several localities. Mining was carried on as early as the twelfth century, but the deposits are still far from exhausted. Clausthal, in the Upper Harz, is the seat of a famous mining academy. The region is well patronized by tourists, as it is rich in historic and legendary interest, as well as in scenery. See BROCKEN.

HARZREISE, härts'rī-ze, DIE (Ger., journey through the Harz). A celebrated autobiographical narrative by Heinrich Heine (1824), based on an actual tour by the author, of which the work is a picturesque account.

HASAN, hä'san, AND **HOSEIN,** hō-sān'. Two grandchildren of Mohammed, sons of his youngest daughter, Fatima, and Ali. After the assassination of Ali (q.v.), his adherents at Cufa recognized his eldest son Hasan as caliph, while Moawiya asserted his claim to the entire Moslem Empire, and gathered a powerful army to invade Irak. Hasan, a man of little courage, with more taste for the harem than the camp, agreed to abdicate at the first taste of war, and retired to Medina (661). He was poisoned by one of his wives eight years later. On the death of Moawiya (680) the people of Cufa made overtures to Hosein, who was then at Mecca visiting him, to claim the caliphate in opposition to Yezid, Moawiya's son. With a small force he proceeded to Irak. Yezid, well informed of the movement, had made ample preparations to receive him, and he was slain at Kerbela on the 10th of Muharram, 681. The fate of the house of Ali made a deep impression on the Moslem world. The Shiites (see MOHAMMEDAN SECTS) still refuse to recognize the claims to the caliphate of any except Ali and his sons. They observe the 10th of Muharram as a day of mourning, and devote the nine preceding days of the month to the memory of the martyrs. The so-called 'miracle play,' a dramatic representation of the history of Hosein, is given, and the spectators become wrought up to the most extravagant expressions of sorrow, and the highest pitch of fanatical enthusiasm. In one of its forms the play lasts for the entire ten days, culminating on the last day in the representation of the death of Hosein. Consult: Muir, *Annals of the Early Caliphate* (London, 1883); Pelly, *The Miracle Play of Hasan and Hosein, Collected from Oral Tradition* (London, 1879).

HAS'CALL, MILO SMITH (1829—). An American soldier, born in Genesee County, N. Y. In 1846 he moved to Goshen, Ind., and two years later was appointed a cadet at the United States Military Academy. After two years' service in the Regular Army he resigned his commission, and went back to Goshen, where he became a lawyer and filled various political offices. At the outbreak of the Civil War he enlisted as a private, but was soon appointed aide-de-camp to General Morris, with the rank of captain, and assisted in organizing six volunteer regiments. On June 12, 1861, he was made colonel of the Seventeenth Indiana Volunteers, and took part in the successful West Virginia campaign. He was commissioned brigadier-general of volunteers on April 25, 1862. Having been transferred to the Army of the Cumberland, he was put in command of a brigade which fought through the Tennessee campaign (October, 1862, to March, 1863). At the battle of Murfreesboro (December 31, 1862-January 3, 1863) he had command of the Sixth Division under Major-General Crittenden. From June to August, 1863, he was in command of the District of Indiana, and afterwards commanded a division in the Army of the Ohio, which took part in the defense of Knoxville (November to December, 1863). The next year he commanded the Second Division of the Twenty-third Army Corps in the Army of the Ohio during the invasion of Georgia. He resigned on October 27, 1864, and returned to Goshen, where he engaged in banking, but later entered the real estate business in Chicago.

HASCHKA, häsh'kä, LORENZ LEOPOLD (1749-1827). An Austrian poet, born at Vienna. In 1798 he became professor of æsthetics in the Theresianum; he was custodian of the university library, and wrote many lyrics, of which the best-known is the Austrian national hymn, "Gott erhalte Franz den Kaiser," set to music by Haydn.

HASDEN, häs'dĕn, BOGDAN PETRICEICU (1838—). A Rumanian poet, historian, and philologist. He taught history in the gymnasium of Jassy, and in 1875 became professor of comparative philology and director of the national archives at Bucharest. His literary labors include dramas, satiric romances, and editorial work, especially on the *Revista Noua*. The most important of his philological works is *Etymologicum Magnum Romaniæ* (1886).

HAS'DRUBAL (Phœnician, whose help is Baal, Gk. *'Ασδρούβας, Asdroubas*). A name of frequent occurrence in Carthaginian history. The more important characters who bore the name follow: (1) Son of Hanno, a general during the First Punic War, who took the field against Regulus in B.C. 256, and met with signal defeat. He was afterwards sent to Sicily with a large army and 140 elephants, but accomplished nothing during a two years' stay in the island, and was at length totally overthrown at Panormus (Palermo) by the Roman consul Metellus in B.C. 250, and on his return to Carthage was put to death for his lack of generalship. (2) Son-in-law of the great Hamilcar Barca (q.v.), an important statesman of the period between the First and Second Punic wars, and a constant ally of his father-in-law and the popular party in Carthage. After demonstrating his military ability in several minor campaigns, he was given the chief control in Spain, where he soon proved his still greater administrative and diplomatic power. He founded the city of Carthago Nova (Cartagena) as a port of communication with the mother city, and also as a convenient centre for the silver-mines which contributed immensely to the Carthaginian resources; and he was so successful in winning over or subduing the Spanish tribes that he brought almost the whole peninsula under his sway. He was assassinated by a revengeful slave in B.C. 221. (3) Son of Hamilcar Barca, and brother of the great Hannibal, who left him in command in Spain when he began his famous

march across the Alps to Italy (B.C. 218). For several years he carried on operations in Spain against the Roman forces under the two Scipios, but without decisive results, although supported by reënforcements under Himilco, Mago, and Hasdrubal, son of Gisco (see below). In 212, however, they gained a great victory over the Romans, in which Publius Scipio was slain; but the Romans regained the advantage in the following year by the capture of Carthago Nova, the enemy's base of supplies. Shortly after, Hasdrubal gathered a greater force with the intention of following Hannibal's example and invading Italy. He crossed the Alps in B.C. 207 and laid siege to Placentia (Piacenza)—a fatal step, as delay gave the Romans an opportunity to attack him before he could join with Hannibal. A bloody battle was fought on the banks of the Metaurus, and Hasdrubal fell in the thick of the fight. (4) Son of Gisco, mentioned above as one of the generals sent to Spain to assist Hasdrubal No. 3. Afterwards he took charge of the military operations in and around Carthage; and when Scipio came into Africa with a large army (B.C. 204), the diplomacy of Hasdrubal won over the assistance of Syphax, the Numidian King, which Scipio also had endeavored to gain. (See SOPHONISBA.) But the allied forces were mercilessly annihilated by Scipio, who hemmed them within their burning camp; but few, including the two generals, escaped. Hasdrubal met a violent death in Carthage for his ill success. (5) A general of the Third Punic War. For his ill success in war against the Numidian King Masinissa, he had been banished from Carthage, but was recalled to take the command in the last struggle against Rome (B.C. 149). His arbitrary and despotic command alienated many from him, and notwithstanding the heroism of the defenders, the persistence of the Roman attack led to the fall of Carthage (B.C. 146), when Hasdrubal fled to Scipio's camp, and was made prisoner. He was led in triumph at Rome, and allowed to pass his remaining days in obscurity in Italy.

HASE, hä'ze, KARL AUGUST VON (1800-90). An eminent theological writer of Germany. He was born at Steinbach, in Saxony, August 25, 1800, and studied theology at Leipzig and Erlangen. He became, in 1823, privat-docent at Tübingen, but was for political reasons, after a tedious trial, confined for ten months in the fortress of Hohenasperg, during which time he produced a theological novel, *Die Proselyten* (1827), and a *Lehrbuch der evangelischen Dogmatik* (1826, 6th ed. 1870). Released in August, 1825, he went to Dresden and did literary work. In 1828 he became privat-docent at Leipzig and in 1830 professor of philosophy in Jena, where his lectures on dogmatics and the life of Christ proved especially attractive. His *Leben Jesu* (1829, 5th ed. 1865; trans. *The Life of Jesus*, 1881), which appeared six years before Strauss's, proposed as its aim to show "how Jesus of Nazareth, according to divine destination, by the free act of His own spirit, and by the opportunities of His time, became the Saviour of the world." He opposed modern supernaturalism in *Die Leipziger Disputation* (1827) and extreme rationalism in *Theologische Streitschriften* (1834-37) and *Die Tübinger Schule* (1855). His *Hutterus Redivivus* (1827, 10th ed. 1862) seeks to do justice to the old Lutheran dogmatics in contrast with modern systems, by exhibiting its harmonious completeness. Besides his *Lehrbuch der Kirchengeschichte* (1834, 11th ed. 1886), which has been translated into English (*A History of the Christian Church*, from the 7th ed., New York, 1855), Hase treated special portions of Church history in *Die beiden Erzbischöfe* (1839); *Neue Propheten* (1851); *Franz von Assisi* (1856); *Das geistliche Schauspiel* (1858; trans., *Miracle Plays and Sacred Dramas*, 1880); *Handbuch der protestantischen Polemik gegen die römisch-katholische Kirche* (1862, 4th ed. 1886). He also published several works on ecclesiastical law; an edition of the *Libri Symbolici Ecclesiæ Evangelicæ* (1827); and *Ideale und Irrthümer* (1872).

HASE, hä'ze, KARL BENEDIKT (1780-1864). A German philologist, born at Sulza, near Weimar. He studied at Jena and Helmstedt, and in 1801 went to Paris, where he was put in charge of the manuscripts of the Imperial Library (1805), was appointed professor of Greek paleography and of modern Greek at the Ecole des Langues Orientales (1816), then professor of German at the Polytechnic Institute (1830), conservator of manuscripts in the library (1832), and, in 1852, professor of comparative grammar in the University of Paris. He was long an editor of the *Journal des Savants;* contributed to Dindorf's edition of Stephanus's *Lexicon* (1831-44); edited Leo Diaconus (1819); Valerius Maximus (1823); Suetonius (1828); and the fragment, *De Ostentis et Mensibus*, by Laurentius Lydus (1823); and by his wide knowledge of late Greek greatly facilitated the publication of *Recueil des historiens des croisades* (1875). Consult: Guigniaut, *Notice historique sur Hase* (Paris, 1867); and Haine, *Hases Briefe von der Wanderung und aus Paris* (Leipzig, 1894).

HASELRIG, hā'zel-rĭg, **HESILRIGE**, or **HAZLERIGG**, Sir ARTHUR (?-1661). An English statesman, member of the Long Parliament, and one of the famous Five impeached by King Charles. He took an active part in the Civil War as commander of a regiment of horse called 'The Lobsters' by the Royalists, and was equally prominent in Cromwell's Parliament, but opposed to the protectorate. Ultimately he voted for the restoration of the Stuarts, though too late in so doing to save more than his life, for he died in the Tower.

HASELTINE, hā'zel-tĭn, WILLIAM STANLEY (1835—). An American painter, born in Philadelphia. He studied under Weber in his native city, and at Düsseldorf, and was elected a National Academician in 1861. Much of his life was spent in Italy, and he rarely exhibited. Among his works are views of Nahant, Capri, and Amalfi.

HASENAUER, hä'ze-nou'ĕr, KARL, Baron von (1833-94). An Austrian architect, born in Vienna, where he studied at the academy under Van der Nüll and Siccardsburg, and obtained the first prize in 1854. After having traveled extensively in Germany, Italy, France, England, and Scotland, he entered upon an active career in Vienna, was again awarded the first prize for architecture at the art exhibition of 1864, became a member of the Academy of Fine Arts in 1866, and honorary member of the Institute of British Architects in 1868. Among a number of

private palaces built by him, the Palais Lützow is to be noticed as one of the finest houses in Vienna, but his most important work was the erection of the magnificent Imperial Museums of Art and Natural History (1872-91) in purest Renaissance style, after his own and Semper's designs. He also built the new Hofburg theatre (completed 1888), and designed the addition to the Imperial palace. He was architect for the buildings of the Vienna Exposition in 1873, and was raised to a baronetcy in the same year.

HASENCLEVER, hä'zen-klā'vēr, JOHANN PETER (1810-53). A German painter, born at Remscheid. He studied under Schadow, at the Düsseldorf Academy, and then spent some years in Munich and Italy. After 1842 he settled in Düsseldorf. His works are usually humorous genre subjects, such as "A Family Quarrel" (1837, New Pinakothek, Munich); "Tasting Wine," and "The Reading Room" (1843, both in National Gallery, Berlin); "Topers in the Wine-cellar" (1847, Ravené Gallery, Berlin). He also executed a series of scenes from Kortum's *Jobsiade*, including "The Examination" (1840, New Pinakothek, Munich); "The School" (1846, Ravené Gallery, Berlin); and "Jobs as Night Watchman" (1852, ib.). His "Gaming-Table" is his most important work of a serious nature. He was also successful in portraiture.

HASENCLEVER, WILHELM (1837-89). A German socialist agitator, born in Arnsberg, Westphalia. He received his education at the gymnasium of his native city, and then became a tanner. In 1862 he was chosen editor of the *Westfälische Volkszeitung*, in 1871 president of the Allgemeiner Deutscher Arbeiterverein, and in 1875 presiding officer of the newly organized Socialist-Labor Party of Germany. He was elected to the Reichstag several times, and controlled or edited various socialist newspapers.

HASENPFLUG, hä'zen-pflōōg, KARL (1802-58). A German architectural painter, born in Berlin, the son of a shoemaker. After a hard struggle in early life, he became the pupil of the decorative painter Karl Gropius, and a few years later was enabled by a royal stipend to study at the academy, but really owed his development mostly to his own efforts. Attracted by the mediæval architecture of Halberstadt, he made his home there in 1830, and, besides cathedrals, painted chiefly views of ruined castles and convents half buried in snow, which appealed to a large public by their great poetic charm. Especially noteworthy among his works are two views of Cologne Cathedral (1832-33); Erfurt Cathedral (1827); and three views of and in Halberstadt Cathedral (1828-36, the last four in National Gallery, Berlin); "Cloister in Winter" (1840, Kunsthalle, Hamburg); "Mediæval Castle Yard" (1842, Schwerin Gallery); and "Ruined Chapel" (Stettin Museum).

HÄSER, hä'zēr, HEINRICH (1811-85). A German medical author, born at Rome, the son of the musician, August Ferdinand Häser. He studied medicine at Jena; taught there from 1836 to 1849, then went to Greifswald, and in 1862 to Breslau. He edited: Gruner, *Scriptores de Sudore Anglico* (1847); a *Bibliotheca Epidemiographica* (2d ed. 1862); the *Repertorium für die gesamte Medizin* (1840-42); and the *Archiv für die gesamte Medizin* (1840-49); and wrote: *Historisch-pathologische Untersuchungen* (1839-41); *Lehrbuch der Geschichte der Medizin und der Volkskrankheiten* (3d ed. 1875-82); *Geschichte der christlichen Krankenpflege und Pflegerschaften* (1857); *Die Vaccination und ihre Gegner* (1854); and *Grundriss der Geschichte der Medizin* (1884).

HASHISH, hăsh'ēsh (Ar. *ḥashīshat*, from Ar. *ḥashīsh*, herbage, hay, from *ḥashsha*, to cut grass). The Oriental name of the tops and tender parts of Indian hemp (*Cannabis Indica*). Various preparations of the plant are employed for the producing of a peculiar intoxication. A favorite mode of extracting its active principle is by boiling the tops and flowers with water, to which butter or oil has been added, evaporating and thus forming an oleaginous solution or fatty extract. This fatty extract is frequently mixed with other substances which are reputed to possess aphrodisiac properties, and is taken in the form of electuary confection, or pastil. The majoon used at Calcutta, the mapouchari employed at Cairo, and the dawames or dawamesk of the Arabs, are preparations of this kind. In India it is employed as a narcotic stimulant under the names hashish, churrus bhang, and gunjah. American hemp (*Cannabis Americana*) possesses a similar but weaker action. The effect of hashish depends largely upon the individual. Among the Orientals the dreams are often of an erotic character, but this is not so among the Western nations. One of the first appreciable effects of the drug is the gradual weakening of the power of controlling and directing of the thoughts. Then comes the stage already described; and accompanying, and in part following it, there are observed errors of sense, false convictions, and the predominance of one or more extravagant ideas. These ideas and convictions are generally not altogether of an imaginary character, but are suggested by external impressions which are erroneously interpreted by the perceptive faculties. A minute may seem a year, and an hour only an instant. Sounds may be greatly exaggerated. The sense of duration of time and extent of space and the appreciation of personality are lost; there is a sensation of weight in the extremities, and anæsthesia of the skin, which may become very complete. Finally, if the dose is sufficiently powerful, there is marked drowsiness and sleep. The drug is used as a sedative as a substitute for opium. For the relief of pain in neuralgia and migraine it has been successfully used.

HASIDÆ'ANS. A Jewish sect. See CHASIDIM.

HAS'KELL. A town and the county-seat of Haskell County, Tex., 16 miles north of Stamford, the nearest railroad station (Map: Texas, E 3). The leading industries are farming and stock-raising. Population, about 1000.

HAS'KINS, CHARLES HOMER (1870—). An American historical scholar, born at Meadville, Pa. He graduated at the Johns Hopkins University in 1887, where he remained as an instructor in history until 1890, when he took his Ph.D. degree, and accepted a position as instructor at the University of Wisconsin. In 1891 he became assistant professor of history, and in 1892 was elected professor of institutional history, which chair he retained until 1902. He spent the year 1896-97 in research work in Europe, devoting himself

especially to examination of the Vatican archives at Rome. In 1899-1900 he was a lecturer on history at Harvard University, and in 1902 was made professor of history in that institution.

HASLER, häs'lĕr, or **HASSLER**, HANS LEO VON (1564-1612). A German composer, one of the founders of a national German music, born at Nuremberg. He studied with his father, Isaac Hasler, town musician, and in 1584 with G. Gabrieli at Venice. He was the first important German composer who studied in Italy, and his works, despite their originality, were influenced by the Italian style. From 1585 to 1601 he was organist to Count Octavianus Fugger at Augsburg; in the latter year he received the post of Court musician at Prague to Emperor Rudolph II. In 1608 he accepted an appointment at the Court of the Elector of Saxony. His compositions were of great value in the history of music, but are of little modern importance. Consult Eitner, *Chronologisches Verzeichniss* (Berlin, 1873-74) of Hasler's printed works.

HASLINGDEN, häz'lĭng-den. A manufacturing and market town in Lancashire, England, four miles south-southeast of Accrington (Map: England, D 3). It has manufactures of cottons, silks, woolens, sizing of cotton warps, and ironworks. In the neighborhood are coal-mines and extensive stone-quarries. Situated in a hilly district near the Forest of Rossendale, it derives its name, signifying 'Hollow of the Hazels,' from the neighboring trees. Its church, restored in 1879, dates from the thirteenth century, and has handsome endowed schools attached. Population, in 1891, 18,200; in 1901, 18,500.

HAS'MONÆ'ANS. See MACCABEES.

HASNER, häz'nĕr, LEOPOLD, von Artha (1818-91). An Austrian statesman and jurist, born at Prague. He studied law at Prague; was appointed professor of the philosophy of law there (1849), and then of political economy (1851); and was elected to the Bohemian Diet and the Austrian House of Deputies in 1861. Two years afterwards he was made president of the latter body and head of the Council of Education. In 1865 he became professor of political economy in the University of Vienna, was called to the Austrian House of Peers in 1867, was appointed Minister of Public Instruction in 1868, and was for a short time president of the Ministry in 1870. He resigned in that year, and was active as a leader of the Liberal Centrist Party in the Upper House. The Austrian public-school system in its present form is a product of his labors. He wrote: *Filosofie des Rechts und seiner Geschichte in Grundlinien* (1851), and an unfinished *System der politischen Oekonomie* (1861). Consult his posthumously published *Denkwürdigkeiten. Autobiographisches und Aphorismen* (Stuttgart, 1892).

HASPINGER, häs'pĭng-ĕr, JOACHIM (1776-1858). A Tyrolese patriot, born at Sankt Martin im Gsiess. He studied at Bozen and Innsbruck, fought against the French in 1796, 1797, and 1799-1801, and became a Capuchin priest in 1805. He was an ardent patriot, and took a leading part in the rising of the Tyrolese against Bavaria, to which power Napoleon had given their country. In 1809 he distinguished himself by his bravery in a number of encounters with the French, and in 1810 he was second only to Hofer and Speckbacher as a leader in the renewed revolt of that year. In 1810 he was exiled by the Bavarians and went to Vienna, whence he was sent on a secret mission two years afterwards to arouse the people of Upper Italy to revolt. He was pastor of a church near Vienna, at Hietzing, from 1814 to 1848; then went into Italy as chaplain to a company of Tyrolese volunteers; lived at Döbling until 1854, and then at Salzburg. He was buried beside Andreas Hofer at Innsbruck. As a member of the Capuchin Order he had unusually great influence with the people, who called him 'Pater Jochem' and 'Rotbart.' Consult Schallhammer, *Biographie des Tiroler Heldenpriesters Joachim Haspinger* (Salzburg, 1856).

HAS'SALL, ARTHUR (1853—). An English historian, born at Bebington, in Cheshire. He studied at Trinity College, Oxford, where he was history exhibitioner in 1876, and the next year won a first-class honor in the School of Modern History, Oxford. From 1880 to 1883 he was a lecturer and tutor at Keble College, and from 1890 to 1892, and again in 1901, examiner in the Honor School of Modern History. He was elected a member of the Hebdomadal Council from 1892 to 1896; was senior proctor in 1893-94; Censor of Christ Church, 1894-95; and was reëlected member of the Hebdomadal Council in 1897. His publications include: *Louis XIV. and the Zenith of the French Monarchy* (1895, in the "Heroes of the Nations" Series); *The Balance of Power, 1715-89* (1896, in the series "Periods of European History," of which he was made general editor); *History of France* (1901); and *The French People* (1901).

HAS'SAM, CHILDE (1859—). An American painter, born in Boston. He studied in Paris under Boulanger and Lefebvre, and has won many medals and prizes. He was elected president of the New York Water-Color Club, and was made one of the Ten American Artists, and a member of the Société Nationale des Beaux-Arts in Paris. His street scenes are notable for atmospheric effect, and his landscapes, in the impressionistic French style, are brilliant in color and broadly painted. His "Plaza Centrale, Havana," won the Webb prize in 1895. He received a third-class medal at the Paris Exposition of 1889.

HASSAN BEN SABBAH, häs'sân ben säb'bä. The founder of the sect of the Assassins (q.v.).

HAS'SAR. Any of several of the dorads or mailed catfish of the Orinoco River and its tributaries, which have some extraordinary habits. They make nocturnal journeys in the dry season, from a diminishing pond to another one, or from river to river, overland, often in companies, and to such distances that several nights are consumed in travel. They also construct nests of leaves at the margin of ponds and streams at the beginning of the rainy season, where the eggs are deposited and guarded till they hatch. Most of them belong to the genus Doras.

HAS'SARD, JOHN ROSE GREENE (1836-88). An American journalist. He was born in New York City, and graduated at Saint John's College, Fordham, in 1855. He was one of the editors of the *New American Cyclopædia*, in 1865

edited the *Catholic World*, and in 1866 joined the editorial staff of the New York *Tribune*. He became widely known as a graphic correspondent, and also as a musical critic of rare capacity and judgment. After the death of George Ripley (1880), he was also literary editor of the *Tribune*. In 1878, with Grosvenor, also of the *Tribune*, he deciphered the telegrams which were thought to prove corruption on the part of the Democratic National Committee, or of Tilden's friends, in the disputed election of 1876. Among his publications are: a *Life of Archbishop Hughes* (1866); *The Ring of the Nibelung* (1877); *Life of Pius IX.* (1878); and *A Pickwickian Pilgrimage* (1881).

HASSE, häs'se, FRIEDRICH RUDOLF (1808-62). A German Protestant Church historian. He was born in Dresden, June 29, 1808, educated at Leipzig and Berlin, and at the latter university first took up the study of Anselm of Canterbury. In 1834 he began to lecture in Berlin on Church history, and went to Greifswald as extraordinary professor of Church history in 1836; thence in 1841 in the same capacity to Bonn, where he became full professor (1849). He made his reputation by his masterly work on Anselm—vol. i., *Life* (1843); vol. ii., *Theology* (1852). He died at Bonn, October 14, 1862. After his death his lecture outlines upon the *Geschichte des alten Bundes* (1863), and *Kirchengeschichte* (1864; ed. by W. Engelmann, 1872), appeared. For his life, consult Krafft (Bonn, 1865).

HASSE, JOHANN ADOLPH (1699-1783). A German dramatic composer, born at Bergedorf, near Hamburg. In 1718 he became a tenor at the Hamburg Opera, and in 1722 became connected with the Brunswick Theatre, where the next year his first opera, *Antigonus*, was produced. In 1724 he went to Italy, studying with Porpora and A. Scarlatti. In 1731 Augustus the Strong appointed him kapellmeister and director of the opera at Dresden, and his wife, the celebrated singer, Faustina Bordini, was engaged as prima donna. While in that city he was involved in a bitter rivalry with Porpora and Mingotti, and it was not until after their departure that Hasse became supreme. At the siege of Dresden, in 1760, he suffered great losses, many of his manuscripts being destroyed. His operas, some of the best of which were composed during his stay in Italy, were extremely popular, among the best of them being: *Il Sesostrate* (1726); *Attalo, re di Bitinia* (1728); and *Dalisa* (1730). In his seventy-fifth year he produced at Milan his last opera, *Ruggiero*, in celebration of the marriage of the Archduke Ferdinand. His music was marked by great naturalness of expression and charming melody. In addition to over a hundred operas, he wrote ten oratorios, five Te Deums, and numerous instrumental pieces and sacred compositions.

HASSELQUIST, häs'sel-kwĭst, FREDRIK (1722-52). A Swedish naturalist, born at Törnevalla, East Gothland, and educated at Upsala. In 1749 he undertook a journey to Palestine. He spent the winter in Smyrna, and the next year in Cairo, where he studied the ebb and flow of the Nile, and later proceeded to the Holy Land. He died near Smyrna, on his return. Linnæus published his *Iter Palæstinum* (1757; translated into English, 1766).

HASSELT, häs'sĕlt. The capital of the Belgian Province of Limburg, situated on the left bank of the Demer, 49½ miles by rail from Antwerp, and 19 miles from the Netherlands frontier (Map: Belgium, D 4). It has manufactures of tobacco, laces, linen, and chicory. The town possesses a theological and a teachers' seminary and an industrial school. Population, in 1890, 13,250; in 1900, 15,249. Here the Dutch gained a victory over the Belgians on August 6, 1831.

HASSELT, à'sâl', ANDRÉ HENRI CONSTANT VAN (1806-74). A Belgian historian and poet, born at Maestricht, and educated at Liège and Ghent. He was employed in the Royal Library at Brussels; was appointed inspector of primary education (1843) and of normal schools (1850); and edited the old French *Romans de Cléomadès* (1865). He compiled: *Het gouden Boeksken* (1845); *Cours de littérature française* (1861); and *Leçons choisies de littérature française* (1865). His prose works include: *Histoire de Rubens* (1840); *Les Belges aux Croisades* (1846); and *Histoire des Belges* (1848); and among his poems mention should be made of: *Poésies* (1852-57); *Primevères* (1854); *Poèmes, paraboles, odes et études rhythmiques* (1862); *Les quatre incarnations du Christ* (2d ed. 1872); and *Le livre des ballades* (1872). He also wrote juveniles under the pseudonym 'Alfred d'Aveline' or 'Charles André,' and some Flemish poetry under the name 'Jan van Limburg.'

HASSENFRATZ, à'sän'frâts', JEAN HENRI (1755-1827). A French scientist, born in Paris. He studied under Monge, became a geographical engineer (1780), and after three years' study of mining, entered Lavoisier's laboratory. He was an ardent Jacobin, a member of the Assembly which decided the fate of the Girondists, and was instrumental in postponing the decree against them. Throughout the Revolution he was active in providing military material, in reorganizing military schools, and in founding the Ecole Centrale de Travaux Publics, in which he was professor of mineralogy and physical geography, and which later became the Polytechnic School. In 1795 he led the bands of the Faubourg Saint-Marceau in their attack on the Convention, and had to leave Paris until the general amnesty of that year. In 1797 he became professor of physics at the School of Mines, and taught until 1814, when he retired. Besides contributions to the *Annales de Chimie* and the *Journal des Mines*, he wrote: *Manuel militaire* (1790); *Géographie élémentaire* (5th ed. 1809); *Cours révolutionnaire d'administration militaire* (1794); *Tableau de minéralogie* (1796); *Cours de physique céleste* (1803); *Sidérotechnie* (1804).

HASSENPFLUG, häs'en-pflōōg, HANS DANIEL LUDWIG FRIEDRICH (1794-1862). A Hessian Minister, born at Hanau, and educated at Göttingen. He was made Minister of Justice and of the Interior (1832), and was an energetic administrator, but a bitter enemy of the Hessian Constitutional Party in the Diet, and of a free press. For five years his absolutist policy was successful, but in 1837 he found himself losing favor at Court, and left the country. In 1841 he went to Berlin, where he was a member of the judiciary until 1850, when he returned to Cassel as Prime Minister, and again fought and finally lost the battle with the Diet. In 1855 Hassen-

pflug retired to Marburg, where he died seven years afterwards.

HASSENSTEIN, häs'en-stīn, BRUNO (1839—). A German cartographer, born at Ruhla. His work includes revisions of Fay's *Great Outline of Geography* (1869), and Spruner's *Handatlas* (1871-79); a new atlas of Japan (1885); and in *Petermanns Mitteilungen*, maps of most of the important exploring expeditions since 1878, especially of the country covered by Junker, Emin Pasha, Hans Meyer, and Sven Hedin.

HASSLER, häs'lĕr, FERDINAND RUDOLPH (1770-1843). A Swiss-American engineer; born in Aarau, Switzerland. He was employed for a time on the trigonometrical survey of Switzerland, subsequently emigrated to the United States, and was acting professor of mathematics at West Point from 1807 to 1810, and at Union College in 1810-11. He was the first superintendent of the United States Coast Survey, and for many years was chief director of that important work. He was afterwards at the head of the Bureau of Weights and Measures in the Treasury Department. His publications include a *System of the Universe*, and valuable reports to Congress on weights and measures, besides several textbooks of science.

HASSLER EXPEDITION. The name given to the United States Coast Survey expedition of 1871, in the steamer *Hassler* (see HASSLER, F. R.), which was the first important scientific expedition sent by the Government for marine exploration. The expedition included Prof. Louis Agassiz and Mrs. Agassiz; Dr. F. Steindacher, ichthyologist; Dr. Thomas Hill, botanist; and Count L. F. de Pourtales, Mr. J. A. Allen, and others. The steamer left Boston December 4, 1871, and reached San Francisco in August, 1872. On the way to Saint Thomas surface observations were made. Deep-sea dredging was done at Barbadoes and along the Brazilian coast. At the Straits of Magellan frequent stops were made, and at particularly interesting places several days were spent, and inland excursions were made, especially to examine glaciers. Throughout the route collections were made, and much of this material was deposited in the Museum of Comparative Zoölogy at Cambridge, Mass. Some of the zoölogical results of the expedition have been published by Agassiz, Lyman, and Pourtales.

HASSUNITES, häs'sun-īts. A name given to the followers of Anton Hassun (1809-84), an Armenian patriarch. Hassun desired to acknowledge the supremacy of the Pope and attended the Vatican Council of 1870. A considerable number of the Armenians were opposed to Hassun, and chose the Bishop Kupelian in his place. After much strife Hassun was banished by the Sultan. Kupelian acknowledged the Pope in 1879, and Hassun, who had been allowed to return to Constantinople, was acknowledged by the Government as head of the Armenian Catholics in Turkey. The anti-Hassunites also submitted to the Pope. In 1880 Hassun resigned, went to Rome, and was made a cardinal.

HASTINAPURA, häs'tī-nä'pōō-rä (Skt., Elephant City). An ancient city of India, on the bank of the Ganges, some fifty miles northeast of the present city of Delhi, and probably one of the earliest Aryan settlements outside of the Punjab. Its importance lies in the fact that it forms a central point of the principal scenes of the *Mahābhārata*. It was the residence and capital of the Kuru family; whereas their rival and noble cousins, the Pandus, built their royal city at Indraprastha, or Indrapat, nearly on the site of the modern Delhi. There are but few traces of the ancient city Hastinapura remaining, though tradition points to a group of shapeless mounds as being the residence of the princes of the House of Bharata whose deeds are commemorated in the great national epic.

HASTINGS, hāst'ĭngz. A Parliamentary and county borough in Sussex, England, on the English Channel, 62 miles southeast of London (Map: England, G 6). It was the premier Cinque Port, but lost its importance after being burned by the French in 1377. It is now the largest fishing-station on the south coast, and a celebrated watering-place, largely frequented for its historical interest, picturesque situation, fine sandy beaches, and its healthful, bracing climate. It lies in a valley, surrounded by hills. Saint-Leonard's-on-Sea, a western suburban town, has been absorbed and joined to the borough. Hastings has two fine piers, large tepid swimming-baths, numerous hotels, good schools, and interesting remains of an ancient Norman castle. The marine parade, three miles in length, is one of the finest sea walks and drives in the kingdom. The town owns spacious open grounds on the East and West hills, a beautiful park, three public gardens, the Brassey Institute, with public library, museum, and art schools presented by Lord Brassey, a fish market, cemetery, an excellent well-water supply, and electric-lighting supply, and maintains bath-houses and hospitals. The streets are sprinkled with sea-water, which is also supplied to private houses for bath purposes through mains. In 924 Athelstan established a mint at Hastings, then an important place, and there William the Conqueror landed and encamped prior to his famous victory over Harold at Senlac Hill (now Battle Hill), which secured to him the conquest of England, on October 14, 1066. On the spot where Harold fell William founded Battle Abbey. (See BATTLE MONUMENT.) William I. by charter made Hastings one of the Cinque Ports. Hastings had early municipal privileges, and received its charter of incorporation from Elizabeth. Population, in 1891, 63,000; in 1901, 65,000. Consult: Cooper, *Notices of Hastings* (1862); Burrows, *Cinque Ports* (London, 1888).

HASTINGS. A city and the county-seat of Barry County, Mich., 32 miles southeast of Grand Rapids; on the Thornapple River, and on the Michigan Central and the Chicago, Kalamazoo and Saginaw railroads (Map: Michigan, H 6). It has a public-school library, and a fine city hall, court-house, and jail. The city is of importance as a manufacturing centre, its products comprising flour, furniture, felt boots, cigars, hose-reels, pumps, car-seats, carriages and wagons, etc. The water-works are owned by the municipality. Population, in 1890, 2972; in 1900, 3172.

HASTINGS. A city and the county-seat of Dakota County, Minn., 20 miles southeast of Saint Paul, at the junction of the Vermillion River with the Mississippi, and on the Chicago,

Milwaukee and Saint Paul Railroad (Map: Minnesota, F 6). It is of considerable importance as a distributing centre, and exports grain, flour, and lumber; its industries include several grain-elevators, a malt-house and breweries, saw, planing, and flour mills, sash, door, blind, wagon, and furniture factories, etc. Population, in 1890, 3705; in 1900, 3811.

HASTINGS. A city and the county-seat of Adams County, Neb., 96 miles west of Lincoln, on the Chicago, Burlington and Quincy, the Missouri Pacific, and other railroads (Map: Nebraska, F 3). It is the seat of Hastings College (Presbyterian), opened in 1882, and of the State Asylum for the Chronic Insane, and has a fine city hall, and City, Prospect, and Heartwell parks. The city is surrounded by an agricultural and stock-raising section, has an important trade in grain, and manufactures flour, wagons, etc. Hastings, incorporated in 1874, is now governed under a charter of 1901, which provides for a mayor, elected biennially, and a city council, the members of which are elected one-half by wards and one-half at large. The water-works and electric-light plant are owned and operated by the municipality. Population, in 1890, 13,584; in 1900, 7188.

HASTINGS. A Danish viking, or sea rover, of the ninth century, to whom legend ascribes most of the deeds performed by the Danish pirates of that time. The facts known concerning him are as follows: From 859 to 863 he was engaged in plundering the Spanish and Italian coasts, and in the latter country captured Luna by stratagem. In 866, Robert, Count of Paris, fell in battle fighting against Hastings, who was then in the Loire Valley. He left this portion of France in 872, and in 889 appeared in the valley of the Somme. In 893 he was defeated by Alfred the Great with whom he made peace. At that time the two sons of Hastings were baptized. Of his later history nothing is known.

HASTINGS, Battle of. The name usually given to the great struggle which took place at Senlac, near Hastings, on October 14, 1066, between the Normans, under William, Duke of Normandy, and the English, under King Harold. Duke William claimed that Harold had agreed to support his claim to the English crown on the death of Edward the Confessor (q.v.), and when this was not done William began preparations to wrest the crown from Harold by force. Harold had just conquered his brother and rival, Tostig, at Stamford Bridge (September 25, 1066), when he heard that the Normans were ravaging the south, and he immediately hastened in that direction. He reached the hill of Senlac on October 13th, and proceeded to fortify his position with a palisade and a ditch. The Norman army was divided into three parts, of which the left wing consisted of Bretons, Poitevins, etc, the right wing of mercenary troops, and the centre of Norman knights and archers led by Duke William in person, and grouped around the banner which the Pope had given. On the English side the best troops were the Hus-carls or bodyguard of Harold. At nine in the morning the battle began with a shower of arrows from the Norman archers, but no impression was made on the English ranks. The Bretons fled and a part of the English, contrary to Harold's orders, broke ranks and pursued. William noticed that they became disordered thereby, and he ordered a large part of his army to feign a retreat. The English fell into the trap, broke their ranks and began to pursue. The Norman centre thereupon was able to storm the summit of the hill, and though the English still fought bravely, Harold's eye was pierced by an arrow, and the battle was lost. William met little vigorous opposition henceforth in his conquest of England. Consult: Freeman, *Norman Conquest*, vol. iii. (2d ed., London, 1876); Green, *The Conquest of England*, vol. ii. (London, 1899). On the spot where Harold stood William erected Battle Abbey. See Battle Monument.

HASTINGS, Francis Rawdon-Hastings, first Marquis of (1754-1826). An English soldier and statesman, Governor-General of India. He was educated at Harrow, and matriculated at Oxford, but entered the army at the age of nineteen, and was sent to America, where he distinguished himself in the Revolutionary War till 1781, rising to be adjutant-general (1778), and afterwards brigadier. He was rewarded with a title, Baron Rawdon, and in ten years had inherited another title from his father, the Earl of Moira. His campaigning in Holland (1794-95) was followed by a term of home service, as master-general of ordnance, and he also was most active in the politics of the time. He was Governor-General of India from 1813 to the beginning of 1823. There he showed his mettle in the transformation of the warlike Gurkhas from foes into friends, and he was accused even of exceeding his instructions in the subjugation of native races, to whom, however, he played the amiable despot, encouraging education and civil reform. In recognition of his services in the establishment of British power in India, he was made Marquis of Hastings (1816), and he was commander-in-chief at Malta for the last two years of his life.

HASTINGS, Frank Abney (1794-1828). An English naval commander. He was the son of Lieut.-Gen. Sir Charles Hastings, and was forced to leave the British Navy for insubordination. He joined the Greek Navy in the struggle against the Turks, fought at Nauplia (1822), and served in Crete as commander of artillery. He bought and equipped a vessel in 1824, with which he did great damage to the Turkish fleet, distinguishing himself especially in the bay of Salona in 1827. In December of the same year Hastings captured Vasiladi. He died of a wound received at Anatolikon in 1828.

HASTINGS, Henry, Earl of Huntingdon. See Huntingdon.

HASTINGS, Selina Shirley. See Huntingdon, Selina Hastings.

HASTINGS, Thomas (1787-1872). An American musician. He was born at Washington, Conn., but at an early age removed to Clinton, N. Y. He became interested in sacred music, and made its study and improvement the chief business of his life. From 1823 to 1832 he edited a religious paper, the *Recorder*, in Utica; then went to New York City as musical instructor and composer, and there published, among other works: *Mother's Hymn Book* (1849); *History of Forty Choirs* (1854); and *Dissertation on Musical Taste* (2d ed. 1853).

HASTINGS, Warren (1732-1818). An English statesman, Governor-General of India. De-

scended from an ancient family long settled at Daylesford, in Worcestershire, he was born at Churchill, in Oxfordshire, on December 6, 1732. He was early left an orphan; but when only seven years old he resolved to recover the estate which had passed out of the possession of his family. Entering Westminster School, he became an excellent scholar, when, at seventeen, he was sent to India as a service writer in the East India Company's service. Having realized but a moderate fortune, notwithstanding the great temptation to enrich himself by means of his position, he returned in 1764 to England. In 1769 he again went to India, on his appointment as member of the Council at Madras, and in 1772 he became president of the Supreme Council of Bengal. When a little later Parliament created a Governor-Generalship of India, it bestowed that office upon Hastings, who entered upon his duties at the beginning of 1774. The finances of his Government were in a disordered state, and the incessant demands of the East India Company for money led to some unscrupulous expedients for raising funds. For instance, Siraj-ud-Daula, Nawab of Oudh, having a claim upon the rich provinces of Katahr, occupied by the Rohillas, asked of Hastings military aid in subduing these people. Hastings granted the request, as in fact a treaty with the Nawab required, and received for the service a large sum of money, which he used to supply a deficit in the Bengal treasury. The Nawab treated the conquered with great severity in spite of the intercession of Hastings. The condemnation and execution of the ambitious, intriguing Brahman, Nanda Kumar, is perhaps unjustly laid at his door. But to raise more money Hastings deposed Chait Singh, Rajah of Benares, for disloyalty and insurrection, and confiscated his possessions. He made an agreement also with Asaph-ud-Daula, son of Siraj-ud-Daula, under which he deprived the mother and grandmother of the Nawab of extensive domains which had fallen irregularly into their hands. The administration of Warren Hastings, although he was constantly trammeled by orders from home, and frequently borne down by an able and factious majority in his own council, was vigorous and successful, and his conduct of military affairs was no less efficient. He broke the power of Hyder Ali, Rajah of Mysore; he organized a system by which justice was dispensed, the revenue collected, and peace maintained. It is greatly to his credit, too, that he encouraged Asiatic learning. When he left India in the spring of 1785 that great empire was tranquil. A treaty had been concluded with Tipu Sahib, son and successor of Hyder; and the Carnatic had been evacuated by the armies of Mysore. On his arrival in England he was received with distinction by George III. and the Court. The directors acknowledged his services by a unanimous vote of thanks. The Whig opposition was, however, loud and vehement against him, and succeeded in carrying in the Lower House a motion for his impeachment at the bar of the House of Lords. The trial began in Westminster Hall, February 12, 1788, the managers of the impeachment being Burke, Fox, Sheridan, Windham, and Charles (afterwards Earl) Grey. Burke opened the proceedings in a speech which extended over four sittings; Fox and Grey urged the charge respecting Chait Singh; and Sheridan was intrusted with the conduct of the article relating to the begums or princesses of Oudh. The interest taken by the public in the impeachment began to decline after these great displays of rhetoric. The trial, notwithstanding, lasted for upward of seven years. On April 23, 1795, it terminated in the acquittal of Hastings. Of 400 peers only 29 voted.

Hastings passed the last twenty-four years of his life at Daylesford in the pursuits of literature and in the occupations of a country gentleman. He died on August 22, 1818, in his eighty-sixth year, and was buried behind the chancel of the parish church of Daylesford. A man of great industry, with an extraordinary capacity for administrative details, he undoubtedly labored for the good of India, often, however, by questionable methods. To him the English Government is largely indebted for its political and judicial organization of India, and for its method of Indian administration. Consult: Gleig, *Memoirs of the Life of Warren Hastings* (3 vols., London, 1841), containing original documents; Trotter, *Warren Hastings* (London, 1878); Bond, *Speeches of the Managers and Counsel* (London, 1859-61); Mill, *History of British India* (London, 1848); *The Minutes of Evidence* (London, 1786); *History of the Trial* (London, 1796); *Debates of the House of Lords* (London, 1797); Forrest, *Administration of Warren Hastings, 1772-1785* (Calcutta, 1892); Lawson, *Private Life of Warren Hastings* (London, 1895); Logan, *Review of the Principal Charges Against Warren Hastings* (London, 1878); Lyall, *Warren Hastings* (London, 1889); Macaulay, *Essay on Warren Hastings* (biased); Malleson, *Life of Warren Hastings* (London, 1894); Strachey, *Hastings and the Rohilla War* (Oxford, 1892); Busteed, *Echoes from Old Calcutta* (2d ed., Calcutta, 1888); Beveridge, *Trial of Nanda Kumar* (Calcutta, 1886); Stephen, *Dictionary of National Biography*, xxv. (brief but excellent biography by Keene).

HASTINGS, Lord WILLIAM (c.1430-83). An English soldier in the service of King Edward IV. He was the son of Sir Leopold Hastings, and upon his father's death succeeded to landed estates in Warwickshire and Leicestershire. Upon the accession of Edward IV. to the throne in 1461, he rewarded Hastings, who, during the civil war, had been a faithful friend and retainer of his father, the Duke of York, with lucrative offices and grants of land. He was an energetic soldier in all the King's wars, besides being an ambassador and negotiator for him on various occasions. He fought in Edward's Scottish campaigns, and upon Warwick's invasion, aided the King in escaping, raised forces in his behalf, and, after his return, commanded part of the army at the battle of Barnet. Having invaded France in 1475, he obtained a treaty of peace and an annuity from the French King. After the death of Edward IV. he was accused of treason by the Duke of Gloucester, and beheaded.

HASTINGS SAND. See WEALDEN SERIES.

HASTY PUDDING. A humorous poem by Joel Barlow (1793). It was written in Savoy, and published in 1796 at New Haven with a dedication to Martha Washington.

HAS'WELL, CHARLES HAYNES (1809—). An American civil, marine, and mechanical engineer, born in New York City. He learned his profession in a steam-engine factory, and in 1836 was appointed chief engineer in the United States

Navy. During his service, which lasted until 1850, he was a member of the boards which designed the *Missouri*, the *Mississippi*, and six other steam frigates. He built the first practicable steam launch (1837), and was the first to use zinc to protect the hulls of iron vessels and marine steam boilers from the galvanic action of salt water and copper. He superintended the construction of the crib bulkhead at Hart's Island, and after 1898 was the consulting engineer of the board of public improvements in New York City. His publications include: *The Mechanic's and Engineer's Pocket Book* (1844; 66th ed. 1901); *Mechanic's Tables* (1854); *Mensuration and Practical Geometry* (1856); and *Reminiscences of an Octogenarian* (1895).

HAT (AS. *hæt*, Icel. *hattr;* connected ultimately with Skt. *chad*, to cover), and HAT MANUFACTURE. The hat is a head-covering, distinguished from the cap and bonnet by having a brim around it. Hats were first manufactured in England about 1510, and superseded caps, or soft headgear, in the reign of Queen Elizabeth. The felting of caps is, however, said to have been known long before this period; and there is a tradition that a knowledge of felted caps or hats had been introduced by the Crusaders. At any rate such an industry flourished in Germany and France in the fourteenth and fifteenth centuries. As the process of felting is ascribed by tradition to Saint Clement, he was early assumed as the patron saint of the craft, and the annual festival of the trade was appointed for the 23d of November. Wool was the material first employed in forming felt hats; but in time, as European trade with America developed, the fur of the beaver, being finer and softer, came into use; hence the term beaver was long synonymous with hat. For about three centuries, fine beaver hats dyed black, and prepared with much skill, formed the head-covering of the higher classes in Great Britain, and distinguished them from the middle and humbler classes, which continued for a length of time to wear the less expensive caps and bonnets.

The growing scarcity of beaver-fur led to attempts to substitute a cloth formed of silk plush, drawn over a pasteboard frame, about 1810. These were not very successful; and hats of wool or beaver-felt were common until about 1840. The high cost of beaver at length brought out the improvement of silk hats to such an extent that the beaver was entirely superseded, and the fabrication of silk hats brought to great perfection.

With the course of fashion hats have undergone a great variety of changes of shape. The raising of the top part and the widening or diminishing of the brims have constituted the chief differences. Sometimes the top has been high and narrow, sometimes high and widened; and as regards the brim it has sometimes been so broad as to loop up. Political and religious differences have been marked by the form of hats. The Puritan of the reign of Charles I. adopted the steeple hat, high and narrow, with a broad brim, and devoid of ornament. The Cavalier, during the same era, wore a lower and broader crown, with a feather stuck on one side. The Quaker hat, low in the crown, with a broad brim, and plain, dates from the origin of the sect at the middle of the seventeenth century. A growing extravagance in breadth of brim led to the device of looping up the back and sides, and thus led to the cocked hat which was worn by gentlemen throughout the eighteenth century. Some men of fashion, however, by way of singularity, wore low-crowned hats with brims, from which was evolved the round hat, which finally superseded every variety of cocked hat at the beginning of the nineteenth century.

The Hungarian patriot Kossuth introduced into the United States the soft felt hat, which has since been an especial favorite in the South and West. Straw hats began to be worn in America about 1800, the first importations being of the palm-leaf variety. With the increased taste for traveling, and for bicycling, golf, and other out-of-door sports, a great demand has arisen from adults of both sexes and from children for light, soft, undressed hats, not easily damaged by rain or rough treatment. Such hats are usually of cloth, and come in great variety of shapes and colors.

HAT-MAKING IN THE UNITED STATES. The history of hat manufacture in this country dates back to very early colonial days. In 1662 the Assembly of Virginia enacted a law offering ten pounds of tobacco for every good wool or fur hat made in the Colony. In 1675 laws were passed prohibiting the exportation of raccoon furs from the provinces. By 1731 the industry had become of so much importance as to interfere most seriously with the trade of the English manufacturers, who in that year petitioned Parliament to forbid the importation of hats from the American colonies. A special committee to which the petition was referred reported that in New York and New England 10,000 beaver hats were manufactured annually, and that there were ten hatters in the single city of Boston, one of whom made forty hats a week. In accordance with the spirit of this petition, laws were passed forbidding the exportation of American hats to other English colonies, forbidding the manufacture of hats by any person who had not served an apprenticeship of seven years at the business, and forbidding negroes from working at the business. But in spite of these hampering restrictions, the industry continued to thrive and to be encouraged by the various colonial governments. Delaware, in 1753, offered a prize of forty shillings for the neatest and best hat manufactured in the lower counties. Carolina, by 1767, had developed a flourishing hat industry, with a large export trade to the Spanish islands. Soon after the close of the Revolution the manufacture of hats had become of great importance in Pennsylvania, and from that time the industry has continued to flourish. Statistics, showing the growth of this industry in the United States, are given at the close of this article.

MANUFACTURE. Felt hats are made in a wide range of qualities. The finer and more expensive qualities are formed entirely of fur; the commoner qualities use a mixture of fur and Saxony wool; and for the lowest kinds wool alone is employed. The processes and apparatus necessary for making hats of fur differ also from those required in the case of woolen bodies; and in large manufactories, especially in America, machinery is generally employed for operations which formerly were entirely manual. Hatter's fur consists principally of the hair of rabbits (technically called coneys) and hares, with some proportion of nutria, musquash, and beaver's

hair, though the latter material has been for many years extremely scarce, and generally any parings or cuttings from furriers are also used. Furs intended for felting are deprived of their long, coarse hairs, after which they are treated with a solution of nitrate of mercury, an operation called carroting or secretage, whereby the felting properties of the fur are greatly increased. The fur is then cut from the skin. Perhaps the modern method of making a felt hat may be best understood by describing the method of the ancient hatter and then the various modifications in this process which have been effected by machinery. Fifty years ago the hatter beat his fur with a bow into a triangular piece of felt which, when laid together by two straight edges, assumed the shape of a cone. (See FELT.) The felt was next shrunk between cloths which were kept hot and wet by frequent dipping in a kettle of boiling size, care being taken to preserve the triangular shape of the felt. Having been shrunk to about one-third its original size, or to proper dimensions for a hat, the conical bag was drawn over a block and tied tightly at the point where the crown spreads out into a brim. The brim portion was next pulled and stretched into shape with a special instrument. While still on the block, the hat was dyed, and again washed, stiffened, and dried. If a long nap was desired, the surface of the felt was carded; while to obtain a smooth finish it was rubbed with pumice-stone. It was then ready to be 'trimmed,' that is, to have the band, binding, lining, and sweat-band put on. Beginning with the cutting of the fur, these processes are now performed by automatic machinery. The description of the general method employed is condensed from that furnished by the Twelfth United States Census (section on wool manufactures), that being the most recent information available. The separation of the fur from the skin is effected by cutting the skin into shreds by means of rapidly revolving shear-blades, fixed just below a table, but so adjusted that, as the skin passes under a roller or guide fixed above the shear-blade, it drops beneath the machine, while the fur, without the apparent displacement of a fibre, passes on the other side of the roller, whence it is removed and packed away until required. Different kinds or qualities of fur are next mixed to produce the quality of hat desired—an operation which is accomplished by means of a machine called a 'devil,' in which the fibres are pulled apart and thoroughly mingled. The fur is next taken to a blowing-machine, where it is kept constantly agitated in a light current of air. The matted pieces, and those to which skin adheres, together with the hair and dirt thrown out from the fine fur, drop through a set of sieves which separate the valuable pieces of fur for further treatment. The blowing process continues until the fur is perfectly free from extraneous matter, when it leaves the machine in a lap, fine and soft, but so light and filmy that it hardly bears the touch. As the fur comes from the blower, it is weighed out into boxes, each of which contains fur enough for one hat. Each box of fur is now passed on to a 'former,' a machine which consists of a revolving cone made of brass or copper, of suitable size for the hat-body. The cone is pierced with innumerable small holes, through which a current of air is drawn by means of an exhaust fan. There is also an arrangement by which minute jets of hot water are thrown upon the newly formed hat-body to give it sufficient consistency to permit its removal from the cone. The fur is fed through a tube to a revolving cylinder, which thoroughly opens and distributes the fur into the machine and spreads it evenly over the surface of the cone, which during this operation is inclosed in a tight box. When the fur is properly distributed the box is opened, and the jets of water are thrown upon the fur, and the embryo hat, over which a cloth is spread for its protection, is removed by hand. The whole operation takes but two or three minutes. The fur is then rolled and pressed, first by hand and then by machinery, to felt it and reduce it to its proper proportions. In the meantime it is sized to add to its strength and durability. An application of shellac dissolved in alcohol is used, a much stronger solution being required for a 'derby' than for a soft hat. Thus far the hat has retained its conical form, but the next step is to give it the hat shape. It is placed upon a mold, consisting of a block and a matrix, which shapes both the crown and brim. The next step is dyeing, after which the hair receives further shaping upon another block. This final block is adjustable, so that all the dimensions of a hat—size of band, height and diameter of crown, and width of brim—are accurately gauged by levers, so that of a given shape, every size can be made on the same block. Pouncing, which is a process of sandpapering to remove inequalities, follows, and is accomplished by placing the hat on a rapidly revolving block, and rubbing the surface with fine emery paper. The trimmings—that is, the sweat-band, the lining, and the ribbon binding—are now attached, and the hat given another shaping upon the block.

Wool hats are made by a different initial process. The wool, as it comes from the card in a continuous lap, is wound upon a machine consisting of two cones placed base to base and revolving upon an axis placed parallel to the end of the card. The double cone is so rotated that the continuous lap of wool is wound in a zigzag manner, crossing and recrossing from end to end. When a sufficient quantity of wool has been received, the machine is stopped, the double cone of wool is divided in the centre, the two resulting hat-bodies removed for felting, and the process repeated. The processes of felting, dyeing, stiffening, blocking, finishing, and trimming follow.

The silk hat, now universally known as an article of dress, is of comparatively modern use. It was known in Florence over a century ago; but its manufacture was not introduced into France till about 1825, and its development has taken place entirely since that time. A silk hat consists of a light stiff body, covered with silk plush of a brilliant glossy texture, the manufacture of which is the most important element in the industry. Originally the bodies were made of felt and various other materials, but now calico, muslin, or other cotton material is almost exclusively used. The muslin is first stiffened with a varnish of shellac, and then cut into pieces sufficient for crown, side, and brim. The side-piece is wound round a wooden hat-block, and its edges are joined by hot ironing, and the crown-piece is put on and similarly attached to the side. The brim, consisting of three thicknesses of muslin cemented together, is now

slipped over and brought to its position, and then a second side-piece and another crown are cemented on. The whole of the body, thus prepared, now receives a coat of size; subsequently it is varnished, and it is ready for the operation of covering. In covering this body, the under brim, generally of merino, is first attached, then the upper brim, and lastly the crown and side sewed together are drawn over. All these by hot ironing and stretching are drawn smooth and tight, and as the varnish of the body softens with the heat, body and cover adhere to each other at all points without wrinkle or pucker. Dressing and polishing, by means of damping, brushing, and ironing, come next, after which the hat is velured in a revolving machine by the application of haircloth and velvet velures, which cleans the nap and gives a smooth and glossy surface. The brim has then only to be bound, the linings inserted, and the brim finally curled, when the hat is ready for use. The plush used for silk hats is made almost wholly in France. For many years in all kinds of hat-making the French excelled, and in such centres as Anduze, Lyons, and Paris the trade is very extensive and important. In Great Britain the felt hat trade is principally centred at Denton and other localities in the neighborhood of Manchester, and in America the States of Connecticut, New York, and New Jersey enjoy the greater part of the industry.

The manufacture of straw hats has grown to be a large industry in the United States within recent years, and large quantities are annually exported. The straw braid, like all hat materials, is chiefly imported, coming from Italy, China, and Japan. The straw braid is sewed by machinery and shaped by means of a block, the pressing being done, frequently, with hydraulic machines. A sizing of glue is used to stiffen the hat before it is pressed. See STRAW MANUFACTURES.

Statistics.—In 1810 the number of fur hats reported as made in the country in one year was 457,666, of which 45,369 were made in Pennsylvania. According to the census of 1840, the value of the hats and caps of all kinds made annually in the United States was $8,704,342. At the census of 1850, 1048 establishments, with a capital of $4,427,798, were engaged in the manufacture of hats and caps. Half a century later 171 establishments were engaged in the manufacture of fur hats, and 24 of wool hats. The fur-hat industry engaged a capital of $16,701,308, and there was produced an annual output valued at $27,811,187. The wool-hat industry involved a capital of $2.050,802, and produced goods valued at $3,591,940.

HATASU, hä'tä-sōō, or **HATSHEPSET**, hâchĕp'sĕt (HATSHEPSU). An Egyptian queen of the Eighteenth Dynasty, also called Ramaka (or Ma-ka-ra) and Chnemt Amum. The daughter of Thotmes I., she was associated with him in the last years of his reign; became the concubine of his son Thotmes II., who succeeded his father; and, as guardian of his son, later Thotmes III., to whom she married her daughter, exercised a great influence over his brilliant reign, and was for some time practically sovereign, as is typified by her appearance on the monuments in male garb. The mutilation of her name in inscriptions points to a falling out between her and the young King, and probably to his complete assumption of power. From Southern Arabia an expedition sent out by Hatasu brought back rich treasure. The temple near Thebes, called Der el-Bahri, which is approached by a lane of sphinxes and is surrounded by obelisks, contains many of the records of her reign and an especially vivid representation of the expedition to Punt.

HATCH, EDWARD (1832-90). An American soldier in the Civil War, born in Bangor, Maine. He began his military career at Washington in 1861, but went West the same year, and rose rapidly from captain to be lieutenant-colonel of the Second Iowa Cavalry. By 1862 he was colonel of the same. He served under General Grant in the South, and after commanding the entire cavalry division in the Army of the Tennessee he was made brigadier-general (1864). His gallantry in the field caused his further promotion to the rank of major-general, and his transference from the volunteer to the regular army corps as colonel of the Ninth United States Cavalry. In this capacity he was engaged in military service in the far West after the war was over.

HATCH, EDWIN (1835-89). An English theologian, born at Derby. He was educated at Pembroke College, Oxford; was ordained deacon in 1858, and priest in 1859; from 1859 to 1862 was professor of classics in Trinity College, Toronto, Can., from 1862 to 1867 rector of the Quebec High School; and from 1867 to 1885 was vice-principal of Saint Mary Hall, Oxford. In 1883 he became rector of Purleigh, Essex, in 1884 university reader in ecclesiastical history and secretary to the boards of faculties. He was Bampton lecturer in 1880, Grinfield lecturer on the Septuagint from 1882 to 1884, and Hibbert lecturer in 1888. The degree of D.D. was conferred upon him by the University of Edinburgh in 1883. He was a founder (1870) and the first editor of the *Official Gazette*. In theology he was an independent thinker, who sought to effect at Oxford a scientific basis for that study. He published *The Student's Handbook to the University and Colleges of Oxford in 1873* (7th ed. 1883), but *The Organization of the Early Christian Churches* (Bampton Lectures, 1881) was his first important volume. This was rendered into German, by the eminent Dr. Harnack, as *Die Gesellschaftsverfassung der christlichen Kirchen in Alterthum* (Giessen, 1883). Other works by him were: *The Growth of Church Institutions* (1887), and *Greek Influence on Christianity* (the "Hibbert Lectures," edited by Dr. Fairbairn, 1890). His writings were read and discussed with interest in Scotland, Germany, and the United States, as well as in England. Consult an article by Harnack in the *Theologische Litteratur Zeitung* (1890).

HATCH, JOHN PORTER (1822-1901). An American soldier, born in Oswego, N. Y. He graduated at West Point in 1845, and went in 1846 to the war in Mexico as a lieutenant of infantry, but exchanged the following year for the mounted rifles, and was promoted for gallantry in the field during the Civil War, which he had entered as brigadier-general of volunteers. He joined the Regular Army in 1866, and rose to be colonel of the Second Cavalry Regiment, 1881, but retired in five years.

HATCH, RUFUS (1832-93). An American banker, born in Wells, York County, Maine. Removing to Illinois, he was first a clerk in a

grocery store at Rockford, after which he joined a surveying party on one of the earliest railroads in Wisconsin, and finally, in 1854, entered the grain commission business in Chicago, where he rapidly accumulated a fortune. In 1862 he removed to New York City, where he established a stock-brokerage business, and became well known as a dealer in and promoter of railway stocks. He managed the famous Chicago and Northwestern 'deal' in 1868, secured control of the Pacific Mail Steamship Company, and finally, after varying fortunes, failed in the Northern Pacific collapse in 1883.

HATCH, William Henry (1833-96). An American lawyer, born at Georgetown, Ky. He was admitted to the bar in 1854; served in the Confederate Army during the Civil War, and rose to the rank of lieutenant-colonel; was member from Missouri in the United States House of Representatives from 1879 to 1895, and during this time took a leading part in securing legislation for the benefit of the agricultural interests. He was largely responsible for the passage of the act, commonly known as the Hatch Act, granting Federal aid to agricultural experiment stations in all the States and Territories.

HATCHEL. See Hackle.

HATCHIE. A tributary of the Mississippi River. See Big Hatchie.

HATCHMENT, or **ACHIEVEMENT** (formerly *atchment*, *achement*, *atcheament*, an abbreviation of *achievement*, Fr. *achèvement*, from *achever*, OF. *achever*, *achiever*, to achieve, from *venir a chief*, Fr. *venir à chef*, to come to the head, or end). In heraldry, an escutcheon or armorial bearing; specifically, the armorial bearing placed on the residence of a person lately deceased. The funeral hatchment is in the form of a lozenge; upon which the shield is placed. The crest and other accessories are given, but in place of the motto a text or other religious legend is used. For a bachelor, the whole of the lozenge background is black. In the hatchment of an unmarried lady, the legend is omitted and a knot of ribbon takes the place of the crest. The hatchment of a husband whose wife survives impales his arms with his wife's in a shield with the external ornaments to which he is entitled, the ground of the hatchment being, under his side of the shield, black, and under his wife's, white. If the wife be an heiress, her arms are not impaled, but carried in an escutcheon (q.v.) of pretense. The arms of a wife whose husband survives are impaled with her husband's arms in a shield, or, in the case of an heiress, borne on an escutcheon of pretense. There is no helmet, crest, or mantling, but a peeress is entitled to her robe of estate. The ground under the dexter side of the shield is white, and under the sinister, black. The hatchment of a widower differs from that of a husband, in the ground being entirely black. The hatchment of a widow differs from that of a wife, both in having the ground entirely black, and in the form of the escutcheon, which (except in the case of an escutcheon of pretense) is lozenge-shaped. The arms are encircled by a silver cordon or cordelière, the symbol of widowhood. On the decease of the last of a family, a death's head surmounts the shield in place of a crest.

The achievement of a reigning king or queen, whether married or not, represents the royal arms complete on a ground entirely black. That of an archbishop or bishop has the insignia of his see impaled with his paternal arms, the whole surmounted by a mitre, and the ground is per pale argent and sable. The dean of a cathedral or collegiate church and a king-at-arms also impale the arms of office with their family arms. In the achievement of the wife of a prelate, there are two shields—the first containing the impaled arms of the see and the bishop, surmounted by a mitre; and the second, the family arms of the bishop with those of his wife. The ground is all white, except that part which is under the arms of the wife.

Funeral escutcheons in Scotland, France, and Germany differ considerably from those in use in England, in that they indicate not merely the right of the deceased to a coat of arms, but his gentility of descent. The hatchment is much larger, sometimes consisting of a lozenge above six feet square, and the arms of the deceased, which occupy the centre, are surrounded by those of the eight or sixteen families from whom he derived his descent, the paternal quarterings on the right side, and the maternal on the left. The deceased is not entitled to a hatchment unless all these families had a right to bear arms. On the four corners are death's heads and the initials and titles of the deceased; the black interstices are powdered with tears. See Heraldry.

HATCHWAY, Jack. A retired naval officer in Smollett's *Peregrine Pickle*. He is the boon companion of Commodore Trunnion.

HATFIELD. A market-town in Hertfordshire, England, on the Lea, 7 miles southwest of Hertford (Map: England, F 5). Population of parish, in 1891, 6963; in 1901, 7551. It is noted for the vicinity of Hatfield House, the seat of the Marquis of Salisbury, built on the site, and containing remains, of the famous Ely Episcopal Palace, erected in the twelfth century. It was acquired by Henry VIII. Edward VI. and Queen Elizabeth were both called to the throne while residents of the palace; James I. also resided here, and it was one of the prisons of Charles I. The present stately Elizabethan mansion, built 1608-11, and situated in extensive and beautiful grounds, contains valuable portraits and historical manuscripts. Consult Brewer, *English Studies*, edited by Wace (London, 1881).

HATFIELD, Edwin Francis (1807-83). An American Presbyterian clergyman, born in what is now Summit, N. J. He graduated at Middlebury College in 1829, studied theology at Andover, and was ordained in New York in 1832. He then became rector successively of the Second Presbyterian Church in Saint Louis and of the Seventh and North Presbyterian churches in New York. Ill health obliged him to give up preaching in 1863. He was for a time agent for the Union Theological Seminary, for which he raised a large sum of money, and for many years clerk of the Presbyterian General Assembly. He was the author of: *Universalism as It Is* (1841); *Saint Helena and the Cape of Good Hope* (1852); *The History of Elizabeth, N. J.*; *The Church Hymn-Book, with Tunes* (1872); and *The Poets of the Church* (1884). He left his library of 6000 volumes to Union Theological Seminary.

HATH'AWAY, ANNE, or AGNES. The maiden name of Shakespeare's wife. See SHAKESPEARE.

HATHERLY, Sir WILLIAM PAGE WOOD, Baron (1801-81). An English jurist, born in London, and educated at Winchester and Cambridge. He was called to the bar in 1827, and was Queen's Counsel eighteen years later. He entered Parliament for Oxford in 1847, and became a power in Church matters, and, though not a polished speaker, was highly respected for his knowledge and conscientiousness. From being a judge and a baronet he rose to be a peer of the realm and Lord Chancellor of Great Britain (1868), but retired in 1872. His personal benevolence influenced his Parliamentary career, and his piety is apparent in his published works, such as *Truth and Its Counterfeits* (1857), and *The Continuity of Scripture* (1867).

HATHOR, hä'thôr. An Egyptian goddess. See ATHOR.

HATIFI, hä'tê-fê, ABDALLAH (c.1460-1521). A Persian epic poet, nephew of Jami (q.v.), born at Khargird, in Herat. The last of the important epic poets, he wrote in rhymed couplets five poems: *Laila wa Majnūn*, a story of unhappy love (edited by Jones, 1788; and in lithograph, Lucknow, 1862); *Haft Manzar*, an imitation of Nizami's *Haft Paikar; Shirlīm wa Khusru*, a tale of the love of a Hindu prince for a rajah's daughter, and remarkable as being based on contemporary fact, and not on conventional legend; *Timur Nāmah*, or *Zafarnāmah*, celebrating the deeds of Timur or Tamerlane, the most important historical epic after the *Shāhnāmah*, of which a part was published by Jones (1788; lithographed at Lucknow, 1869); and an uncompleted story of the glories of Shah Ismail. This pentad is one of the many imitations of Nizami's *Khamsah*. Hatifi is also the name of an earlier Persian poet, who wrote *Gui u Chaugān*, a poem on the relation of man to God under the figure of the ball and the racket—though afflicted and beaten, he must turn again to him who smote; and again of a Turkish poet of Amasia in Asia Minor, who wrote in the sixteenth century.

HATTALA, hä'tä-lä, MARTIN (1821—). A Czech philologist, born in the County of Arva, Hungary. He studied at Pressburg and Vienna; became a priest in 1848, but soon devoted himself to linguistics; was teacher in the Pressburg Gymnasium (1850-54), instructor (1854), and later professor of Slavic philology in the University of Prague. His writings comprise studies in Czech and Slovack phonetics and syntax. Especially to be noted is his defense of the authenticity of the manuscripts of Kvalove-Dvor and Grünberg, containing old epics and lyrics in Bohemian; also, *De Continuarum Consonantium in Linguis Slavicis Mutatione* (1867); attacks on Schleicher and others; and, with A. Patera, *Reliquiæ Metricarum Alexandreidon Palæobohemicarum* (1881). He also wrote on the phonetics of Bohemian and Slovack (1854); a comparative grammar of Bohemian and Slovack (1857); a Slovack grammar (1864); and *Brus jazyka českého*, a work on style and diction (1877).

HATTERAICK, hät'tēr-äk, DIRK. A smuggler in Scott's *Guy Mannering*.

HATTERAS, CAPE. See CAPE HATTERAS.

HATTERIA, or SPHENODON. A genus of New Zealand 'lizards,' described in more detail under TUATARA (q.v.), which is the sole remaining representative of the group Prosauria, and is therefore of great interest as illustrating in its structure a "primitive, almost ideally generalized type of reptiles."

HATTI SHERIF, hät'tê shâ-rēf', or **HATTI HUMAYUN,** hōō'mâ-yōōn' (Turk., excellent writing, from Ar. *khaṭṭ*, script, line, from *khaṭṭa*, to trace, and *šarīf*, sublime, from *šarafa*, to surpass). The name given by the Turks to important rescripts of the Sultan. The hatti sherifs are composed in the Turkish language, and written in the Arabian court-hand Divani. Above the text, as a token of the authenticity of the rescript, stands the intricate flourish or mark of the Sultan, usually in black, but sometimes in red or gold. This flourish is called tugra, or rishani sherif. The hatti sherif is irrevocable, while the written decrees of the Sultan relative to matters not so important, called Irads, are arbitrary decisions or opinions of the ruler liable to be amended, and, in many instances, entirely abrogated.

HATTO, hät'tô. The name of two archbishops of Mainz. HATTO I. (c.850-913) became Abbot of Reichenau in 888, and Archbishop of Mainz three years later. He possessed great influence at the Court of the Emperor Arnulf, and after the death of the latter in 899 became the guardian of his infant son, Louis the Child. In the struggle between the German kings and the anarchic feudal nobility, Hatto was a zealous partisan of the monarchy, and brought to its aid a bold spirit, a crafty mind, and a conscience which balked neither at treachery nor murder. His haughty bearing and magnificent mode of life still further incensed the nobles, who hated him as the instrument of the royal power. The feeling with which he was regarded by the people as a whole is attested by the widespread legend that his body, after death, was carried off by the devil and flung into the crater of Mount Etna. Of greater authenticity is the story related of his perfidious conduct toward Count Adalbert of Babenberg, a noble of Thuringia, who had been at enmity with the Emperor, and who was induced by Hatto to seek the King's presence for the purpose of effecting a reconciliation, the Archbishop promising under oath to restore him unharmed to his castle. After the two had started on their journey from Adalbert's home, Hatto found some pretext for returning with his unsuspecting companion to the castle, thus fulfilling the letter of his vow. Setting out once more, they arrived at the royal camp, where Adalbert was put to death. Hatto is also the hero of the well-known legend connected with the Mouse Tower, situated on an island in the Rhine, near Bingen. During a famine, as the story goes, the Archbishop caused a number of poor people to be burned in a barn, comparing their cries of agony to the squealing of mice. He was thenceforward pursued by a plague of these animals, to escape which he built the tower on a rock in the Rhine. He could not, however, evade his persecutors, and was finally devoured by them. This story, however, is told with slight variations of several historic characters, and is quite as frequently associated with his namesake, HATTO II., who was Archbishop of Mainz from 968 to 970. Consult:

Heidemann, *Hatto I., Erzbischof von Mainz* (Berlin, 1865); Baring-Gould, *Curious Myths of the Middle Ages* (London, 1866-67).

HATTON, Sir Christopher (1540-91). An English statesman and jurist, born at Holdenby. He became a member of the Inner Temple (1559), sat in the Parliaments of 1571, 1572, 1584, and 1586, and showed himself a bitter enemy of the Jesuits. Parry, who defended them in Commons, Hatton accused, and finally had him condemned to death. He was a commissioner at the trial of Babington, of the conspirators against Elizabeth, and of Mary Stuart, and in general showed himself a clever courtier of the Queen. In 1587 she made him Lord Chancellor—the 'dancing Chancellor,' as he was called, in allusion to the story that the Queen first looked on him with favor when she saw him dancing. In literary history Hatton is best known as the patron of Spenser, who dedicated to him *The Faerie Queen*. Consult Nicolas, *Memoirs of the Life and Times of Sir Christopher Hatton* (London, 1847).

HATTON, Frank (1846-94). An American journalist, born in Cambridge, Ohio. He learned the newspaper business in the office of his father, who edited the Cadiz (Ohio) *Republican*. He served through the Civil War, attaining the rank of first lieutenant, and then became a journalist in Iowa, finally becoming editor-in-chief of the *Burlington Hawkeye*. In 1881 he was appointed Assistant Postmaster-General, and three years later succeeded Walter Q. Gresham as Postmaster-General, thereby becoming the youngest Cabinet officer since Alexander Hamilton. He was for some time editor-in-chief of the *Mail* in Chicago, and in 1888 returned to Washington, where he edited the *Post*.

HATTON, Joseph (1841—). An English journalist, novelist, and playwright, born at Andover. He was educated at home and in Chesterfield, and began his literary career by writing for the *Derbyshire Times*, a paper his father had founded. In 1868 he went to London to edit and transform the *Gentleman's Magazine*, and was soon correspondent for German, Australian, and American papers, while he made frequent visits to the United States in the interests of English journals. His popular *Cigarette Papers* appeared first in the *People*, of which he became editor in 1900. His Eastern travels bore fruit in *The New Ceylon* (1881), and he brought out *Henry Irving's Impressions of America* (1884); but he is best known as the author of such novels as: *Under the Great Seal* (1893); *The Banishment of Jessop Blythe* (1895); *The Dagger and the Cross* (1897); *When Rogues Fall Out* (1899); and *In Male Attire* (1900). His romance, *John Needham's Double*, was dramatized for E. S. Willard, and Richard Mansfield produced his version of *The Scarlet Letter*. Hatton also arranged *The Prince and Pauper* for his daughter Bessie, and *Jack Sheppard* for Weedon Grossmith. One of his novels, *By Order of the Czar*, had the distinction of being condemned by the Russian censor.

HATTON, Joseph Liptrot (1809-86). An English musical composer, born in Liverpool. With much natural ability, inherited from father and grandfather, both violinists, he was never thoroughly educated, and but one of his songs, "To Anthea," ranks as a classic. He wrote about three hundred in all, and many of them were as popular as the composer himself. A versatile genius with a sense of humor, he filled many rôles—organist at sixteen years of age; actor with Macready in *Othello* (1832); conductor of chorus in English opera (1842-43); composer of pianoforte pieces and an operetta, *Queen of the Thames;* interpreter of Bach's fugues without the notes; and vocalist at the Hereford Musical Festival (1846). He went on concert tours with Vieuxtemps, Sims Reeves, and other artists, and upon one of his American visits stayed for two years. From 1853 to 1859 he was musical director at the Princess's Theatre under Charles Kean, and when the Ballad Concerts were started at Saint James's Hall, London, in 1866, Hatton was the accompanist and conductor till 1875. He edited song albums for Boosey & Co., attempted oratorio as well as opera, and his part songs are still sung. He died at Margate, and was buried in Kensal Green.

HÄTZER, hĕts'ẽr, Ludwig (c.1500-29). A prominent Swiss Anabaptist. He was born at Bischofszell, near Saint Gall, Switzerland; studied at Freiburg im Breisgau, and attained high rank as a scholar, particularly in Latin, Greek, and Hebrew. He was intimate with Zwingli, but being a radical he desired to move faster than Zwingli thought prudent. In the fall of 1524 he returned to Zurich and openly allied himself with the Anabaptist party. He published a German translation of Œcolampadius's book upon the sacraments; but his continued rejection of infant baptism alienated Zwingli from him, and in March, 1526, he was banished. He went to Basel, where he translated Malachi, with Œcolampadius's commentary (1526), and finally to Strassburg, where he finished, with Johann Denk, a translation of the Prophets (1527), which he published at Worms. He returned to Augsburg, only to be banished again (spring, 1528). He wandered to Constance, and on the trumped-up charge of having seduced the servant of his wife, he was beheaded after three months' imprisonment, February 4, 1529. So bitter is still the feeling against the Anabaptists that even to-day he is represented as having been immoral and justly condemned. His very name has been spelled in an opprobrious manner, Hetzer, meaning irritator.

HATZFELD, hăts'fĕlt, or (Hungarian) **ZSOMBOLYA,** zhôm'bô-lyŏ. A small town, in the County of Torontál, Hungary, 152 miles southeast of Budapest, in a very fertile district (Map: Hungary, G 4). Wheat, corn, and rape are raised, and horses are exported. Hatzfeld is the principal settlement of the Swabians of Southern Hungary, who recaptured the town from the Turks in 1718, and redeemed the district from swamps. Population, in 1890, 9600; in 1900, 10,152; mostly Catholic Germans.

HAUBERK, hą'bẽrk (from OF. *hauberc, halberc,* Fr. *haubert,* from MHG., OHG. *halsberc, halsberge,* AS. *halsbeor,* hauberk, from OHG., MHG., Goth. *hals,* Ger. *Hals,* AS. *heals,* neck; ultimately connected with Lat. *collum,* neck + OHG. *bergan,* MHG., Ger. *bergen,* Goth. *bairgan,* AS. *beorgan,* to protect). In mediæval armor, a defense for the body consisting of a shirt made of steel. Originally the hauberk was only a protection for the neck, and was made of thick leather. Later it was made of chain mail, and at the end of the eleventh century was joined to

the mail shirt or byrnie (q.v.), the name being applied to the whole garment. In the twelfth century the sleeves of the hauberk sometimes terminated at the elbow, but in the thirteenth and fourteenth centuries these came down to the wrist, and very generally descended over the hand in the form of a glove or mitten. In the fourteenth century the hauberk was sometimes worn under plate armor. See ARMOR.

HAUBOLD, hou'bōlt, CHRISTIAN GOTTLIEB (1766-1824). A German jurist of the historical school, born at Dresden and educated at Leipzig, where he became professor in 1789. He wrote: *Institutiones Juris Romani Literariæ* (1809); *Institutionum Juris Romani Privati Lineamenta* (last ed., by Otto, 1826); *Manuale Basilicorum* (1819); *Doctrinæ Pandectarum Lineamenta* (1820); and the excellent *Lehrbuch des sächsischen Privatrechts* (3d ed., by Hänsel, 1847-48).

HAUCH, houk, JOHANNES CARSTEN (1790-1872). A prolific Danish poet and dramatist. Born at Frederikshald, in Norway, of Danish parents, he came to Denmark (1803) when his mother died, and fought against the English in 1807. He entered the university at Copenhagen in 1808, and was made a doctor in 1821. Through association with Oehlenschläger, he became an apostle of literary reform. He wrote many dramas of little importance. Then in 1834 he turned to prose fiction, in which field he wrote: *Vilhelm Zabern* (1834), the most admired; *Guldmageren* (1836); *En polsk Familie* (1839); and *Slottet ved Rhinen* (1845). In 1842 he published a collection of poems. In 1846 he was made professor of Scandinavian languages at Kiel, but returned to Copenhagen in 1848, and now wrote many good tragedies, such as: *Söstrene paa Kinnekullen* (1849); *Marsk Stig* (1850), the best; *Tycho Brahe's Ungdom* (1852); and *Julian den Frafaldne* (1868). He wrote also an historic epic, *Valdemar Atterdag* (1862), and a second collection of poems (1861). He succeeded Oehlenschläger as professor of æsthetics at Copenhagen in 1851. Of strong imagination and with a bent for the mystic and supernatural, his work at its best is admirable, but its average is not high. Hauch's *Dramatic Works* appeared in three volumes (Copenhagen, 1852-59); his romances in seven (ib., 1873); and his poems have also been collected (ib., 1890 et seq.). Consult Brandes, *Danske Digtere* (Copenhagen, 1877).

HAUCK, houk, ALBERT (1845—). A German Lutheran theologian, born at Wassertrüdingen, in Middle Franconia. He studied at the universities of Erlangen and Berlin, and in 1882 became a professor at Erlangen, where he remained until 1889, when he went to the University of Leipzig. In 1891 he was elected a member of the Royal Academy of Sciences. His writings include: *Tertullians Leben und Schriften* (1877); *Die Bischofswahlen unter den Merowingern* (1883); *Kirchengeschichte Deutschlands*, in six parts (parts 1-3, 1887-96; parts 1-4, 2d ed. 1898-1902). As a reward for these labors he was given the great Verdun prize by the Prussian Academy of Sciences (1899). In 1881 he became an editor of the revised edition of the *Realencyklopädie für protestantische Theologie und Kirche* (3d ed. 1896), and after Herzog's death in 1882, the sole editor.

HAUENSCHILD, hou'en-shīlt, RICHARD GEORG SPILLER VON (1825-55). A German poet and novelist, born in Breslau, better known under his pseudonym, 'Max Waldau.' He began the study of law in the university of his native city, but soon forsook it for modern languages, history, and philosophy. He was one of the most gifted German poets of the first half of the nineteenth century. His poems include: *Blätter im Winde* (1848); the epics *Cordula. Graubündner Sage* (2d ed. 1855) and *Rahab* ((1855); and the elegy, *O diese Zeit! Kanzonen* (1850). Of his novels, the humorous romances, *Nach der Natur* (2d ed. 1851), and *Aus der Junkerwelt* (1850), are most noteworthy.

HAUER, hou'ĕr, FRANZ VON (1822-99). An Austrian geologist, born at Vienna, and educated there and at Schemnitz. In 1846 he became an assistant of Haidinger, and from 1849 to 1867, as a member of the Imperial Geological Institute, and later as its director, took part in many geological surveys. In 1885 he was appointed superintendent of the Vienna Museum of Natural History, and edited its *Annalen* (1886-96), and for the last seven years of his life was a member of the Austrian House of Lords. His published works include: *Geologische Uebersicht der Bergbaue der österreichischen Monarchie* (1855), with Foetterle; *Die Geologie und ihre Anwendung auf die Kenntnis der Bodenbeschaffenheit der österreichisch-ungarischen Monarchie* (2d ed. 1878); and a *Geologische Karte von Osterreich-Ungarn* (5th ed. 1896). Consult Böhmersheim, *Zur Errinnerung an Franz von Hauer* (Vienna, 1899).

HAUFF, houf, WILHELM (1802-27). A German novelist, born at Stuttgart. His education was desultory, and revealed no precocity; his effective training came from his mother and sisters, and tended to cultivate the imagination rather than the intellect. He studied theology at Tübingen (1820-24), and in 1826 published his first volume, *Märchenalmanach*, followed by two sequels of like title, all marked by a singularly dramatic humor. Equally successful were the *Mitteilungen aus den Memoiren des Satans* (1826), and *Der Mann im Monde* (1826), the last under the name of H. Clauren, a lesser novelist, whose sentimentality it was intended to parody. This it did so successfully as to deceive Clauren's most enthusiastic admirers. His best romance is his *Lichtenstein* (1826). It is a vivid series of historical pictures of men and manners, and has held its popularity for three generations. Hauff traveled in Germany, France, and Belgium, became editor of the Stuttgart *Morgenblatt*, and married. The summer of 1827 he passed in the Tyrol, still at work; but in September his health began to fail, and in October he died. To 1827 belong the *Phantasien im Bremer Ratskeller; Das Bild des Kaisers;* and *Die Bettlerin vom Pont des Arts.* Among the other collected *Tales*, the best are: *Das Wirtshaus im Spessart; Othello; Jud Süss;* and *Die Sängerin.* Hauff's *Works* are still often reprinted, and enjoy undiminished popularity. In his early death Germany lost a writer of unusual ability and rich promise.

HAUG, (JOHANN CHRISTOPH) FRIEDRICH (1761-1829). A German poet, known also by his pen-name 'Hophthalmos,' born at Niederstolzingen (Württemberg). He studied in Stuttgart at the Karlschule, or military institute of Duke Karl Eugen, where he was one of the Schil-

ler group; in 1783 was appointed a secretary to the Ducal Board of Privy Councilors, in 1794 private secretary, and in 1816 librarian of the Royal Public Library at Stuttgart, with the title of Aulic Councilor. Ready in improvisation, he wrote quantities of neat but rather commonplace verse for literary almanacs, anthologies, and journals, and for Cotta's *Morgenblatt*, of which he was an editor from 1807 to 1817. As an epigrammatist, however, he was perhaps second only to Logau (q.v.). The most representative exercise of his wit is to be found in his *Zweihundert Hyperbeln auf Herrn Wahls ungeheure Nase* (1804, 3d ed. 1850), a *tema con variazioni*, which certainly to unprejudiced minds attests his mobility and resourcefulness. A selection from his *Gedichte* appeared at Stuttgart in 1840; another forms No. 1136 of Reclam's *Universalbibliothek*. Consult Fischer, *Beiträge zur Litteraturgeschichte Schwabens* (Tübingen, 1901).

HAUG, houg, MARTIN (1827-76). A German Orientalist, born at Ostdorf, in Württemberg. Overcoming every obstacle to his early education, he became a school-teacher, first at Ostdorf and later at Unternsingen. Here he was forced to continue his classical and Hebrew studies in secret; but he persevered, and developed a taste in linguistics and Sanskrit. Haug entered the gymnasium at Stuttgart in 1848, and in 1852 received the degree of doctor of philosophy at Tübingen. Until 1859 his work was mainly at Bonn and Heidelberg, but in that year he was appointed superintendent of Sanskrit studies at the Government College at Poona, India. Leaving Europe with his bride, he went to India, where he worked unceasingly in Sanskrit, Avestan, and Pahlavi, in addition to the task of reforming the system of native education. In 1866 Haug returned to Germany, and two years later was appointed to the newly created chair of Sanskrit and comparative linguistics at Munich, which he held until his death. Haug's work was of signal importance for Indo-Iranian studies in the Orient. He was the first to recognize the importance of the traditional interpretation of the texts as contrasted with the linguistic or comparative school; and his books, though comparatively few in number, are still, for the most part, of value. His chief contributions were: *Die fünf Gâthâs* (2 vols., 1858-60); *The Aitareya Brahmana of the Rigveda* (2 vols., 1863); *An Old Zend-Pahlavi and Pahlavi-Pazand Glossary*, in collaboration with Hoshengji Jamaspji (2 vols., 1867-70); *The Book of Arda Viraf*, in collaboration with E. W. West (2 vols., 1872-74); and *Essays on the Parsis* (3d ed. 1884). Consult Evans, in West's edition of the essays.

HAUG, ROBERT (1857—). A German artist, born in Stuttgart. His studies were begun at the Art School of Stuttgart, and continued at Munich in the academy, the Old and New Pinakothek, and the Schack Gallery. At the Munich International Exposition of 1888 he attracted very favorable notice by his two works, "The Prussians Near Möckern" (in the Stuttgart Gallery) and "Volunteer Riflemen of 1813" (in the National Gallery, Berlin), the latter of which also obtained the gold medal at the Berlin Art Exposition in 1891. He became an instructor in the Stuttgart Art School in 1894. His further works, for the most part scenes from the War of Liberation, characterized particularly by fine atmospheric effects, include "At Dawn" (1891; Dresden Gallery); "The Approach of Blücher's Army to the Rhine" (1893), "Fight in the Streets of Leipzig, October, 1813" (1895; Leipzig Museum); "The Castle Guard," and "Battle in a Cornfield" (National Gallery, Berlin).

HAUGIANS, hou'gi-anz. A religious body in Norway, the followers of Hans Nielsen Hauge (1771-1824). He was an ignorant peasant, but became an enthusiastic revival preacher early in the nineteenth century, and so annoying to the regular clergy that they procured his punishment by fine and imprisonment. He held that the ministry is a common duty, and that ordination for the service is not necessary; that Church creeds and confessions are of small account, but faith and works are everything; and he laid much stress upon strict discipline. He gained many followers, particularly from the lower classes, and his work was continued after his death. For the life of Hauge, consult Bang (Christiania, 1875). His name is commemorated in Hauge's Synod, one of the independent Lutheran bodies of the United States. The synod was organized in 1846-50 by immigrants from Norway. Its main strength is in the States of Minnesota, South Dakota, and Wisconsin.

HAUGWITZ, houg'vits, CHRISTIAN HEINRICH KARL, Count (1752-1831). A Prussian statesman, born near Oels, in Silesia, and educated at Halle and Göttingen. His mystical philosophy won him the favor of Frederick William II., who sent him to Vienna as Ambassador, and in 1792 appointed him Minister of Foreign Affairs. During his administration the second partition of Poland took place (1793), and the humiliating Peace of Basel was signed (1795). When the French occupied Hanover in 1803, Haugwitz resigned; but two years later, when the French troops had entered Ansbach, he was sent to treat with Napoleon, and after Austerlitz signed the treaty ceding Ansbach, Cleves, and Neuchâtel to the French, and giving Hanover to Prussia. Soon after he replaced Hardenberg as Prime Minister, but was unable to better the relations with France, and after Jena retired to his estates in Silesia and Poland. Consult Minutoli, *Der Graf von Haugwitz und Job von Witzleben* (Berlin, 1844).

HAUK, MINNIE (1852—). An American dramatic soprano. She was born in New York, of German parentage, and studied both at home and in Europe. Her first appearance was on the concert platform in New Orleans (1865), and three years later she made her operatic début in New York City. The same year she appeared in Italian opera in London with great success. The following year she was engaged as the prima donna of the Vienna Court Opera, and from 1873 to 1875 was employed in a like capacity at Berlin. She also sang with marked success in every capital of the civilized world.

HAUKSBEE, hâks'bê, FRANCIS, the elder (?-c.1712). An English physicist, admitted to the Royal Society of London in 1705, and who made a number of brilliant discoveries. Little is known of his life save through his scientific papers which were published in the *Philosophical Transactions*, and a volume on *Physico-Medicinal Experiments on Various Subjects, Containing an*

Account of Several Surprising Phenomena Touching Light and Electricity Producible on the Attraction of Bodies. He discovered that light could be produced by mercury shaken in a glass tube, and that this effect was increased when the action took place in a vacuum. Hauksbee devised one of the first electrical machines, and also made improvements in the air-pump. He is supposed to have died in 1712, his last papers in the *Philosophical Transactions* appearing posthumously in 1713. He is mentioned by Newton in certain letters.

HAUKSBEE, Francis, the younger (1687-1763). An English optician, possibly a son of the foregoing. He was for forty years previous to his death clerk and housekeeper of the Royal Society, London. He was somewhat of a scientist, being an instrument-maker and optician, and is said to have been the first to deliver scientific lectures with experiments in London. "A Course of Mechanical, Optical, and Pneumatical Experiments" was given by Hauksbee, who performed the experiments while the explanatory lecture was delivered by William Whiston, M.A. The syllabus of this course of lectures, as well as those on astronomy and chemistry, is interesting as showing the state of experimental science at that time.

HAULIK DE VÁRALJA, hou'lik dâ vâ'rŏlyŏ, Georg (1787-1869). A cardinal and archbishop of Agram, born at Tyrnau in Hungary. He was a very aggressive and determined adversary of Kossuth, who in 1849 proscribed him as a traitor. His *Selectiones Encyclicæ Literæ et Dictiones Sacræ* (1850-53), a collection of pastoral letters, is of value to historical study.

HAULLEVILLE, ôl'vêl', Prosper Charles Alexandre, Baron de (1830—). A Belgian publicist, born in Luxemburg, of a French immigrant family from Lorraine. He studied law at Liège, Brussels, and Bonn, and then entered Belgian politics as a member of the Constitutional-Catholic Party. He was editor at various times of *L'Universel*, the *Revue Générale*, and the *Journal de Bruxelles*. His books include: *Histoire des communes lombardes depuis leur origine jusqu'à la fin du XIIIème siècle* (1858); *La définition du droit* (1875); and *De l'avenir des peuples catholiques* (1876), the last of which was translated into nine languages, and procured him the position of Papal chamberlain.

HAUNTED MAN, The. A Christmas story by Charles Dickens (1847).

HAUPT, houpt, Erich (1841—). A German Protestant theologian, born at Stralsund, and educated at Berlin. He was professor of New Testament exegesis, successively at Kiel (1878), Greifswald (1883), and Halle (1888). He wrote: *Der erste Brief des Johannes* (1869); *Die alttestamentlichen Citate in den vier Evangelien* (1871); *Die Kirche und die theologische Lehrfreiheit* (1881); *Plus ultra, zur Universitätsfrage* (2d ed. 1890); *Die Bedeutung der heiligen Schrift für den evangelischen Christen* (1891); *Zum Verständnis des Apostolats im Neuen Testament* (1896), etc.

HAUPT, Herman (1817—). An American engineer, born in Philadelphia, Pa. He graduated at West Point in 1855, but resigned a commission in the Second Infantry to become an assistant engineer on the public works of Pennsylvania. In 1844 he became professor of civil engineering and mathematics in Pennsylvania College, but three years later he resumed the practice of his profession, as principal consulting engineer of the Philadelphia Railroad, of which he became, successively, the general superintendent and chief engineer. He was chief engineer of the Hoosac Tunnel from 1856 to 1861. In the Civil War he was chief of the United States Bureau of Military Railroads, and served on the staff of General McDowell with the rank of colonel. From 1872 to 1876 he was general manager of the Piedmont Air-line Railroad, from 1876 to 1878 was chief engineer of the Pennsylvania Transportation Company and Seaboard Pipe-line, from 1881 to 1885 was general manager, and 1885 to 1886 was general superintendent of the Northern Pacific Railroad. He invented a drilling machine that won the highest prize of the Royal Polytechnic Society of Great Britain, and was the first to prove the practicability of transporting oil in pipes. He wrote: *Hints on Bridge Building* (1840); *General Theory of Bridge Construction* (1852); *A Consideration of the Plans Proposed for the Improvement of the Ohio River* (1855); *Military Bridges* (1864).

HAUPT, Lewis Muhlenberg (1841—). An American civil engineer, born in Gettysburg, Pa. He was educated at Harvard and at West Point, became lieutenant of lake surveyors by 1868, and in the following year was attached to a military district in Texas. From 1872 to 1892 he was professor of civil engineering in the University of Pennsylvania, and in 1885-86 was editor of the *Engineering Register*. In 1886 he invented a method for marking channels. He was a member of the Nicaraguan and the Isthmian Canal Commissions (1897-99), was president of the Colombia-Canea Arbitration (1897), and was chief engineer of the survey for ship canals across New Jersey, and was consulting engineer on the construction of the Ohio-Lake Erie ship canal. In addition to his numerous contributions to engineering journals, his publications include: *Working Drawings and How to Make and Use Them* (1881); *The Topographer—His Methods and Instruments* (1884); *Physical Phenomena of Harbor Entrances* (1887); *Canals and Their Economic Relation to Transportation* (1890); and *A Move for Better Roads* (1891).

HAUPT, houpt, Moritz (1808-74). A well-known German philologist. He was born at Zittau, and studied from 1826 to 1830 at Leipzig, where in 1841 he was appointed professor of the German language and literature. For having participated in the agitation of 1848-49, he was deprived of his professorship. In 1853, however, he was called to Berlin to succeed Lachmann as professor of classical literature. In 1861 he became perpetual secretary of the Academy of Sciences. By his painstaking and scholarly critical work he rendered distinguished service to both classical and German philology, chiefly as an editor of texts. In the former field he published: *Quæstiones Catullianæ* (1857); *Observationes Criticæ* (1841); editions of Horace (4th ed. 1881), Catullus, Tibullus, Propertius (5th ed. 1885), Vergil (2d ed. 1873), and other classical writers. His chief contributions to German philology were editions of Hartmann von Aue's *Erec* (1839), *Lieder und Büchlein*, and *Der arme Hein-*

rich (1842); Rudolf von Em's *Der gute Gerhard* (1840); the poems of Gottfried von Neifen (1851); and the *Moritz von Craon* (1858), and *Von dem übeln Weibe* (1871) of Neidhard von Reuenthal, and, above all, Konrad von Würzburg's *Engelhard* (1844, new ed. 1890). He also edited Æschylus from the papers of Hermann (2d ed. 1858), and completed Lachmann's edition of the Mediæval German lyrics of the Minnesingers (*Des Minnesangs Frühling*, 4th ed. 1888). In 1836, with Hoffman von Fallersleben, he founded the *Altdeutsche Blätter*, succeeded in 1841 by the *Zeitschrift für deutsches Altertum*, which he edited until his death. His numerous briefer contributions are collected in his *Opuscula* (3 vols., 1875-76); and his *Französische Volkslieder* appeared posthumously in 1877. Consult: Belger, *Haupt als akademischer Lehrer* (Berlin, 1879); and Nettleship's lecture (Oxford, 1879).

HAUPT, Paul (1858—). A Semitic scholar, one of the pioneers of Assyriology in America. He was born at Görlitz, Germany, November 25, 1858. He studied at the universities of Berlin and Leipzig. In 1880 he became privat-docent in the University of Göttingen, and from 1883 to 1889 was assistant professor of Assyriology. In 1883 he became professor of Semitic languages at Johns Hopkins University, but until 1889 continued to lecture in the summer at Göttingen. Besides numerous smaller articles, he projected and edits the *Polychrome Bible*, a critical edition of the Hebrew text of the Old Testament, and a new English translation with notes. A unique feature of this edition is the use of different colors to distinguish the various sources and component parts in the Old Testament books—each one of which is intrusted to a specialist in biblical studies. Among his Assyriological publications may be mentioned his edition of the *Nimrodepos* (the Gilgamesh epic, 1884-91); *Akkadische und sumerische Keilschrifttexte* (1881-82); *Die akkadische Sprache* (1882); and *Sumerische Familiengesetze* (1883). He is also co-editor with Friedrich Delitzsch of the *Beiträge zur Assyriologie und semitischen Sprachwissenschaft*, published in Leipzig.

HAUPTMANN, houpt'mân, Gerhart (1862—). One of the greatest of modern German dramatists. He was born in Salzbrunn, son of a hotel-keeper, and grandson of a weaver. His first work, *Promethidenlos* (1885), was an epic. His dramas, *Vor Sonnenaufgang* (1889), *Das Friedensfest* (1890), *Einsame Menschen* (1891), and *Die Weber* (1892), show the influence of Zola, Ibsen, and Tolstoy, a spirit of revolt against the social conditions and the artistic ideals of a military and capitalistic State. Thus the young Hauptmann, with the young Sudermann, was for a time leader of a second Young German movement, and the production of *Vor Sonnenaufgang* at the Free Theatre of Berlin was the signal for a contest, recalling in a way that over the *Cid* or *Hernani*. The quiet and retiring poet became at once a notoriety. These dramas were aggressively democratic, social, realistic. His actors are no longer persons or characters, they are described as 'people in action,' who walk, talk, and act as in every-day life, or at least seem to do so, by an art that hides art. And it is every-day life of which they speak, the sordid social struggles of to-day in which they are engaged, the vulgar vices that hold them in a gloomy, brutal grasp. This naturalism is as pessimistic as that of Zola. *Die Weber* constantly suggests *Germinal*, but the poet and the artist in Hauptmann here rises above the theorist and the philosopher. The idealist is not defeated, but is learning to lift ugliness itself to the realm of art.

Up to 1892 Hauptmann might have seemed morbidly ethical in tragedy. He was now to show himself in *Kollege Crampton* (1892) and *Der Biberpelz* (1893) capable of painting delightful pastels of humorous character, though it is here with a professional thief and there with a drunkard that we have to do. And presently in *Hannele* (1893) he was to reveal himself in still another character as an extreme idealist, dealing no longer with vice, hunger, and mental decay, but with dreams, fantasies, and faith. *Hannele* is a mystic poem. So is *Florian Geyer* (1895), and *Die versunkene Glocke* (1897, translated by Meltzer, 1900) calls itself 'a fairy drama.' Then may be noted in *Fuhrmann Henschel* (1898) a turn from mysticism to an idealized realism in a situation suggesting that of Balzac's *La rabouilleuse*, though its fundamental naturalism is tempered by a spiritual restraint that comes from a great poet's moral intuition. Here Hauptmann has touched earth again as the poet of social altruism, giving to the German working class an artistic expression of their own weakness, and of the selfish strength of others. He is here the poet of the poor, the downtrodden, the lonely, the helpless, the perplexed, even the vicious. He recognizes the individualism produced by the material struggle for existence and wealth, but he would convert it to new ends by the inspiration of a Christian socialism. *Schluck und Jan* (1900), a farce, is a romantic adaptation of an Arabian tale, and Hauptmann's next drama, *Michael Kramer* (1900), while abounding in lines of sententious eloquence, is sordid in subject, and proved on the stage a melancholy failure. Hauptmann wrote also two novelistic studies, *Der Apostel* and *Bahnwärter Thiel* (1892).

HAUPTMANN, houpt'mân, Moritz (1792-1868). A German composer and eminent writer on the theory of music, born at Leipzig. He was educated as a musician, and studied the violin under Spohr. His opera, *Mathilde* (1826), was very successful, but it was not until 1842, when he became cantor and musical director at the Thomasschule in Leipzig, that his genius as a teacher was universally acknowledged. His pupils, among whom were F. David, Kiel, Joachim, Sullivan, Von Bülow, and Cowen, cherished an enthusiastic admiration for him, and at his death Leipzig was in mourning. Of his compositions, all of which are marked by purity and beauty of style, the best are his violin pieces. He embodied the result of many years' labors in his *Die Natur der Harmonik und Metrik* (1853, 2d ed. 1873; Eng. trans. 1888), which was a work of paramount importance and the foundation of modern musical theory.

HAURAKI (hou-rä'kê) **GULF.** An inlet on the east coast of North Island, New Zealand, 70 miles long and 40 miles broad. The Great Barrier Island forms a natural breakwater at its entrance, and it contains numerous picturesque islands and good harbors. Auckland and Thames are the chief towns on its shores.

HAURAN (Arabic *el-Hauran*, Gk. *Ἀύρανῖτις*, *Auranitis*). A district of Syria, east of the Jordan (Map: Turkey in Asia, C 2). In a wider sense the name is used to designate the Turkish province including Hauran proper, Jedur, Jaulan, and part of the hill-country south of the Yarmuk. Whether the Hauran mentioned by Asshurbanipal (B.C. 668-626), on the Rassam cylinder (vii. 111), was intended as a designation of this larger territory cannot be determined. But in Ezek. xlvii. 16-18, Jaulan is clearly included in the description. In a narrower sense Hauran extends east of Jaulan to the desert and from the district of Damascus to the Yarmuk. This tract of land includes: (1) en-Nukra, 'the cavity'; (2) el-Leja, 'the refuge'; and (3) el-Jebel, 'the mountains.' En-Nukra is a hollow east of Jaulan, south of el-Leja, and west of Jebel ed-Druze, 1500 to 2000 feet above sea-level, with an exceedingly rich soil, formed by decomposed volcanic matter. El-Leja is composed entirely of lava found in great masses and in fantastic shapes, with little vegetation. El-Jebel is the high mountain region, with the lofty peaks of el-Kuleib and the fortress of Salkhad. The oldest monument is probably the so-called Job-stone at Sheikh Saad, which is now known to have been erected by Rameses II. (about B.C. 1300). The underground dwellings are no doubt much older. None of the cities of which ruins now exist can be regarded as older than the Græco-Roman period; but there may have been older cities on the same sites. Great houses, built entirely of basalt, have been perfectly preserved, and arouse the amazement of travelers. Numerous Greek inscriptions have been found, both Christian and pagan. A railroad extends from Damascus to Mzerib. Consult: Wetzstein, *Reisebericht über Hauran und die Trachonen* (Berlin, 1860); Schumacher, *Across the Jordan* (London, 1883); Merrill, *East of the Jordan* (New York, 1883); G. A. Smith, *Historical Geography of the Holy Land* (London, 1895).

HAURÉAU, ō'rā'ō', JEAN BARTHÉLEMY (1812-96). A French historian and politician, born in Paris. He was educated in the colleges of Louis le Grand and Bourbon, and became a revolutionary writer on the staff of several metropolitan newspapers before he went to edit the *Courrier de la Sartha* (1838-45) in Le Mans, where he also became city librarian. Thence he returned to the *National* in Paris, and after the Revolution of 1848 he was made keeper of the manuscripts in the National Library, retaining the position until the coup d'état of December 2, 1852. He was sent by the Department of Sarthe to the Constituent Assembly, after the dissolution of which he abandoned politics. He was made librarian of the Ordre des Avocats in 1861, and director of the National Printing Office in 1870, but retired in 1882. He was commander of the Legion of Honor from 1878. He wrote *François I. et sa cour* (1853); *Charlemagne et sa cour* (1854); *Gallia Christiana* (1856-65); and *Histoire de la philosophie scholastique* (1872-80), his best-known work.

HAURIENT (from Lat. *hauriens*, pres. part. of *haurire*, to draw water). A term in heraldry (q.v.), applied to a fish placed upright per pale.

HAUSA (hou'sȧ) **STATES, or HAUSA LAND.** A term of ethnographical rather than geographical significance. It now designates that part of Nigeria (q.v.) which lies north of the Benue and Niger rivers. It embraces the kingdoms of Sokoto (q.v.) and Nupe. The former includes the sub-sultanate of Gando, and the Kalam, Muri, Bautchi, and Jauri territories, and the Adamawa Empire. Bornu borders on the east, and the Niger from Lokodja to Birni borders on the west. The total area is estimated at 150,000 square miles, with about 4,000,000 inhabitants. The Hausa people are negroes with much admixture of other races—Tuareg, Berber, Fulah, etc. Their cranial index, or ratio of head-width to head-length, is 77.3. They are said to be intelligent, industrious, and hospitable, and are one of the most civilized races of Central Africa. They engage in agriculture, cattle-raising, and commerce, and make good artisans. They form a large part of the military forces of Great Britain in Nigeria, and also of the Congo Free State. For the most part they have adopted Mohammedanism from their conquerors, the Fulahs. The Hausa language has become that of trade over a large region to the westward and northward to the Barbary States. It represents an isolated branch of the Hamitic family of languages. An association for its study was formed in London in 1892, and a professorship has been established at Cambridge. Another race found in the region is the Tuculör. The Hausa Empire is supposed to have been very powerful about the middle of the fifteenth century. It gradually became divided up into States, some of which represented the highest civilization of the Sudan. The Fulahs entered the country gradually, and in the early part of the nineteenth century made themselves masters of the whole region. Consult: Robinson, *Hausaland* (London, 1896); *Hausa Literature* (Cambridge, 1896); *Hausa Grammar* (London, 1897); Robinson and Brooks, *Hausa Dictionary* (Cambridge, 1899-1900). There are also grammars by Schoen (London, 1862) and Marre (Vienna, 1901).

HAUSEGGER, hou'zĕg-ĕr, FRIEDRICH VON (1837—). An Austrian writer on musical theory, born at Vienna. He studied music with Salzmann and Otto Dessoff, and, after practicing law for some time at Gratz, became in 1872 a teacher of music at the university there. His most important book is *Musik als Ausdruck* (1885), and *Richard Wagner und Schopenhauer* (1892) and *Vom Jenseits des Künstlers* (1893) are also valuable.

HAUSER, houz'ĕr, FRANZ (1794-1870). A Bohemian opera singer, born at Prague. He was a pupil of Tomaschek, and had a remarkable barytone voice. From 1817 to 1837 he sang with great success in Prague, Dresden, Vienna, London, Berlin, etc., and from 1846 to 1864 was director and singing teacher at the Munich Conservatory. He had a splendid collection of Bach's works, and his correspondence with Hauptmann and Mendelssohn is interesting. He died at Freiburg, Baden.

HAUSER, MISKA (1822-87). An Hungarian violinist, born at Pressburg. He was a pupil of Kreutzer and Joseph Matalay, and of the Vienna Conservatory. He made successful concert tours of Europe, America, Australia, and India, and composed a good deal of violin music. He published *Aus dem Wanderbuch eines österreichischen Virtuosen* (1858-59), which was an account of his American trip. He died at Vienna.

HAUSRATH, hous'rät, ADOLF (1837—). A German Protestant theologian, born at Karlsruhe. He was educated at Jena, Göttingen, Berlin, and Heidelberg, and was appointed professor of ecclesiastical history at Heidelberg in 1867. His publications include: *Der Apostel Paulus* (2d ed. 1872); *Neutestamentliche Zeitgeschichte* (3d ed. 1875-79); *D. F. Strauss und die Theologie seiner Zeit* (1876-78); *Arnold von Brescia* (1891); *Peter Abälard* (1893); *Martin Luthers Romfahrt* (1894); *Die Arnoldisten* (1895); *Karl Holsten* (1897); *Aleander und Luther auf dem Reichstage zu Worms* (1897); *Alte Bekannte* (1899-1901); and, under the name George Taylor, the historical novels *Antinous* (1880); *Klytia* (1883); *Jetta* (1884); *Elfriede* (1885); and *Peter Maternus* (1898); and the stories *Unter dem Katalpenbaum* (1899) and *Potamiäna* (1901).

HAUSSA STATES. See HAUSA STATES.

HÄUSSER, hois'ĕr, LUDWIG (1818-67). A German historian and politician, born at Kleeburg in Lower Alsace. He entered the University of Heidelberg as a student of philology, but under Schlosser's influence soon devoted himself to history, the study of which he continued at the University of Jena. After his graduation he taught for a number of years, spent some time in Paris, and in 1845 was appointed professor of history at Heidelberg. Soon afterwards he became interested in the political movements of the day and wrote a pamphlet on *Schleswig-Holstein, Deutschland und Dänemark* (1846). At the beginning of 1847 he was chosen an editor of the *Deutsche Zeitung,* and in November of the same year was elected to the Second Chamber of the Baden Legislature, where he supported the Federal Constitution. He took no part in the May Revolution of 1849, and the next year again became a member of the Legislature, but resigned in October, and devoted himself to his historical studies. His opposition in 1858 to the reaction in the Protestant Church was as successful as the polemic into which he entered in 1859 against the concordat with the Papacy. From 1860 to 1865 he was again a member of the Second Chamber, and supported the Liberal Ministry. He was one of the founders of the *Süddeutsche Zeitung,* and in December, 1863, took part in the assembly of representatives of the German States at Frankfort. Though Häusser was conspicuous in politics, his fame rests chiefly upon his historical works. He was a brilliant and inspiring lecturer. His chief work, *Deutsche Geschichte vom Tode Friedrichs des Grossen bis zur Gründung des Deutschen Bundes* (4 vols., 1854-57; 4th ed. 1869), is one of the most striking achievements of modern German historical research. Among his numerous other publications are *Geschichte des Zeitalters der Reformation* (1868; 2d ed. 1879) and *Geschichte der Französischen Revolution* (1867; 3d ed. 1891), which were issued after his death. Many of his lectures, edited from stenographic reports, have also been published.

HAUSSEZ, ô'sâ', CHARLES LEMERCIER DE LONGPRÉ, Baron d' (1778-1859). A French politician, born at Neufchâtel, of an aristocratic family. At sixteen he began to take a part in conspiracies against the Directory and the Consulate, and was an enthusiastic supporter of the Empire, but joined the Royalist Party on the return of the Bourbons. In 1829 he became Naval and Colonial Minister, and in the following year was forced to flee to England because of his loyalty to Charles X. He was condemned to perpetual imprisonment; but in 1839, after extensive travels in Italy, Switzerland, and Germany, benefited by the amnesty to return to France. Among Haussez's works the following may be mentioned: *Réflexions d'un ami du roi* (1816); *La Grande Bretagne en 1833* (1833); *Voyage d'un exilé* (1835); *Alpes et Danube* (1837); and *Etudes morales et politiques* (1844 and 1851). From his political memoirs excerpts were published in the *Revue de Paris* (1894).

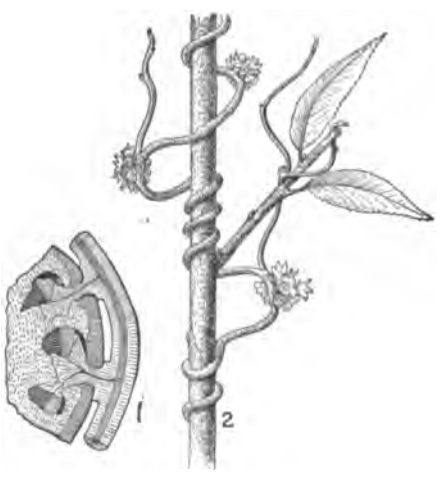
HAUSSMANN, ôs'män', GEORGES EUGÈNE, Baron (1809-91). A French official under the Second Empire. He was born in Paris, and was educated at the Conservatory of Music, but became an advocate. After the Revolution of 1830 he was sous-préfet successively of Nérac, Saint-Girons, and Blaye, and under the Presidency of Louis Napoleon was prefect of Var, the Yonne, and Gironde. He was appointed Prefect of the Seine in 1853. While holding this office, Haussmann expended some $500,000,000 in rebuilding and beautifying Paris. Parks were planted on the sites of hovels; splendid boulevards were run through the city; squares were laid out; statues, bridges, and magnificent public buildings sprang up with almost miraculous rapidity. In carrying on his work Haussmann let no considerations of private rights or financial expediency stand in the way. His enemies accused him of systematic peculation, and declared that his broad boulevards were intended for the rapid mustering of troops and cannon in case of any uprising against the Empire. A stinging pamphlet by Jules Ferry, and the enmity of Ollivier, who became Minister in 1870, brought about Haussmann's downfall. His work, however, had done much to make the Second Empire popular. In 1857 he was made a Senator, and elected a member of the Academy of Fine Arts. He was likewise a member of the Imperial Council of Public Instruction. After the fall of the Empire he quitted France for a time. On his return he was appointed director of the Crédit Mobilier, and did much to improve the condition of that financial institution. In 1877 he was returned to the Chamber of Deputies by the Arrondissement of Ajaccio, in Corsica.

HAUSSONVILLE, ô'sôn'vêl', GABRIEL PAUL OTHENIN DE CLÉRON, Count d' (1843—). A French author and politician, born at Gurcy-le-Châtel. Elected a Deputy in 1871, he voted with the Right Centre. He failed of reëlection in 1876, because of his lack of loyalty to the Republic, and in 1877 retired to private life and literary labors. He was elected to the French Academy in 1888, and in 1891 became the spokesman of the Orleanist dynasty. Haussonville's more important works are: *Les établissements pénitentiaires en France et aux colonies* (1875); *Sainte-Beuve* (1875); *L'enfance à Paris* (1879); *Le salon de Mme. Necker* (1882); *Etudes biographiques et littéraires* (1879-81); *Mme. de La Fayette* (1891); *Socialisme et charité* (1895); *Lacordaire* (1896); and *La duchesse de Bourgogne et l'alliance savoyarde* (1898-1901).

HAUSSONVILLE, JOSEPH OTHENIN BERNARD DE CLÉRON, Count d' (1809-84). A French

statesman and author, born in Paris. He was secretary to the Embassy at Brussels, then at Turin, then at Naples, and from 1842 to 1848 represented Provins in the Chamber of Deputies. He was not a great speaker, but was an active member of the Conservative Party until the Revolution of 1848, when he retired and devoted himself to literature. His most important works are: *Histoire de la politique extérieure du gouvernement français de 1830 à 1848* (1850); *Histoire de la réunion de la Lorraine à la France* (1854-59); and *L'Eglise romaine et le premier Empire* (1864-69), the work which gained him admission to the Academy in 1869. During the Franco-German War he wrote political letters valuable for their opportuneness more than for their literary style, notably, *La France et la Prusse devant l'Europe*. After the peace he became the protector of exiles from Alsace and Lorraine who wished to continue under French rule. His wife, Louise de Broglie, was also a writer, and the Count supported her brother, the Duke, in politics, against M. Thiers. He became Senator for life in 1878.

HAUSTO'RIA (Neo-Lat. nom. pl., from *haustor*, drawer, from *haurire*, to draw). A term applied to special structures which are found in a variety of plants, and whose function is that of attachment and suction. Some of the best illustrations of such outgrowths are found among parasitic fungi, in which the filaments have the general habit of putting forth processes that penetrate the cells of their hosts. In the interior of the host cell the haustorium usually enlarges, and through the greatly increased surface it is able rapidly to absorb nourishment for the fungus. Such haustoria generally cause the death of the host cells. Haustoria of a far more complicated structure are found in higher plants, as the dodder (*Cuscuta*), and such parasites as the beech-drop and broom-rape (*Orobanchaceæ*), which live on the roots of certain trees. In these groups the haustoria are probably really adventitious roots, but the structure becomes greatly modified. They penetrate the tissue of the host and establish a direct connection with the conducting vascular bundles, so that the parasite actually taps the sources of food-supply, water, and organized food material, and draws off what it needs.



HAUSTORIA OF DODDER
1. Haustorium enlarged. 2. Dodder-vine, showing positions of haustoria.

HAUTBOIS, hō'boi. See OBOE.

HAUTEFEUILLE, ōt'fē'y', PAUL GABRIEL (1836—). A French mineralogist and chemist, born at Etampes, and educated at the Ecole Centrale, in which he taught metallurgy, and was director of the chemical laboratory until 1885. In that year he became professor of mineralogy in the University of Paris. His written work appeared mostly in technical journals, especially in the *Comptes Rendus* of the French Academy of Sciences, and he also published: *Recherches sur l'ozone* (1884), as well as a biographical memoir, *Henri Sainte Claire Deville* (1885, with Chappuis).

HAUTE-GARONNE, ōt'gà'rŭn'. A department in the south of France, bounded on the south by the Pyrénées, and on the west by the departments of Hautes-Pyrénées and Gers (Map: France, H 8). Area, 2219 square miles; population, in 1896, 459,377; in 1901, 448,481. It is watered by the Garonne, from which it derives its name, and within the basin of which it wholly lies. The soil in the valleys is very productive, and yields heavy crops of grain, maize, beans, etc. Orchard-fruits, with melons and tobacco, are produced in abundance, and the annual yield of wine is large. Rick salt is produced, and fine marble is obtained at Saint Beat. The chief manufactures are woolen and cotton fabrics and hardware. The Department of Haute-Garonne was formerly divided between the provinces of Languedoc and Gascony. It is divided into the four arrondissements of Toulouse, Muret, Saint Gaudens, and Villefranche. Capital, Toulouse.

HAUTE-LOIRE, ōt'lwär'. A southeast department of France, formed mainly from portions of Auvergne and Languedoc (Map: France, K 6). Area, 1916 square miles. The surface is mountainous, covered by the Cévennes, the Cantal Mountains, and the Margeride chain, with wooded slopes. The chief rivers are the Loire and the Allier. The soil of the plains is fertile, and the agricultural produce, consisting of the usual crops, with fruits, is abundant. Iron, coal, copper, lead, and other minerals are found, and there are important manufactures of silk and lace. Capital, Le Puy. Population, in 1896, 316,699; in 1901, 314,580.

HAUTE-MARNE, ōt'märn'. A department in the northeast of France, southeast of the Department of Marne (Map: France, M 3). Area, 1402 square miles. The surface is generally hilly and mountainous in the south and east; about one-fourth is in forest. The principal rivers are the Marne, with its tributaries, and the Meuse. Oats and wheat are largely cultivated, and wines are produced in several parts—Aubigny, Montsaugeon, etc. The department is rich in iron ore, and there are numerous furnaces, the production of iron being the principal branch of industry. Capital, Chaumont. Population, in 1896, 232,057; in 1901, 226,545.

HAUTERIVE, ō't'rēv', ALEXANDRE MAURICE BLANC DE LANAUTTE, Count d' (1754-1830). A French diplomat and politician, born at Aspres, and educated at Grenoble and Tours. In 1792 he was made consul at New York. A false accusation lost him this post, and he was forced to

live as a farmer in America until 1798, when he was recalled and appointed chief of the first division of political correspondence in the Ministry of Foreign Affairs. His brochure, *De l'état de la France à la fin de l'an VII.*, undertaken at the order of Bonaparte, won him a high place under the Consulate and Empire, and he frequently served as Minister of Foreign Affairs in the absence of Talleyrand. But his policy of an Austrian alliance clashed with his chief's demand for a Prussian alliance, and he was transferred to the post of director of archives. In his later years he interested himself in archæology, wrote on Egyptian antiquities, and was elected to the Society of Inscriptions (1820).

HAUTES-ALPES, ōt'zălp'. A southeastern department of France, adjoining the Italian frontier, formerly part of the ancient Province of Dauphiné (Map: France, N 7). Area, 2158 square miles; population, in 1896, 113,229; in 1901, 109,510. It is traversed by the Cottian Alps, which reach their maximum altitude in the department in Les Ecrins, 13,460 feet in elevation. The chief river is the Durance, noted for the picturesque scenery along its course. Marble is quarried and anthracite coal and argentiferous lead are mined. Mountain pasturage for sheep is its chief agricultural branch. Capital, Gap.

HAUTE-SAÔNE, ōt'sōn'. A northeastern department of France, bounded on the north by the Department of Vosges, and on the east by Belfort. Area, 2062 square miles. It is traversed from north to south by the Saône River, from which it derives its name. About one-half of the entire area is cultivable land; more than a fourth, comprising the north and northeast districts, is covered with forest-clad mountains. In the south and southwest are fertile plains, bounded by hills, covered with vines or timber. Fruits and tobacco are largely cultivated. Sheep, including some flocks of the merino breed, and cattle are raised in large numbers. Coal, copper, manganese, and iron are found. Capital, Vesoul. Population, in 1896, 272,891; in 1901, 266,605.

HAUTE-SAVOIE, ōt'sȧ'vwä'. An eastern department of France, bordering on Switzerland and Italy, formerly part of Savoy. Area, 1667 square miles. The summit of Mont Blanc is situated in this department; about one-fourth of the surface is forested. The Rhône is the principal river. In the north, south, and west, wheat, oats, and fruit are cultivated, but the chief agricultural industry is pastoral. Capital, Annecy. Population, in 1896, 262,142; in 1901, 263,803.

HAUTES-PYRÉNÉES, ōt'pē'rā'nā'. A southern department of France, part of the old Province of Gascony lying east of the Basses-Pyrénées. Area, 1749 square miles. As its name implies, it contains some of the loftiest summits of the Pyrenean chain. The aspect of the scenery is varied, mountains and precipitous rocks in the south, an agreeable diversification of hill and dale in the centre, with fertile plains in the north. The principal rivers, none of which, however, are navigable in the department, are the Adour and the Gave de Pau. The well-cultivated and artificially watered lowlands yield good crops of cereals, leguminous plants, flax, and fruit of every kind, including the grape, from which excellent wine and brandy are made. Horses, mules, cattle, sheep, swine, and poultry are raised. This department—which is the richest part of the Pyrénées in mineral products, especially marble, copper, iron, zinc, lead, antimony, slate, and granite—contains also the celebrated sulphur springs of Saint-Sauveur, and the hot baths of Bagnères, Barèges, and Cauterets. Capital, Tarbes. Population, in 1893, 218,973; in 1901, 215,546.

HAUTE-VIENNE, ōt'vyĕn'. A west central department of France, formed mainly from portions of the old Limousin and Marche. Area, 2130 square miles. It is traversed by the Monts du Limousin, ranges of low hills, well wooded, and intersected by fertile valleys. The Vienne River crosses the department from east to west. Rye, wheat, and other cereals are cultivated in the valleys; cattle are raised on the extensive meadow lands, and chestnuts are grown for local consumption and export; the soil generally, however, is stony, and agriculture is in a backward condition. Mines of iron, lead, copper, and antimony are worked; granite and building-stone are quarried, and in the south, near Saint-Yrieix, there are valuable deposits of kaolin, from which the porcelain factories of Sèvres and Limoges draw in part their supplies. Capital, Limoges. Population, in 1896, 375,724; in 1901, 381,753.

HAUTLEIN, ō'tlān', MARQUIS DE. The courtly French nobleman at whose castle Sir Walter Scott professes to have gathered the materials for his novel *Quentin Durward*.

HAUT-RHIN, ō'rān'. A former department of France. See BELFORT, TERRITORY OF.

HAÜY, ä'wē', RENÉ JUST (1743-1822). A French mineralogist, born in Saint-Just, France. He was educated for the Church, and took priest's orders. While engaged in teaching in Paris, he acquired a fondness for botany, but, subsequently, hearing Daubenton lecture on mineralogy, he developed an interest in that science. The accidental dropping of a crystal of calcite revealed to him the geometric law of crystallization, on which subject he published more than a hundred papers. During the Revolution he was thrown into prison, but was released through the influence of Geoffroy Saint-Hilaire. In 1793 he was appointed on the Commission of Weights and Measures, and in 1794 became keeper of the Cabinet of Mines. Subsequently, in 1802, he became professor of mineralogy in the Museum of Natural History in Paris, where his magnificent collection of crystals is still preserved. Besides being an honorary canon of Notre Dame, he was a member of the French Academy, and of other scientific societies. Abbé Haüy's principal works are: *Traité de mineralogie* (1801), in which he contended that the crystalline form should be the principal element in the determination of a mineral; *Traité élémentaire de physique* (1803); *Traité des caractères physiques des pierres preciéuses* (1817); *Traité de crystallographie* (1882).

HAÜY, VALENTIN (1745-1822). A French abbé, brother of the preceding, who invented methods for teaching the blind. He was born in Saint-Just, and it is said that his interest in a pianiste stricken with blindness first stimulated his search for a means to alleviate the

affliction. This means he first discovered in the printing of raised maps and letters. He started schools for the purpose of giving manual, mathematical, and musical training to the blind, but his zeal outran his discretion, and others excelled him in the carrying out of his ideas. During the ascendency of Napoleon, he lived in Saint Petersburg for more than ten years, working there for the blind. He was twice married, though a priest. His publications include *L'éducation des aveugles* (1786), and *Mémoire historique sur les télégraphes* (1810). Consult: Strebitzky, *Valentin Haüy à Saint Pétersbourg* (Paris, 1884).

HAÜYNITE, ä'wê-nīt, or **HAÜYNE,** ä'wên. A sodium, calcium, aluminum silicate and sulphite that crystallizes in the isometric system, has a vitreous lustre, and is blue, green, red, and yellow in color. It is found chiefly in igneous rocks, usually in association with nephelite and lucite, occurring especially in volcanic regions, such as in the lavas of Vesuvius, on Mount Somma, and elsewhere in Italy; also in the Azores, Canary, and Cape Verde Islands, and in the United States it is found in Montana. The mineral is named after the famous French mineralogist Haüy.

HAVANA, hȧ-vă'nȧ *or* hȧ-văn'ȧ (Sp. *La Habana*). The capital of Cuba and the largest city in the West Indies, situated on the northern coast of the island, in latitude 23° 8′ N., and longitude 82° 22′ W. (Map: Cuba, C 3). It lies on a peninsula bounded by the Gulf of Mexico and the Bay of Havana. The latter is regarded as one of the safest harbors of the world, while its depth is sufficient for vessels of the greatest draught; its narrow entrance is protected by the Punta Castle on the west and Morro Castle and La Cabaña on the east. Havana comprises an area of about nine square miles, and is surrounded by a sea wall on the west. The older portion of the city, which was formerly surrounded by a wall begun in 1633 and demolished in 1863-80, has all the shortcomings of the old colonial town. Its streets are narrow and crooked, and up to the time of the American occupation were in a state of the utmost neglect. Beyond the limits of the old city, however, Havana is essentially modern. The well laid out and broad streets, the abundance of promenades, and picturesque plazas would do credit to any city on the Continent. The houses are generally low and built in the Spanish style, which, however, is relieved by the bright coloring of the walls and roofs. The atmosphere, also, is generally bright and clear, as there are very few days wholly clouded, the rain generally falling in the afternoon. The climate, though tropical, is tempered by alternating land and sea breezes. The mean temperature is 78° for the warmest, and 70° for the coolest month, the extremes being 50° and 90°. The humidity, however, is above 80 per cent. at all seasons.

In the old city, and near the inner entrance to the harbor, is the Plaza de Armas, fronting which on the west stands the former Governor's palace, while the next block behind is occupied by the university. To the north of this plaza is La Fuerza, the oldest structure in the city, built as a defense in 1538 by Hernando de Soto. Beginning at the Castillo de la Punta at the outer harbor entrance, and running outside the old city wall, is the Prado, a wide and beautiful boulevard with a double row of shade-trees along the middle. It terminates in the Colón Park, or Campo Marte, the largest in the city, planted with trees and palms, and having a fountain in the centre. Running west from Colón Park is the Calle de La Reina, which is continued as the Paseo de Tacón, a splendid drive passing the Botanical Gardens and terminating at the citadel of El Príncipe outside of the city. At the eastern entrance stands a fine statue by Canova of Charles III., and from its western end a road leads to the Colón Cemetery with a magnificent entrance of three granite arches, and containing numerous fine monuments, among which the firemen's monument, made entirely of marble, and erected to the memory of thirty firemen who perished in the performance of their duty, is a magnificent piece of monumental sculpture. Other notable promenades are the Alameda de Paula and the Calzada de La Infanta, a fine boulevard skirting the city on the west.

The public buildings of the capital are not far behind its natural embellishments; the Governor's palace and the cathedral dating from 1724, which contained, until 1898, the remains of Columbus, are among the most prominent. The educational institutions include the University of Havana with five faculties, founded by the Dominicans in 1670; the Jesuit College de Belén, a museum and library, and a number of minor schools. The theatres are numerous, and one of them, the Teatro Tacón, is one of the largest playhouses in the world. There are numerous hotels and clubs in the city; and the newspapers and periodicals number over a hundred, the leading ones being: *La Lucha*, *El Diario*, *La Discusión*, and *El Nuevo Pais*. Barring the water-supply, which is excellent, the public works of Havana are utterly inadequate. At the end of the Spanish-American War the American authorities found the city in a woefully unsanitary condition. The streets were unswept, garbage was piled in heaps, and the pavements were in a miserable condition, especially in the old city. The sewerage system was hardly more than a name. The existing sewers were in some places completely clogged, and all of them leaked, contaminating the surrounding soil. In 1902, however, the city was handed over to the new Republic in a wonderfully improved condition. A well-regulated system of street-cleaning and garbage collection had been put in operation. Many of the streets had been repaved and various kinds of experimental pavements were laid. Contracts had been let for a new sewer system, and a complete survey of the city, with a view to adopting a system of street grades, had been made. Streets, hospitals, and other buildings had been so thoroughly disinfected that yellow fever, which during the recent war carried off many thousands of people, has now been almost, if not wholly, eradicated.

The chief industrial establishments of Havana are its cigar and tobacco factories, which are the largest in the world. The exports consist chiefly of cigars, tobacco, and sugar, which mostly find their way to the United States. Havana is the chief outlet for the products of the island. It is connected by steamers with the United States, France, England, and Spain, and by rail with every important centre on the island. The imports consist chiefly of foodstuffs and cotton.

Since the evacuation of the island by Spain, the commerce of Havana has shown a considerable increase. The total value of the foreign commerce for 1900 was about $75,000,000, of which about $50,000,000 represented imports. The total commerce with the United States in the same year amounted to about $32,000,000. During the same year 3276 vessels, with a total tonnage of 2,078,126, entered the port, and 3226, with a tonnage of 2,079,802, cleared. The extensive commerce of Havana is greatly facilitated by the numerous financial institutions situated in the city. The population of Havana, including its suburbs, was 242,055 in 1899, against 200,448 in 1887. The foreign born at the last census numbered 52,900, or about 22.5 per cent. of the total population.

The Bay of Havana was discovered in 1508 by Sebastian de Ocampo. The city itself was originally founded in 1515 on the south coast, by Diego de Velasquez, but in 1519 it was transferred to its present site. It was sacked and burned by pirates in 1528; was plundered by another band in 1555, having by that time become Spain's chief naval station in the New World; and was again despoiled in 1563. It was unsuccessfully attacked by Drake in 1585, after which the forts Morro and de la Punta were built. During the seventeenth century it was several times attacked and blockaded by Dutch fleets, while pirates were continually hovering around, on the watch for unprotected galleons. During the eighteenth century the city was several times threatened by the English, who took Morro Castle by assault in 1762 and captured the city, remaining in control for a year. The United States battle-ship *Maine* was blown up in the harbor on February 15, 1898. In that year the city and harbor were blockaded by the American fleet during the war with Spain. For a good description of Havana, see Norton, *Complete Handbook of Havana and Cuba* (Chicago, 1900).

HAVANA. A province of Cuba. See LA HABANA.

HAVANA. A city and the county-seat of Mason County, Ill., 40 miles southwest of Peoria, on the Illinois River, and on the Illinois Central and the Chicago, Peoria and Saint Louis railroads (Map: Illinois, B 3). It has manufactures of drills, gasoline engines, farm implements, flour, etc., and a considerable trade in fish, agricultural produce, grain, and fruit. The city owns its water-works. Population, in 1890, 2525; in 1900, 3268.

HAVARD, ȧ'vär', HENRY (1838—). A French art critic, born at Charolles. He left France because of his part in the Commune, but returned after the amnesty. His stay in Italy, Belgium, and Holland during his exile did much to influence his choice of art criticism as a vocation. In 1887 he was appointed inspector-general of fine arts. Among his more important works, after the early critiques in the *Siècle*, are: *Les merveilles de l'art hollandais* (1873); *Objets d'art et de curiosité tirés des grands collections hollandaises* (1873); *Les quatre derniers siècles* (1874); *La Hollande pittoresque* (1874-78); *Amsterdam et Venise* (1876); *L'art et les artistes hollandaise* (1879-81); *Histoire de la peinture hollandaise* (1881); *La Hollande à vol d'oiseau* (1880); *La Flandre à vol d'oiseau* (1882); *L'art dans la maison* (1884); the valuable *Dictionnaire de l'ameublement et de la décoration* (1887-90); with Vachon, *Les manufactures nationales* (1888); *Van der Meer de Delft* (1889) *Les Boulle* (1893); *L'orfèverie* (1896); *Les arts de l'ameublement* (1897); and *Histoire et philosophie des styles* (1899-1900).

HAVAS (ȧ'vȧ') **AGENCY.** An organization in Paris, founded by a rich merchant, Charles Havas, in the reign of Louis Philippe, for the purpose of gathering telegraphic news and supplying it to newspapers. It was in 1879 converted into a company.

HAVASUPI, hä'vȧ-sōō'pē. A small but interesting tribe of Yuman linguistic stock in the Coconino Cañon, northwestern Arizona. Although numbering only 250, their isolation has enabled them to preserve their primitive characteristics to a remarkable degree. Living as they do in the bottom of a cañon, isolated from the outside world by great perpendicular barriers of rock, the Havasupi Indians are perhaps nearer to the original estate than any other tribe in the Southwest. They are agriculturists and entirely self-supporting, having always possessed three years' provisions stored away in stone-built granaries in the clefts of the mountain walls. The women are expert basket-makers. To the Spaniards they were known as Cojonino.

HAVEL, hä'vel. A river of Northern Germany, and a considerable tributary of the Elbe. It has its origin in a small lake a mile west of the town of Neustrelitz, in Mecklenburg (Map: Germany, E 2). It flows southward from its source to Potsdam, and thence west and northwest to its junction with the Elbe, opposite the town of Werben. Its entire length is 220 miles, and it is navigable to Fürstenberg, a town within 30 miles of its source. The Havel, forming for a considerable part of its course the connecting link to a long chain of lakes, is of great importance to the internal trade of Prussia, and serves as a feeder to numerous canals. Of its affluents, the Spree, which is longer than the Havel, is the only one worthy of mention.

HAVELOCK, hăv'ĕ-lŏk, Sir HENRY (1795-1857). An English soldier. He was born April 5, 1795, at Bishop-Wearmouth, Durham, where his father was a merchant and a ship-builder. He was educated at the Charterhouse and studied law at the Middle Temple, but abandoned the profession. He entered the army soon after the battle of Waterloo, went to India in 1823, and distinguished himself in the Afghan and Sikh wars. In 1856 he commanded a division of the army that invaded Persia. News arriving of the Indian Mutiny, in 1857, he hastened to Calcutta. He was directed to organize a small movable column at Allahabad, and to push on to the relief of Cawnpore and Lucknow. By forced marches and three sanguinary victories he reached Cawnpore, and found the mutilated bodies of the English women and children who had been massacred upon his approach. An avenging column quitted Cawnpore to advance upon Lucknow. After eight victorious battles with the rebels, Havelock's little army, thinned by fatigue and sickness, was obliged to retire upon Cawnpore. Early in September, 1857, General Outram arrived with reënforcements; Havelock again advanced to the relief of Lucknow, Outram chivalrously refusing to take the com-

mand out of his hands. After desperate fighting at Mungulwar, at the Alam Bagh, and through the streets of Lucknow, they gained the Residency, to the joy of the beleaguered garrison, but were in turn besieged. They held their own until Sir Colin Campbell (later Lord Clyde) forced his way to their rescue on November 19th. Havelock, unfortunately attacked by dysentery, died five days after the relief, on November 24, 1857. His services had won him the distinction of K. C. B., and other honors, including a baronetcy, were conferred upon him before the news of his death reached England. The rank and the pension were given to his widow. For his biography, consult: Brock (London, 1858); Marshman (London, 1860); Forbes (London, 1890).

HAV'ELOCK-AL'LAN, Sir HENRY MARSHMAN (1830-97). An English soldier, the son of Sir Henry Havelock, the reliever of Lucknow. He was born at Chinsurah, India, and was educated at a private school in London. In 1846 he was commissioned an ensign in the Thirty-ninth Foot. He was a lieutenant in 1848 and an adjutant in 1852. In 1857 he saw active service in Sir James Outram's Persian campaign. After the outbreak of the Indian Mutiny he accompanied his father to Calcutta, and served on his staff in his victorious march to the relief of Cawnpore and Lucknow. At Cawnpore, on July 16, 1857, his gallantry and daring in leading a charge for the capture of a gun won for him the Victoria Cross. In the advance from Cawnpore to Lucknow he was severely wounded. In January, 1858, the baronetcy and pension which it had been proposed to bestow upon his father was conferred upon him. He served until the suppression of the mutiny, received brevets of major and lieutenant-colonel, and commanded Hodson's Horse in Lord Clyde's last campaign. He served in New Zealand under Sir Duncan Campbell in the Maori War of 1863-64, and as assistant quartermaster-general in Canada in 1867-69. On leave of absence, and as a newspaper correspondent, he saw the Franco-German War of 1870-71, and the Russo-Turkish War of 1877-78. He was a member of Parliament as a Liberal, and later as a Liberal-Unionist, 1874-81, 1885-92, and from 1895 until his death. He took an active part in the debates, and held the position of chairman of the Naval and Military Service Committee. In the latter capacity he visited India to study the needs of the Indian Army in the Parliamentary recess of 1897, and visited the Afghan frontier, where a campaign against the hill tribes was in progress. Here, on December 30, 1897, while accompanying the troops near Ali Masjid, an unmanageable horse carried him beyond the lines, and he was fired upon and killed by some Khaibaris who were harassing the British flank. He took the additional surname of Allan in 1880, and retired from the active list of the Army in 1881 with the rank of lieutenant-general. He wrote *Three Main Military Questions of the Day* (1867). Consult: Kaye, *History of the Sepoy War* (London, 1864-75); Malleson, *History of the Indian Mutiny* (ib., 1878-80); Marshman, *Life of Sir Henry Havelock* (ib., 1870).

HAVELOCK THE DANE, THE LAY OF. An Anglo-Danish legend of early England. Gaimar, an Anglo-Norman chronicler of the twelfth century, speaks of it as an ancient story. The earliest form is a French version, *Le Lai de Avelloc*, abridged by Gaimar. The old French and an English version of the later thirteenth century were published by Sir F. Madden for the Roxburgh Club (1828), and *The Lay of Havelock the Dane* was edited by W. W. Skeat in the Early English Text Series (1868). The Danish prince, Havelock, was rescued by Grim, a fisherman, who became his foster-father. When Havelock gained the English crown, he rewarded Grim, who built the town of Grimsby.

HAVEMANN, hä've-män, WILHELM (1800-69). A German historian, born in Lüneburg, Hanover. He studied law in the universities of Göttingen and Erlangen. In 1825 he was arrested for his alleged revolutionary activity, and was sentenced to five years' imprisonment. After his release he taught in various schools until 1838, when he became a professor in the University of Göttingen, where he was admitted to the Gesellschaft der Wissenschaften (1850). His most important work is the *Geschichte der Lande Braunschweig und Lueneburg* (rev. ed. 1853-57).

HAVEMEYER, hāv'e-mī'ēr, WILLIAM FREDERICK (1804-74). An American politician. He was born in New York City, of German parentage, was educated at Columbia, and went into business with his father. In 1842 he retired from business with a good fortune, and devoted himself to politics. He was an enthusiastic Democrat, and was elected Mayor of New York in 1845 and in 1848 by large majorities, and for a third time in 1872, but by a narrow margin. His first two terms were marked by the thorough care he bestowed on even the smallest details of his office and the honesty and economy he exacted. His third administration was less felicitous than the others in his appointments, and contentions with the aldermen monopolized the greater part of his time. An appeal was made to the Governor for his removal, but was not acted upon. He was president of the Bank of North America from 1851 to 1861, and brought it successfully through the crisis of 1857. His fearlessness and political experience were of the greatest value in the overthrow of the Tweed 'ring.'

HA'VEN, ALICE BRADLEY (1828-63). An American author. Her maiden name was Emily Bradley, and she was born at Hudson, N. Y. Her first writing appeared in the Philadelphia *Saturday Gazette*, to whose editor, Joseph C. Neal, she was married in 1846. She continued her writing under the name of 'Cousin Alice,' and although after her husband's death in 1847 she took editorial charge of the paper, she still found time to contribute many poems and short stories to other periodicals. In 1853 she married Samuel L. Haven. Her works include: *The Gossips of Rivertown* (1850); *Contentment Better than Wealth; All's Not Gold that Glitters;* and *Out of Debt, Out of Danger.*

HAVEN, ERASTUS OTIS (1820-81). An American educator and Methodist Episcopal bishop. He was born in Boston, graduated at Wesleyan University in 1842, and after a short period of teaching in preparatory schools entered the Methodist ministry. In 1853 he was chosen professor of Latin in Michigan University, and three years later became editor of *Zion's Herald*, in Boston. He was twice elected to the Massachusetts Senate, where he distinguished him-

self by his intense interest in educational matters. In 1863 he accepted the presidency of Michigan University, and six years later became president of Northwestern University. He later held the position of corresponding secretary of the Methodist Episcopal Board of Education, but resigned in 1874 to become chancellor of Syracuse University. In May, 1880, he was ordained a bishop. Among his works are: *The Young Men Advised* (1855); *Pillars of Truth* (1866); and a treatise on *Rhetoric*.

HAVEN, GILBERT (1821-80). An American clergyman, bishop of the Methodist Episcopal Church. He was born at Malden, Mass.; graduated at Wesleyan University in 1846, taught for several years, and in 1851 joined the New England Conference. He was for a short time chaplain of a Massachusetts regiment in the Civil War. In 1862 he traveled in Europe for his health, and on his return was two years a preacher in Boston. In 1867 he became editor of *Zion's Herald*, holding the place until elected bishop in 1872. For some years he had manifested great interest in the welfare of negroes, especially in the Southern States, and had supervision of relief for destitute freedmen in Mississippi. As bishop he was stationed at Atlanta, Ga., with special charge of the interests of his Church in the South. He was an earnest advocate of Protestant missions in Mexico, and described his missionary journey to that country in *Our Next-Door Neighbor* (1875). Among his other writings were: *The Pilgrim's Wallet* (1865); *Life of Father Taylor, the Sailor Preacher* (1871); and *Christus Consolator* (1893), edited by his son.

HAVEN, JOSEPH (1816-74). An American Congregational clergyman. He was born in Dennis, Mass.; graduated at Amherst in 1835, and studied theology at the Union Theological Seminary and at Andover. He held pastorates at Ashland and Brookline, Mass., from 1846 to 1850, and also edited the *Congregationalist*. He was professor of mental and moral philosophy at Amherst (1850-58), and from 1858 until 1870 was professor of systematic theology at the Chicago Theological Seminary. Besides text-books on mental and moral philosophy, he published: *Studies in Philosophy and Theology* (1869), and *Systematic Divinity* (1875).

HAVERCAMP, hä'vẽr-kämp, SIEGEBERT (1684-1742). A Dutch numismatist and scholar, born and educated at Utrecht. He was long a preacher and an instructor in Greek at Leyden, and was appointed professor of Greek and later of history in the same university. He edited Josephus (1726), Lucretius (1725), and other works; wrote on the history of Holland (1739), and a universal history to the time of Charlemagne (1736-39); but is best known for his numismatical writings, *De Numismate Alexandri Magni* (1722); *Thesaurus Morellianus* (1734); and *Nummophylasium Reginæ Christinæ* (1742).

HAVERFORD COLLEGE. An educational institution situated at Haverford, Pa. It was opened in 1833 as a school designed to afford literary instruction and religious training to the children of Friends, under whose control the present college continues. Systematic physical training and athletic sports were made prominent in the original plan, and are still insisted upon. The school was temporarily suspended in 1845, in order to give opportunity for collecting an endowment, and was reorganized as a college in 1856. In 1902 the faculty numbered 20 and the student body 125. At the same time the library contained 40,000 volumes. The college grounds, occupying 225 acres, are valued at $400,000, the buildings are valued at $300,000, while the endowments represent $1,000,000. The degrees of B.A., B.S., M.A., and M.S. are conferred.

HAVERFORDWEST, hăv'ẽr-fôrd-wĕst' *or* hăr'fẽrd- (Welsh *Hwlffordd*). A seaport, market-town, and municipal county, the capital of Pembrokeshire, Wales, on Saint George's Channel, 8 miles northeast of Milford (Map: England, A 5). It has coal-mines and a paper-mill. A thriving trade exists, exporting coal, cattle, and agricultural produce, and importing timber, spirits, tea, etc. Its port admits vessels of 100 tons. It has an interesting old church, the remains of a castle built about 1140, and of a twelfth-century priory endowed by Robert de Hwlffordd. The town was colonized with Flemings by Henry I. in 1107, and has a long roll of charters embodying peculiar privileges. It owns its gas and waterworks, markets, and slaughter-houses. Population, in 1901, 6000.

HAVERGAL, FRANCES RIDLEY (1836-79). An English religious writer. She was born at Astley, England, where her father, William Henry Havergal (q.v.), was rector. She was educated partly at home and partly at Düsseldorf, Germany. She early developed considerable musical talent, and wrote hymns for which she furnished the harmonies. These gradually found their way into print; their popularity induced editors of religious magazines to seek her out, and she became known almost against her will. Her devotional works, in both verse and prose, include: *The Ministry of Song* (1870); *Kept for the Master's Use* (1879); *Loyal Responses* (1878); *Coming to the King* (1886); and *Red-Letter Days* (1879). She is best known as author of the hymn "Take My Life and Let It Be." Her *Poetical Works* (2 vols., 1884), containing her hymns, her best work, were collected by her sister, who also published *Memorials of Frances Ridley Havergal* (London and New York, 2d ed. 1880).

HAVERGAL, WILLIAM HENRY (1793-1870). An English composer, born at Chipping Wycombe, Buckinghamshire, and educated at Oxford. He took orders; was curate under Biddulph at Saint James, Bristol, and Creech Heathfield (1816-20); and later curate at Coaley (1820-22), and at Astley (1822-26). In 1829 he received severe injuries in a carriage accident, and after that time did little preaching, but devoted himself more and more to music. He edited Ravenscript's *The Whole Booke of Psalms* (1844), and published a collection of his own compositions, *A Hundred Psalm and Hymn Tunes* (1859). Of his separate works the best known are the "Worcester Chant," the song "Summer Tide is Coming," and the psalm tune "Evan." Consult the biography by his daughter, Mrs. Crane (London, 1882).

HAVERHILL. A city in Essex County, Mass., 33 miles north of Boston, at the head of navigation on the Merrimac River, and on the Boston and Maine Railroad (Map: Massachusetts, E 2). The city, which includes several villages, is handsomely built on hills sloping

to the river, and is connected by iron bridges with the towns of Groveland and West Newbury. Haverhill is noted as an industrial centre, particularly for the manufacture of boots and shoes. Other manufactures are slippers, woolen hats, paper, boot and shoe machinery and supplies, woolens, leather, boxes, and bricks. Among the principal buildings are the city hall, public library, Masonic Temple and other society halls, old ladies' home, children's home, Hale Hospital, city hospital, city almshouse, and Bradford Academy. There are also a marble soldiers' monument, and one to Hannah Dustan. Under the original city charter of 1870, the government is administered by a mayor, elected annually, and a bicameral council, which confirms the executive's appointments of police, fire, and health boards, and park, water, and license commissioners, and elects all other municipal officials, excepting the school board, which is chosen by the people. The annual income and expenditures of the city amount to about $1,170,000 and $1,145,000 respectively, the principal items of expense being $33,000 for the police department (including amounts for police courts, jails, etc.), $50,000 for the fire department, and $139,000 for schools. The city owns and operates its water-works. Population, in 1890, 27,412; in 1900, 37,175.

In 1640 a company from Ipswich and Newbury settled on the site of the old Indian town Pentucket, and in the following year adopted the name Haverhill (from Haverhill, England, the birthplace of their minister, John Ward). Being a frontier town, Haverhill was continually harassed by the Indians. In the attack of 1697 Mrs. Dustan was captured. (See DUSTAN, HANNAH.) In 1708 the French and Indians entered the town and killed 16 and captured 35 of the inhabitants. In 1645 a town charter was secured, and in 1870 Haverhill was incorporated as a city. The town of Bradford was annexed in 1897. In 1882 there was a disastrous fire. Lake Kenoza, one mile northeast, is famous as the birthplace of Whittier. Consult: Chase, *The History of Haverhill* (Haverhill, 1861); Frankle (editor), *The Story of a New England Town* (Boston, 1891).

HAVERHILL. A town, including several villages, and a county-seat of Grafton County, N. H., 85 miles north by west of Concord; on the Connecticut River, and on the Boston and Maine Railroad (Map: New Hampshire, F 5). It has extensive granite-quarrying and dairying interests, and manufactures lumber, farm wagons, house-finishings, stanchions, whetstones, etc. Population, in 1890, 2545; in 1900, 3414.

HA'VERS, CLOPTON (c.1650-1702). An English anatomist and physician. He studied at Cambridge and Utrecht, and from the latter college obtained the degree of M.D. in 1685. Havers began his medical practice in London, and gave special attention to the subject of anatomy, embodying his ideas in the *Osteologia Nova* (1691). This work was the first exhaustive treatise on the structure of the bone, and served to perpetuate the author's name by the term 'Haversian canals.' His other publications are a *Survey of the Microcosme* (1695), and a *Discourse of the Concoction of the Food* (1699).

HAVERSACK (Fr. *havresac*, from Ger. *Habersack, Hafersack*, haversack, sack for oats, from *Haber, Hafer*, oats + *Sack*, sack). A canvas or strong duck cloth bag, carried by soldiers on the march. It is a part of the man's equipment, and on service contains the rations for immediate consumption. It is worn on the left side, secured by a strap passing over the right shoulder.

HAVERSCHMIDT, hä'vĕr-skmĭt, FRANÇOIS (1835-94). A Dutch poet, born at Leeuwarden. He studied for the Church at Leyden, and undertook two small charges in 1859. Three years afterwards he went to Nieuwediep, and in 1864 to Schiedam. There he published some prose essays, *Familie en Kennissen* (1876); but he is better known as 'Piet Paaltjens,' under which name he published all the poems written after his early youth—*Snikken en Grimlachjes* (1867), of which six editions were called for in two years.

HAVER'SIAN CANALS. See BONE.

HAV'ERSTRAW. A village in Rockland County, N. Y., 32 miles north of New York City. It is picturesquely situated on the west shore of the Hudson River, which here expands into Haverstraw Bay, and on the New Jersey and New York and the West Shore railroads (Map: New York, F 4). It is principally engaged in brickmaking, and has a public library. The village is governed under a general State act, the administration being vested in a president and a council chosen at the annual charter election. Population, in 1890, 5070; in 1900, 5935. Haverstraw was settled by the Dutch, became a precinct in 1719, and was incorporated as a town in 1854. At the house of Thomas H. Smith, since called the 'Old Treason House,' Arnold met André in September, 1780, to arrange for the surrender of West Point. In 1825 the 'Haverstraw Community' was organized here, but broke up in a few years. Consult an article, "Smith House at Haverstraw," in *Magazine of American History*, vol. v.

HAVET, à'vâ', ERNEST (1831-89). A French philosopher, born in Paris. After some educational appointments of minor importance, he was on the staff of the Normal School (1836), and became also professor of French literature at the Collège de France (1855-85), and member of the Academy of Moral and Political Sciences. His best works are an edition of Pascal's *Pensées*, with commentary (1881), and *Le christianisme et ses origines* (4 vols., 1871-84).

HAV'ILAH. A country in Arabia. It is mentioned in Gen. ii. 11-12 as surrounded by the river Pishon and containing gold, bdellium, and *shoham* stone; in Gen. x. 29 (I. Chron. i. 23), as one of the districts of Joktan; in Gen. x. 7 (I. Chron. i. 9), as one of the tribes of Cush; in Gen. xxv. 18, as bordering on the territory of the Ishmaelites; and in I. Sam. xv. 7, where, however, the name should probably be emended into Telam. Niebuhr found a district called Huwaila between the seats of the Beni Khalid and Oman on the Persian Gulf. In South Arabian inscriptions a Khaulan is mentioned. The products of this country referred to in Gen. ii. 11, gold, the gum of the *bedolach* tree, and the *shoham* stone, which is the Assyrian *samtu*, or malachite, seem to point to Jemama and Northeast Arabia extending to the Persian Gulf (Glaser). As the priestly additions to the law (see HEXATEUCH) connect the South Arabian tribes with Africa, Gen. x. 7 may be explained without the theory of an Arabian Cush. Consult: Glaser, *Skizze der Ge-*

schichte und Geographie Arabiens (Berlin, 1890); Meyer, *Geschichte des Alterthums*, vol. i. (Stuttgart, 1889); and the commentaries on Genesis by Dillmann (Leipzig, 1892) and Gunkel (Göttingen, 1901).

HAVILAND, William (1718-84). An English soldier in the French and Indian War in America. He was born in Ireland, and in 1739 was appointed ensign in an infantry regiment, with which he is believed to have served at Porto Bello and Cartagena. During part of the rebellion of 1745 he was aide-de-camp to Colonel (afterwards Lord) Blakeney, and subsequently returned to Ireland, where he remained until 1752, when he was appointed a lieutenant-colonel. In 1757 he went to America with a regiment, was in command at Fort Edward during the winter of 1757-58, served under Abercromby at Ticonderoga, and later under Amherst. In 1760 he was put at the head of a mixed force of colonists and Indians, 3400 strong, and ordered to force a way by Lake Champlain, defended by a French post at Isle aux Noix, and to join the armies of General Murray and Lord Amherst, which were converging on Montreal. He was entirely successful. After the capitulation of Montreal he served in the West Indies, and was present at the conquest of Havana in 1762. An energetic and resourceful officer, he was advanced in rank until he was made general in 1783.

HAVILDAR' (Hind. *havāldār*, from Hind., Pers. *havālah*, Ar. *havālat*, charge, custody + Pers. *dār*, possessing). The highest non-commissioned rank in the native army of British India.

HAVIN, ä'văn', Léonor Joseph (1799-1868). A French politician, born in Paris. He studied law, became justice of the peace at Saint-Lô (1830), and for the following seventeen years was Deputy from the Department of La Manche. He was a prime mover in the agitation which led to the February Revolution, but allied himself with the Moderates in the National Assembly of 1848-49. He continued to take a prominent part in the Republican Government up to 1851, but after the coup d'état he lost his position in the State Council, and his influence was henceforth exerted through his journal, *Le Siècle*, which became noted for good judgment and loyalty to liberal principles.

HAVLÍČEK, hăv-lē'chĕk, Karel (1821-56). A Bohemian journalist, critic, and poet, born at Borová, whence his pseudonym, 'Havel Borovský.' He studied at Prague, taught at Moscow, and after his return to Bohemia wrote for the *Národní Noviny* at Prague, and at Kuttenberg for the *Slovan*. For his liberal articles in these journals he was imprisoned at Brixen in the Tyrol, where he wrote the sarcastic *Tiroler Elegien*. He returned to Bohemia in 1855, and died at Prague in the following year. He wrote many clever epigrams, which have not all been published; the satiric poem, *Křest sv. Vladimira* (1877); and translations from Gogol, Voltaire, and others. His collected works, *Sebrané Spisy*, contain a part of his epigrams. His biography, by Tuma, was published at Prague (1883).

HAVRE, ä'vr', Le. The second seaport of France, and the capital of an arrondissement of the Department of Seine-Inférieure, on the estuary of the Seine, 108 miles northwest of Paris (Map: France, F 2). It is a well-built and regularly laid out city, with a number of fine boulevards and squares, as the Boulevard François I., Strasbourg, and the Course de la République, the chief boulevards occupying the site of the ancient ramparts. The most prominent public buildings are the city hall, built in Renaissance style; the Church of Notre Dame, dating from the sixteenth century; the exchange, the Palais de Justice, arsenal, and custom-house. The museum has fine statues of Bernardin de Saint-Pierre and Casimir Delavigne (both natives of Havre), and contains collections of paintings and sculptures and a library of about 50,000 volumes. The harbor, formed in part by an immense dam, is regarded as one of the best in France, and has a capacity of about 500 vessels. Its entrance, defended by two forts and a number of batteries, is barely 300 feet in width. The harbor is divided into nine separate basins, and has over eight miles of quays.

The situation of Havre at the mouth of the Seine gives it great advantage in regard to the internal trade of the country, while its position on the English Channel makes it one of the chief centres of the foreign trade. The annual imports and exports exceed 2,000,000 tons, valued at nearly 2,000,000,000 francs. The chief articles of import are coffee, cotton and cotton goods, grain, hides and skins, silk, etc. The exports are mainly silk and cotton goods, coffee, clothing, metal articles, and artificial flowers. Havre has a number of large industrial establishments, including sugar refineries, chemical and glass works, breweries, ship-building yards (for battleships as well as merchant vessels), electrical works, and works for the manufacture of guns and heavy ordnance. Population, in 1896, 119,470; in 1901, 130,196.

Havre, originally named Ville Françoise, or Françoiseville, and afterwards Havre de Grâce, was founded in 1517 by Francis I., from whom it received numerous privileges. It was surrendered to the English by the Huguenots in 1562, but was retaken by the French soon afterwards. It was bombarded by the English in 1694, 1759, 1794, and 1795. Havre owes its harbor improvements to Richelieu, Louis XIV. (who employed Vauban), Louis XVI., and Napoleon.

HAVRE DE GRACE, hăv'ĕr de grās. A city in Harford County, Md., 36 miles northeast of Baltimore; on the Susquehanna River, near its mouth, in Chesapeake Bay, and on the Baltimore and Ohio and the Philadelphia, Wilmington and Baltimore railroads (Map: Maryland, N 2). It makes large shipments of coal and lumber, and has shad and herring fisheries, flour, cotton, saw, and planing mills, and can and shoe factories, and carries on fruit-canning. On Battery Island is a Government fish hatchery. Population, in 1890, 3244; in 1900, 3423.

HAWAIIAN (hä-wī'an) **ISLANDS**, or **HAWAII**, hä-wī'ē (formerly Sandwich Islands; politically, the Territory of Hawaii). A chain of islands in the Pacific Ocean, belonging to the United States, and forming geographically and ethnologically the extreme northeastern group of Polynesia. They are situated between latitudes 18° 54′ and 22° 15′ N., and between longitudes 154° 50′ and 160° 30′ W., about 2200 miles southwest of San Francisco, and 4893 miles from Hong Kong. The chain consists of eight inhabited and several small uninhabited islands, ar-

ranged nearly all in single file extending for about 400 miles from southeast to northwest. The inhabited islands with their areas are, beginning at the southeast: Hawaii, 4210 square miles; Maui, 760; Kahulaui, 63; Molokai, 270; Lanai, 150; Oahu, 600; Kauai, 590; and Niihau, 97. Total area, 6740 square miles. Small as the land area is, it is about half that of all the other Polynesian Islands. Oahu is as large as the Society group; Maui corresponds in size with the Marquesas group; and the island of Hawaii is nearly as large as all the other Polynesian groups.

TOPOGRAPHY AND GEOLOGY. The islands are purely of volcanic origin, being really the summits of enormous volcanic cones raised by eruptions from the bottom of the ocean, which falls rapidly to a depth of 18,000 feet not far from the shores. The islands are all mountainous, but only one, Hawaii, is actively volcanic, having two of the largest craters in the world, Mauna Loa and Kilauea (q.v.). Hawaii is the most recent in order of formation; it is much less eroded than the others, and though it contains the highest peak of the group—Mauna Kea, 13,805 feet—its elevations are all rounded and easily ascended. The other islands, especially Kauai, which is considered the oldest, are deeply eroded into picturesque crags and deep ravines and gorges. The coasts are to a large extent steep and rocky, consisting in some places of precipices 100 to 500 feet high and extending for several miles. There are some sandy beaches, however, and in many places the coasts are lined with coral reefs; between the mountains and the coasts extend fertile plains and valleys, which are the scene of agricultural activity.

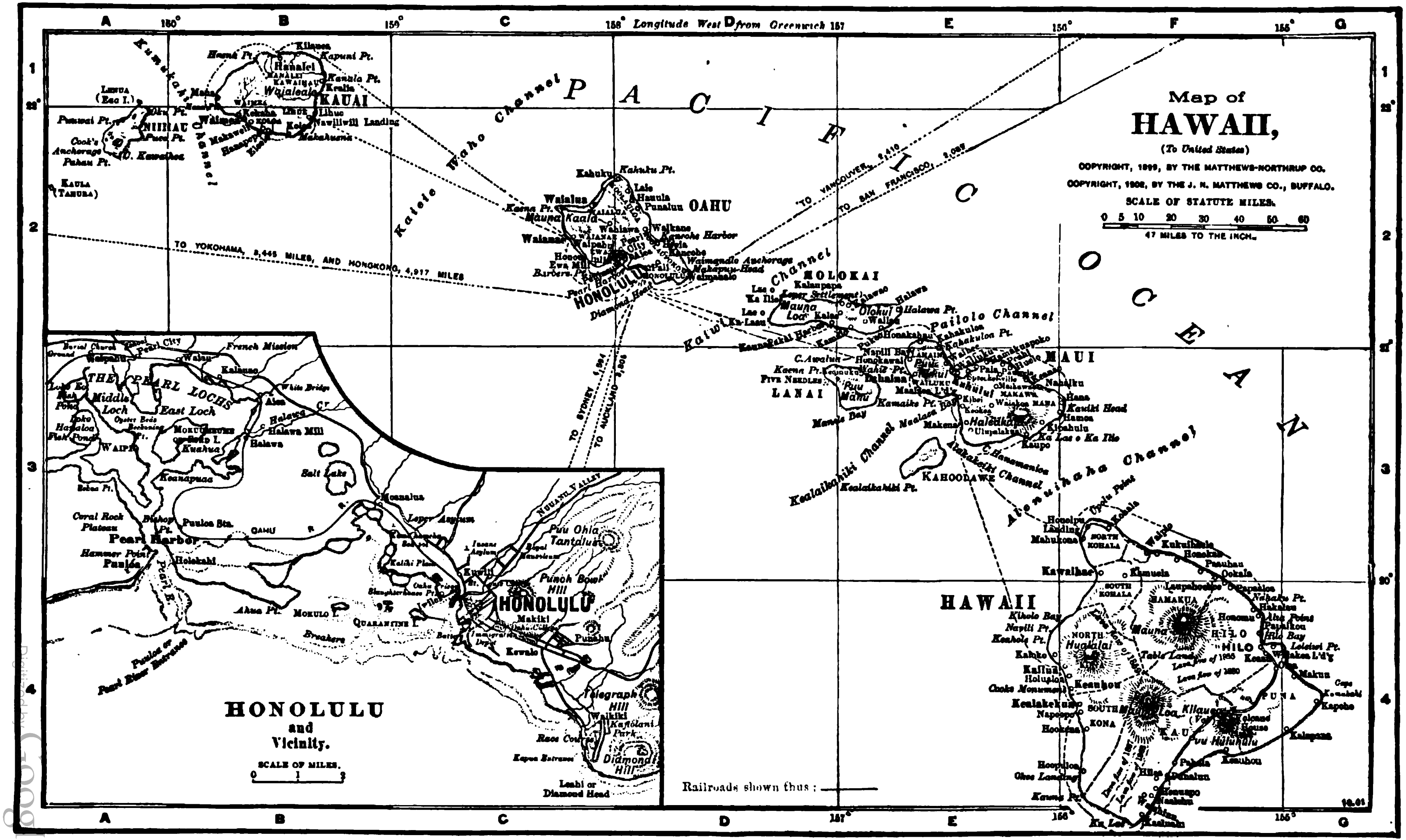
CLIMATE AND HYDROGRAPHY. The climate is in general characterized by a remarkable equability of temperature; it is never too warm and never cold, except on the mountain summits, and even within the narrow limits there are no sudden changes. This is due to the fact that there are neither large ice-fields nor hot continental deserts within thousands of miles, and the winds which reach the islands have to pass over a broad expanse of water of a uniform and moderately warm temperature. The average temperatures of the lowlands of Hawaii are 70° for January and 78° for July, and the extreme maximum and minimum temperatures recorded are, respectively, 89° and 54°. On the mountain peaks, of course, frosts occur, and snow sometimes remains throughout the year. The mean temperature is about 10° cooler than in any other land in the same latitude. The winds show the same equability; the prevailing winds for ten months in the year are the northeast trades. Alternate diurnal land and sea breezes occur, especially on the southwest coasts and around Hilo Bay on the northeast coast of Hawaii; warm southwest gales are also common in winter. Storms are rare, and hurricanes unknown. With respect to humidity and rainfall, however, the climate is extremely varied, each narrow locality having its own peculiar climate, depending on its position with regard to the winds and mountains. Most of the rain is brought by the northeast trade winds, and, owing to the great elevation of the islands, it is almost all precipitated on the northeastern sides, which have accordingly the most varied vegetation, while the leeward or southwestern sides are much drier and, especially in Hawaii Island, almost arid. Just above Hilo Bay, where the cold winds from the mountains meet the warm and moist trade winds, there is an annual rainfall of 100 to 200, and even 250, inches, one of the heaviest in the world; but at Honolulu the rainfall is only about 32 inches a year. Though the sky is as a rule clear and sunny when it is not actually raining, the humidity is considerable, turning to almost oppressive sultriness during the winter southwest winds. In general, the climate is very healthful and agreeable to Europeans, but it is not an ideal one for cases of pulmonary tuberculosis.

The rivers of Hawaii are nearly all small mountain torrents, and, as might be foreseen from the foregoing, they are largely confined to the north and east sides of the island.

FLORA AND FAUNA. The indigenous flora and fauna of Hawaii are interesting, as they partake of the characters both of the Asiatic and Australian, as well as of the American flora. There are about 130 species of ferns and 900 species of flowering plants, of which 600 are peculiar to the islands. Some of the characteristic plants are a peculiar Pandanus or screw-pine, several tree-ferns, and among the forest trees the Koa (*Acacia Koa*). Forests still cover large areas of the uplands, but have greatly decreased. Where vegetation is found it generally grows luxuriantly, but large areas, especially in Hawaii, are covered with naked lava fields.

There are very few indigenous mammals in Hawaii, and no reptiles, except a single species of lizard. The birds are interesting, including many peculiar and highly specialized species, notably in the family Drepanididæ, which differ characteristically from those of the rest of Polynesia. The land mollusks have also reached a remarkable development, almost every valley having its own peculiar species, some of which are allied to those of Mexico and California.

AGRICULTURE. Hawaii is of industrial interest almost wholly by virtue of its agricultural development. The physical and climatic conditions make possible the successful cultivation of a very large variety of industrial plants, including those of both the temperate and tropical zones. The area of possible cultivation is greatly limited, however, by the decidedly mountainous character of the islands and the area covered with lava. Less than half the total area, or about 2,000,000 acres, is adaptable to grazing, and 294,000 acres are improved. The soils, wholly derived from basaltic lavas, are formed either by decomposition (the dark and light red and yellow soils) or by sedimentation, the decomposed rocks being removed by rainfall to lower altitudes. The highland soils are thin and poor, having been depleted of many soluble elements that nourish plants; the upland soils (dark red), just above the sedimentary flats and lowlands, and the lowland soils are very deep and remarkably productive. In a general way the variety of crops depends upon the elevation. Sugar-growing is largely confined to the low plains and hillsides, followed on the higher levels in turn by coffee, fruits and vegetables, and pasture lands, but these zones are not clearly defined. In the census year 1900 there were only 86,854 acres in crops. Prominent among the factors which have prevented a fuller development have been the absence of a local market and the great scarcity



of labor. At an earlier date the unsettled political conditions and the uncertainty of the continued favor of the United States discouraged the investment of capital. Thus far, sugar-cane is the only plant extensively raised. The sugar industry dominates the entire industrial life of the islands. Over half the population is engaged in the industry in some capacity. Any cause that lowers the price of sugar injuriously affects the general prosperity. Sugar-cane has long been grown on the islands of Hawaii, Maui, Kauai, and Oahu, and has recently been introduced on Molokai and Lanai. There are over 60 great plantations now in operation. The acreage in sugar in 1900 was over 65,000 acres, and the annual production, about 225,000 tons, varies considerably from year to year.

The sugar industry involves large outlays of capital, and is, therefore, not suited to a system of small proprietorship. On the contrary, the system of cultivation resembles in some ways the old plantation system of the South with its gangs of laborers and overseers. The scarcity of labor led to its importation under contract, especially from Japan and China, and the greater part of the labor force has been thus secured. To those under contract, labor is compulsory and enforced through the courts, violence being forbidden. On the west side of the islands irrigation is required, but under irrigation the cane grows more quickly and yields more abundantly than on the east side. Water is conducted from the mountain streams through flumes, which also often serve for the conveyance of cane to the mills. Rice occupies as yet the second place in area of production, and in the value of the product. The lowest flats close to the sea are used for rice. The home consumption is so large that only a few million pounds are left for export. It is cultivated almost wholly by the Chinese. Coffee is a young industry, and though it is cultivated on the four larger islands, it is not yet important. The prospects of the coffee industry are regarded as most favorable, as the coffee-berry is a natural product of the islands, where it grows wild. Little progress has been made in the raising of most fruits, vegetables, and cereals; but bananas and pineapples are raised in export quantities. The finest pineapple is a small native variety. The bananas are known for their good quality. Recent experiments show that American maize grows and matures perfectly. The natives raise very few vegetables for the market, only taro and a few Irish potatoes coming from the country districts. Honolulu is supplied with vegetables almost wholly by the Chinese, who occupy suitable lands around the city.

Owing to the uncertainty of rainfall in the pasture area, and to the horn-fly nuisance, the stock-raising industry is but little developed. Almost every native possesses from one to three horses. According to an arrangement made in 1848, the greater portion of the land was divided between the King, the chiefs, and the Government. The portion received by the chiefs has passed almost wholly into the hands of foreigners. The crown-lands and the Government lands, amounting to about 1,750,000 acres, were assumed by the United States. In 1895 a land act, passed to regulate the disposal of this land, was carefully drawn with a view to preventing its monopolization by speculators, and to securing its division into homesteads for actual settlers. It may be acquired by individuals for 'homestead lease,' lease with right of purchase, cash freehold, etc., the amount that can be acquired generally being limited in a manner that prevents capitalists from acquiring permanent control of the land.

MANUFACTURES. The lack of fuel and of metals will permanently limit the scope of Hawaii's manufactures. Sugar manufacture is the only branch of this industry which is at present important. No molasses is made, nor is the sugar refined within the Territory. In 1900 there were 44 sugar-making establishments, with 2369 hands employed, $7,991,000 capital invested, and an annual product estimated at $19,254,000. The combined product of the three fertilizer establishments and that of the four foundry and machine-shops each exceeded $1,100,000. The capital invested in the islands came almost wholly from the United States.

TRANSPORTATION. The islands are favorably situated for purposes of communication with the rest of the world, inasmuch as they are on the line of traffic between the United States and the Southern Asiatic countries and Australia. They are a convenient midway station, and many vessels renew their supply of coal at the islands. The port of Honolulu is one of the best in the Pacific. It is protected by a coral reef, through which a channel 30 feet deep has been cut to admit large vessels. The harbor facilities have not increased as rapidly as has the commerce, and the limitations are such that recourse may ultimately have to be taken to Pearl Harbor, five miles to the north, which offers unlimited facilities, and requires only the cutting of a channel through the reef for a passageway. In 1900 the tonnage of merchant vessels entering Hawaiian ports was 786,800, of which 363,160 was American. Regular steamboat communication is maintained between the larger islands of the group. The principal railroad extends along the coast of Oahu from Honolulu northward and east to Kahuku. Other short lines have been constructed, chiefly on the sugar plantations.

COMMERCE. The limited home market for the principal product of the islands and the lack of home manufactures give rise to a very large export and import trade. The following figures show the development of the merchandise trade with the United States:

Imports from Hawaii to the United States, 1880, $4,606,000; 1890, $12,313,000; 1900, $20,707,000.

Exports from the United States to Hawaii, 1880, $2,086,000; 1890, $4,711,000; 1900, $13,500,000.

Uncorrected estimates for 1901 place the exports and imports respectively at $28,000,000 and $20,000,000. The exports are almost exclusively sugar, and the imports principally machinery used in the sugar industry and other manufactured products. The trade of the United States with these islands is more than four times that of the United States with the Philippine Islands. Our large trade with Hawaii has developed almost wholly since 1876, the year of the reciprocity treaty, which made possible the growth of the sugar industry. Practically all

of the exports of the islands come to the United States, while the imports from foreign countries —of which coal is the most important item— are less than a third of the amount received from the United States.

FINANCE. The total cash receipts for 1901 amounted to $2,140,000, of which $1,230,000 were collected by taxation. The total expenditures were $2,925,000, the largest items being 'public works,' 'health,' and 'public instruction.' The assessed value of property increased almost four-fold from 1892 to 1901.

POPULATION. The population of Hawaii is exceedingly heterogeneous, and the question of population is one of the most vital and difficult with which the present and future welfare of the islands is concerned. The earliest estimate of the native population, that of Captain Cook in 1778, placed the number at 400,000, which is generally considered as being about a fourth too large. At any rate, the native population soon after this date began rapidly to diminish. The decline is shown by the following figures: in 1823, 142,000 (missionaries' estimate); in 1872, 49,044; in 1890, 31,019; and in 1900, 29,834. The cause of this decline is not fully understood, but prominent among the reasons assigned is the introduction of foreign diseases, which have proved peculiarly fatal to the natives, and the small birth-rate, which is the result in part, at least, of a maternal aversion to domestic responsibilities. In Honolulu the death-rate per thousand in 1900 for Hawaiians was 42.81, which is abnormally large. These tendencies therefore indicate the ultimate extinction of the race. Notwithstanding the disposition shown by the Hawaiians freely to intermingle with other races, there is a remarkably small number of 'part Hawaiians,' as will be seen in the table below. Marriages between natives and Chinese are common, but the Japanese have shown an aversion to mixed marriages. The decrease in the native population and their disinclination to work made necessary the importation of labor. Among those first imported were the Portuguese from the Azores, but these were not inclined to reëngage as plantation laborers at the expiration of their three-year contract, and subsequent importations have been almost wholly of the lower class of Chinese and Japanese. An attempt to introduce Polynesians did not result satisfactorily. Immediately after the establishment of the Republic, the Japanese came in large numbers, but a treaty with Japan in 1899 gave the United States the right to regulate immigration, and in the year ending in June, 1901, there were only 391 immigrants from that country. The United States law restricting Chinese immigration applies to the islands, and this source of labor is now closed. Prior to the annexation to the United States the Government encouraged and aided immigration, though endeavoring at the same time to check the inflow of Chinese. Under the United States control Government aid ceased, and Chinese laborers are not allowed to enter. The last labor experiment was the importation of Porto Ricans, but they did not prove very satisfactory. The Chinese are the most desirable unskilled labor that can be obtained, and the planters are loud in their demands for the permission of the United States to admit them. The population for 1890 and 1900 was as follows:

	1890	1900
Hawaiians	34,436	29,834
Part Hawaiians	6,186	7,535
Caucasians	21,300	26,533
Chinese	15,300	25,742
Japanese	12,360	61,122
South-Sea Islanders	409	407
Negroes	.....	254
Total	89,991	153,727

Of the Caucasians in 1900, 12,061 were Hawaiian born, 4068 were born in the United States, and 12,357 were foreign born. More than two-thirds of the total population are males. The inhabitants by islands were as follows: Hawaii, 46,843; Oahu, 54,504; Maui, 25,416; Kauai and Niihau, 20,734; Molokai and Lanai, 2504. Honolulu, on the island of Oahu, is the principal city; population, in 1900, 39,306.

ETHNOLOGY. The original inhabitants of the Hawaiian Islands are, in physique, good representatives of the Polynesian race, rather tall, and often quite good-looking. In head-form they have a tendency toward brachycephaly. In language the Hawaiians are most nearly related to the Samoans and Tahitians, but their speech has some phonetic and grammatical peculiarities of its own. In mental ability and artistic genius the Hawaiians rank high among their kindred, as their advanced governmental institutions, their assimilation of foreign culture, their industrial and artistic manufactures (kapa-printing, straw-plaiting, feather-weaving, etc.), and their development of a literature amply demonstrate. The love of Hawaiians (and other Polynesians) for games and sports proves them not incapable of action requiring both mental and physical exertion. It was upon one of the peculiarities of the Hawaiian family system, the *punulua*, a sort of incipient polyandry, that Morgan (1871-77) based his second stage in his scale of evolution of the family, the '*punuluan* family.' From the older culture the *Kahuna* beliefs, the *hula-hula* dance, etc., have survived. The advent in 1900 of Papa Ita, the Tahitian 'fire-walker,' proved how much of the ancient Hawaiian religion was still alive beneath the cover of Christianity.

RELIGION. With a population representing so many races, there is naturally a variety of religions. The great activity of the early missionaries succeeded in bringing the native population within the fold of the Christian Church. However, the Christian faith is ofttimes lightly held, and their old-time pagan practices are sometimes secretly indulged in. The native Protestant following is nearly twice that of the Catholic, the Mormons among them numbering about 4000. The Portuguese are mainly Catholic; but most of the other European and American elements represented are Protestants. The Chinese and Japanese hold generally to their Oriental faith.

EDUCATION. One of the earliest results of missionary effort in Hawaii was the establishment of schools. The first Constitution (1840) provided for a school in districts wherever fifteen or more children suitable to attend school lived close together. At present the school attendance is compulsory for the entire school year for children between the ages of six and fifteen,

and tuition is free. Ninety-six per cent. of all children of the above age attend school; 83 per cent. of all those of Hawaiian blood above six years old can both read and write. In all schools the English language is the basis of instruction. The supervision of the schools is in the hands of a Minister of Public Instruction and six commissioners. No person in holy orders nor any minister of the gospel is eligible as commissioner. The salaries of teachers are high compared with those received by teachers in the States. There were 559 teachers in 1900, of whom 299 were American. The climatic conditions do not necessitate heavy investments in school buildings, and the tuition constitutes about 73 per cent. of the total cost. The per capita expenditure is about $2.17, which amounts to $23.36 per capita for those who attend school. There are a normal training school, high school, and an endowed college at Honolulu. There are six private boarding schools for Hawaiian girls. See EDUCATION, COLONIAL.

CHARITABLE INSTITUTIONS. The principal public charitable enterprise is the maintenance of the leper settlement on the island of Molokai. The settlement is located on a peninsula which is shut off from the mainland by mountains. The number of lepers is decreasing, there being at present in the settlement about 900, nearly all of whom are natives. Some of them own property in the settlement and are self-supporting, but the Government makes every effort properly to care for them, and the annual expense is heavy. A certain amount of local self-government is allowed in the settlement.

GOVERNMENT. By an act of Congress in 1900, Hawaii was organized with a Territorial form of government, similar to that of the other organized Territories of the United States. It has a Territorial representative in Congress. The capital is Honolulu. See TERRITORIES OF THE UNITED STATES.

HISTORY. Peopled probably from the Polynesian Islands, the Hawaiian Islands when first known to white men had passed through the first stages of savagery, and were progressing toward civilization. The particular stage which it had reached was that of feudalism. Instead of a heterogeneous collection of tribes, there were in the eighteenth century as many kings as there were inhabited islands in the group, and in the island of Hawaii there were at least two kings. The people held the land which they tilled in tenancy to a class of middlemen, or gentry, who served subordinate chiefs, who were themselves under the control of the dukes or high lords, who owed allegiance to the King. The land was held in military tenure. Society was highly organized into orders, religious and social, with a system of checks, by means of laws and ceremonies. The whole tendency of political movement was toward centralization.

The first white men in Hawaii were the survivors of the crews of two Spanish vessels which were wrecked on the islands as early, possibly, as 1527. They intermarried with the natives, and their descendants, recognized by their Caucasian characteristics in complexion and features, are known to this day at Kekea. Gaetano, in 1542, made a landfall here, and in 1567 Mendena located scientifically the position of Kauai, as has been shown by Spanish scholars; but it was reserved for Capt. James Cook (q.v.), while on his third voyage in the Pacific, to find this group in 1778. After returning from Bering Strait, to pass the winter in Hawaii, he abused the hospitality of the natives, and in a squabble lost his life. His estimate of the population at 400,000, though an undoubted exaggeration, shows that the group was densely inhabited. Cook named the group Sandwich Islands, after John Montague, the fourth Earl of Sandwich (1718-92). In 1790 Kamehameha, one of the kings of the main island, defeated Keoua, a rival in another portion of the same island, and thus paved the way for the establishment of a single dynasty. Kamehameha's ambition was to bring the whole group of islands under his sway, but with ordinary weapons it is uncertain whether he could have succeeded. In the nick of time, American whalers and fur traders brought the King firearms, which gave him a tremendous advantage over his opponents, who were still living as in the Stone Age. In 1792 the British navigator George Vancouver brought over cattle, and taught the inhabitants ship-building. At the beginning of the nineteenth century the fur trade on the Pacific coast received a tremendous impulse as a result of the epoch-making expedition of Lewis and Clark. American vessels, reaching the northwest coast in the spring, traded up and down it with the Indians for peltries. Spending the winter in the Sandwich Islands, the American shipmen dressed their furs, refitted, laid in fresh provisions, and bought the sandalwood then so abundant in the islands, besides sharks' fins and tortoise-shells, for the China trade. To this day in China the name for Hawaii is 'Sandalwood Islands.' In the second spring season they went north on the American coast for furs, stopping again at Hawaii, and then sailing to China and exchanging their cargo of furs and sandalwood for tea, silk, porcelain, matting, ginger, and firecrackers, they sailed homeward with a favorable monsoon. Native Hawaiians served on these ships, and thus became known in the United States, stimulating missionary interest.

This trade in sandalwood enriched the chiefs and kings, but especially Kamehameha, who thus secured the sinews of war by sending his people all over the island to cut and transport the fragrant wood, which he traded for vessels, arms, ammunition, and military stores. Master of a navy and an army, he was able, after several campaigns, to conquer the whole of the Hawaiian archipelago. He made the once feudalized islands a central monarchy, and established the royal succession in his own line. He died May 8, 1819, and his oldest son, Liholiho, succeeded him, under the title of Kamehameha II., though the real power behind the throne was an 'empress dowager,' the widow of Kamehameha I. Under the old religious system of taboo (q.v.), which represented conservatism, a class of men corresponding to the 'literati' of other lands existed who were more or less hostile to change, and especially to centralization. So, exactly as in the case of China, when feudalism was overthrown by She-Hwang-Ti, the new King, advised by his Premier, the widow of Kamehameha I., abolished by decree the hoary system of taboo. This bold reform met with organized resistance, and in the appeal to arms a bloody battle was fought. The conservatives were overthrown and the iconoclasts went through the islands smashing and burning the idols, or tossing them into the

sea. Thus the Hawaiians were a people without a religion. At this juncture of affairs Christian missionaries from the United States arrived. More than ten years before, native Hawaiians, serving as sailors on American ships, had stirred the generous impulses of New England, and one of the first missionary companies sent out by the American Board of Commissioners of Foreign Missions, seven married men with their wives, reached Honolulu April 4, 1820. The King and his Queen made a voyage to England in 1823, and died there in 1824. This event put fresh power into the hands of the widow of Kamehameha I., who governed the kingdom for nine years, until the younger brother of the deceased King reached his majority and reigned as Kamehameha III. Under the training of the American missionaries, all the people were in a few years taught to read and write. The Ten Commandments were adopted as a basis of laws in 1825, and other criminal laws were enacted in 1827 and 1829. In 1840 the King and his nobles promulgated a constitution granting civil rights to the people. In 1846 he abolished the last relics of feudalism by approving the Land Act, which yielded up the Crown lands and provided for the people becoming owners of the soil. In 1852 the Constitution was revised by the King, and the Legislature and free suffrage were established. Dying on December 15, 1854, Kamehameha III. was succeeded by Alexander Liholiho, son of Kinau, the daughter of the founder of the dynasty. This prince assumed the title of Kamehameha IV. After reigning nine years, honored because of his perseverance in the principles of civilization, he died November 30, 1863, and was succeeded by his brother Lot, as Kamehameha V. During his reign Honolulu became a beautiful modern city, and business and commerce prospered greatly. Nevertheless the new ruler was a reactionary. He forcibly abrogated the national Constitution, and issued another, in which the right of suffrage was limited by a property qualification. When he died, December 11, 1872, without issue, the direct line of Kamehameha became extinct. After four weeks' government by the Cabinet, the Legislature elected the nominee of the people, Lunalilo, as King. He attempted in vain to restore the old Constitution. His short and troubled reign of one year ended February 3, 1874.

Lunalilo died childless, and the Legislature again proceeded to elect a king, and on February 12, 1874, chose David Kalakaua, though their action was violently opposed by Emma, the Queen Dowager. In the riot which broke out between her partisans and the legislators, several persons were injured. The war-ships in the harbor under the British and American flags landed marines and sailors, order was restored, and the King began his reign. Kalakaua visited the United States in 1874, and in 1875 a reciprocity treaty was arranged between that country and Hawaii. This was renewed in 1887. The King made a tour of the world in 1881. Nevertheless he showed a tendency in the latter part of his reign to relapse into the ancient savagery of his people. The patience of the better elements of society being exhausted, the party of progress at a mass meeting held June 30, 1887, demanded from the King a new constitution and better government, with a Cabinet under the control of the Legislature. Although Kalakaua agreed to the demand and signed a new constitution, which was ratified by the vote of the people, he lost no opportunity to regain his power. In this course he was encouraged by his sister, the Princess Liliuokalani. On the King's attempting in 1889 to overthrow the new Government, the progressive party reorganized, and a skirmish occurred in which the royal partisans were defeated. On January 20, 1891, Kalakaua died in San Francisco. His sister, Liliuokalani, became Queen. Her reign was marked by continual evasions and nullification of the Constitution. The men of the progressive party, consisting chiefly of Americans and the better elements among the foreigners and natives, were fully acquainted with her determination to promulgate a new political instrument which would enhance the royal power; but just when she was about to bring her plans to consummation they dethroned the Queen and organized a provisional government. The Committee of Thirteen, January 15, 1893, passed a resolution "that it is the sense of this committee that, in view of the present unsatisfactory state of affairs, the proper course to pursue is to abolish the monarchy, and apply for annexation to the United States." The Queen's ministers appealed for help to the foreign legations, while the leading citizens of the town were openly and publicly preparing to abolish the Queen's government by force of arms. The United States legation was in close touch with the best element both of the Americans and of the native Hawaiians. Realizing the great significance of the Revolution and the importance of the interests of his country that were involved, the United States Minister, John L. Stevens (q.v.), had a force of 140 sailors and marines landed from the U.S.S. *Boston*, for the protection of American interests, and at once recognized the provisional government on behalf of his own. Commissioners were sent to the United States to negotiate a treaty of annexation, while Minister Stevens, believing that this small State was not safe from aggression, on his own responsibility declared Hawaii under the protection of the United States, February 16, 1893. President Harrison submitted to Congress a treaty of annexation, but upon the accession of President Cleveland the treaty was withdrawn, the Minister's action disavowed, and a special commissioner, Mr. Blount, was sent to the islands to report upon the situation. The commissioner's report represented that the action of Mr. Stevens had been unwarranted, and that it was the landing of the United States seamen that made the success of the Revolution possible. The disposition of the United States Government appearing to be favorable to the deposed Queen, negotiations were entered upon for her restoration; but her refusal to grant a general amnesty made it impossible to support her pretensions. Thrown upon its own resources, Hawaii was proclaimed a republic July 4, 1894, and duly organized, with Sanford B. Dole as President, and a Legislature of two chambers. The political excitement that had made the annexation question a disturbing one in the United States having subsided, and the Republican Party being again in power, the Government of Hawaii, then firmly established, renewed negotiations for annexation in 1898.

In accordance with a resolution of Congress, passed July 7, 1898, the Hawaiian Islands were formally annexed August 12, 1898. By the act

of Congress of April 30, 1900, all persons who, on August 12, 1898, were citizens of the Republic of Hawaii, were declared to be citizens of the United States and of the Territory of Hawaii. On June 14, 1900, Hawaii was organized as a Territory, with ex-President Dole as the Territorial Governor. The political problem of Hawaiian administration lies in the number of races, that which is strongest in wealth and intelligence being smallest in numbers.

During the monarchy, which lasted about a century, the foreign relations of Hawaii were influenced chiefly by naval officers, who often acted with a high hand. The first commercial agency of the United States was established in 1820, and in 1823 Capt. Ap Catsby Jones, U. S. N., negotiated a treaty of commerce and navigation, the first ever made by Hawaii with a foreign power, which was not, however, ratified by Congress. In 1839 Commander La Place of the French frigate *Artémise*, under threat of war, demanded privileges for Roman Catholic converts of the French missionaries, who had been on the islands since 1827. In 1842 the independence of the kingdom was recognized by the United States. In 1843 a British officer, Lord Paulet, made demands which resulted in a provisional cession of the islands to Great Britain; but his action was promptly overruled by his superiors at home, and the same year Admiral Thomas restored the islands and the Hawaiian flags. In 1862 the English Reformed Catholic missionaries began their work. In 1843 the United States commercial agent was made a commissioner, in 1863 Minister Resident, in 1898 Minister Plenipotentiary.

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HAWARDEN, här'den. A market-town in Flintshire, Wales, eight miles southeast of Chester (Map: Wales, D 3). Population of parish, in 1891, 13,610; in 1901, 15,817. Near by stands Hawarden Castle, long the residence of William E. Gladstone. The castle, built in 1752, stands near the ruins of an older one granted by William the Conqueror to his nephew, Hugh of Avranches, called by the Welsh the Wolf. After many vicissitudes it became the property of Cromwell's Lord Chief Justice, Sergeant Glynne, from whom it descended to Mrs. Gladstone. Consult Morley and Friederichs, "In William Gladstone's Village," in *Strand Magazine*, vol. xvi. (London, 1898).

HAWEIS, hāz, HUGH REGINALD (1838-1901). An English clergyman and author. He was born at Egham, Surrey; graduated at Trinity College, Cambridge, in 1859; served under Garibaldi at the siege of Capua; and in 1860 became curate of Saint James's Church, Marylebone, London. Indefatigable in his efforts to educate the masses, he strongly advocated the opening of libraries, galleries, and museums on Sundays. He often lectured at the Royal Institution, and was the Lowell Institute lecturer in Boston in 1885. He was the Anglican delegate to the Chicago Parliament of Religions in 1893, and for the next two years continued a successful lecture and preaching tour around the world. His numerous published works include: *Music and Morals* (1871); *American Humorists* (1883); *Christ and Christianity* (5 vols., 1886-87); *The Broad Church* (1891); *Travel and Talk* (2 vols., 1897); and *Old Violins* (1898).

HAWEIS, MARY ELIZA (JOY) (?-1898). An English author, artist, and philanthropist, daughter of the genre painter T. M. Joy, born in London. She married the Rev. H. R. Haweis, was a member of the Society of Authors and of the Society of Woman Journalists, vice-president of the Maternity Society and of the Central National Society for Women's Suffrage, and superintendent of the Mercy Branch of the British Woman's Christian Temperance Union. She exhibited at the Royal Academy, at the Dudley Gallery, and the British Institution, and was a successful illustrator. She wrote *Chaucer for Children*, *Chaucer for Schools*, and *Tales from Chaucer*; conducted a course in Chaucer in the National Home Reading Union; wrote on art, decoration, gardening, and the like; and published a novel, *A Flame of Fire* (1897).

HAWES, hāz, STEPHEN (?-1521). An English poet. He was born probably in Suffolk, and was educated at Oxford. He traveled on the Continent, and became a groom in the household of Henry VII. His rare minor poems are of interest chiefly to bibliophiles. But his *Passetyme of Pleasure, or the Historie of Graunde Amoure and la Bel Pucel* (printed by Wynkyn de Worde in 1509) occupies an important place in the history of English poetry. It is a long allegorical poem written in seven-line stanzas, divided into forty-six chapters. It describes the education and career of a perfect knight. Standing midway between Chaucer and Spenser, Hawes is the connecting link between them. Reprints of sixteenth-century editions have been made by Southey in *English Poets* (London, 1831), and by Wright (Percy Society, ib., 1845).

HAWESVILLE, hāz'vĭl. A city and the county-seat of Hancock County, Ky., 85 miles west by south of Louisville; on the Ohio River,

and on the Louisville, Henderson and Saint Louis Railroad (Map: Kentucky, E 3). It is in a coal-mining district, and manufactures flour, hubs, shingles, etc. Population, in 1890, 1013; in 1900, 1041.

HAWFINCH (from *haw*, hedge + *finch*). A large European finch or grosbeak (*Coccothraustes vulgaris*), considerably larger than the chaffinch. The adult male has the crown and back chestnut brown, the neck and rump gray, the wings partly black, the larger wing-coverts white. The hawfinch exists numerously over the whole Palearctic Province, and is only partly migratory, but is a very shy bird, avoiding man, and not much is known of its habits. It frequents orchards and hedgerows, seeking for berries and fruit, and gets its name from its supposed partiality for hawthorn-berries. It nests in such places and in forest trees.

HAWICK, hą'ĭk. A manufacturing town and ancient burgh or barony in Roxburghshire, Scotland, at the junction of the Teviot and Slitrig, 50 miles southeast of Edinburgh (Map: Scotland, F 4). It has important hosiery and tweed mills, dye-works, and tanneries. Its antiquities have almost disappeared; the most important is the Moathill, an earthen work 30 feet high and 312 in circumference. Its oldest church, dating from 1214, was rebuilt in 1763. It has fine modern residences, a handsome town hall, a splendid water-supply, and a complete system of drainage. Its municipal charter was granted in 1537. Population, in 1891, 19,200; in 1901, 17,303.

HAWK (AS. *heafoc*, *hafuc*, Icel. *haukr*, OHG. *habuh*, *habih*, Ger. *Habicht*, hawk, from AS. *hebban*, Goth. *hafjan*, OHG. *heffan*, Ger. *heben*, Eng. *heave;* connected with Lat. *capere*, to seize, Alb. *kap*, I seize). A term popularly meaning any bird of prey not an owl nor vulture. In a more restricted sense the word designates a section of the family, the Accipitrinæ, reckoned by falconers among the ignoble birds of prey. They have wings so short as not to extend to the extremity of the tail, and the bill short and curving from the base. In many of their characters and habits, however, they make a very near approach to the true falcons. In this sense the term would exclude eagles, buzzards, harriers, kites, and the like. In fact, however, the scientific use is hardly more exact than the popular, and descriptions of the various birds so called will be found under FALCON, and under the names of groups or species, as BUZZARD; HEN-HAWK; MARSH-HAWK; PIGEON-HAWK; and so on. (See also Plate of EAGLES AND HAWKS.) It should also be noted, however, that in some instances the name is entirely misapplied, ornithologically speaking, to birds whose shape or actions suggest those of a falcon. Examples of this are 'man-of-war hawk' (the frigate-bird) and 'nighthawk' (q.v.), or 'mosquito-hawk' (a nightjar).

HAWK-BILLED PARROT. A large and remarkable parrot (*Derotypus accipitrinus*) of the Amazon and Orinoco valleys, related to the Amazon group (Chrysotis), and especially characterized by an erectile collar or ruff around the back of the neck. This ruff, the breast, and abdomen are dark red, each feather with a blue edge; the head is brown; the shoulder and inside of both wings and tail are black, while the plumage of the back wings and tail above are green. It frequents palm-trees, utters a cry of piercing shrillness, and erects its ruff when angry or excited with a most threatening effect. It is said to become an admirable pet, as it is easily tamed, is very hardy, agile, and graceful in its movements, and is nearly as good a talker as the gray parrot. Consult Greene, *Parrots in Captivity* (London, 1884).

HAWKE, EDWARD, Baron HAWKE (1705-81). An English admiral. He was born in London. He entered the navy in 1720, and served on the North American and West Indian stations until 1725, when he returned to England and passed his examinations. After serving several years on various foreign stations, he came into prominence in the naval engagement at Toulon in 1744, when he broke from the line of battle in order to engage the Spanish ship *Poder*, and succeeded in compelling her to strike her colors. In 1747 he was promoted rear-admiral of the white. In October of the same year he captured six out of a squadron of nine French men-of-war convoying a fleet of merchant vessels bound for the West Indies, and was created a Knight Companion of the Bath. In December of the same year he was chosen member of Parliament for Bristol. In May, 1748, he became vice-admiral of the blue, and in January, 1755, admiral of the white. In 1756 he succeeded Admiral Byng as commander of the fleet in the Mediterranean. In 1759 he took charge of a squadron sent to cruise off Brest, and to intercept a French fleet preparing for an invasion of England. On the morning of November 20th he sighted the French fleet under Admiral Conflans, off Belle-Isle, and notwithstanding that the French, trusting to their knowledge of the rocks and shallows, retired toward the shore, he engaged them with such impetuosity that more than half of their vessels were either disabled, captured, or driven on shore. For this victory, gained with the loss of only two vessels, Hawke received the thanks of the House of Commons and a pension of £2000 per annum. In 1765 he was appointed Vice-Admiral of Great Britain and First Lord of the Admiralty. In 1776 he was raised to the peerage, by the title of Baron Hawke of Towton. He died at Sunbury, October 17, 1781. Consult Burrows, *Life of Edward Lord Hawke* (London, 1883).

HAWK-EAGLE. A convenient term for a group of large birds of prey of the Old World, which combine characteristics of both eagles and hawks, and in most cases are crested. The best known of these is Bonelli's hawk-eagle (*Nisaëtus fasciatus*), which ranges from Spain (where it is a common resident on the rock of Gibraltar) to the Far East, where it is one of the largest and most prominent birds of prey. In India it is numerous and conspicuous, both in the high mountains and in the lowland jungles, and is one of the large hawks called 'peacock-killers.' The booted eagle (*Nisaëtus pennatus*) of the Mediterranean region, noted for its shrill scream, and the beautiful great crested eagle of Africa (*Spizaëtus bellicosus*), are other representatives of the group, in which some authors include the crested 'eagle-hawks' of tropical America.

HAWKE BAY. An inlet on the east coast of North Island, New Zealand, which gives its name to a provincial district, and a county be-

tween Auckland and Wellington (Map: New Zealand, F 3). The bay was named after Sir Edward Hawke, First Lord of the British Admiralty, when Captain Cook on October 8, 1769, entered it for the first time. Napier, the chief city and port of the district, is on the bay. European settlement dates from 1848.

HAWKER. See PEDDLER.

HAW'KER, ROBERT STEPHEN (1803-75). A Cornish poet and antiquary, born at Stoke Damerel, Devonshire. He was educated at Pembroke College, Oxford (where he won the Newdigate prize in 1827 by a poem on Pompeii), was ordained in 1831, and went as vicar to Morwenstow, Cornwall, in 1834. Afterwards the neighboring parish of Wellcombe was added to the living. Hawker did much for the people in his poor parish during his forty years as priest among them, especially for the sea-faring men. Toward the end of his life he became a Roman Catholic, and in his last hours was received into that Church. His works include: *Records of the Western Shore* (1832; second series, 1836); *Ecclesia* (1840-41); *Reeds Shaken by the Wind* (1843); *Second Cluster* (1844); *Echoes from Old Cornwall* (1846-47); *The Quest of the Sangraal* (1864); *Cornish Ballads and Other Poems* (1869 and 1884). His collected poetical works appeared in 1879, with a notice by J. G. Godwin. He also wrote *Footprints of Former Men in Far Cornwall* (1870). His most celebrated poem, *Trelawny*, first published anonymously, was believed, even by such men as Scott and Dickens, to be an old ballad. Consult: Lee, *Memorials of the Late Rev. R. S. Hawker* (London, 1876); and Gould, *The Vicar of Morwenstow* (London, 1876). Mortimer Collins pictures Hawker as Canon Tremaine in his novel *Sweet and Twenty*.

HAWKESBURY. A river of New South Wales, Australia. It rises in the Blue Mountains, and flows northeast parallel with the coast until it passes Windsor, where it turns to the southeast and enters the Pacific at Broken Bay, 20 miles north of Sydney (Map: New South Wales, F 3). Its length is about 330 miles, and it is navigable for ships of 100 tons to Windsor, about 50 miles from its mouth. It is crossed by a steel railway bridge, 2900 feet long. The Hawkesbury is remarkable for its inundations, and in 1844 the waters rose 20 feet in a few hours.

HAWKESBURY. A lumber town and terminus of a branch line of the Canada Atlantic Railway, in Prescott County, Ontario, Canada (Map: Ontario, J 2). It is on the river Ottawa, 55 miles northwest of Montreal, and has ferry communication with Grenville on the opposite bank. Population, in 1891, 2042; in 1901, 4150.

HAWKES'WORTH, JOHN (c.1715-73). An English writer. Apprenticed to an attorney, his first steps in literature were in the footprints of Samuel Johnson, compiling Parliamentary debates for the *Gentleman's Magazine* (1744), in which some of his poems were afterwards published. Most of his essays appeared in the *Adventurer*, successor of the *Rambler*, which was very popular during the two years of its existence (1752-54), and of which Hawkesworth was editor and joint founder. Besides adapting old and writing such new plays as *Edgar and Emmeline* (1761), he wrote the words for an oratorio, *Zimri* (1760); an Oriental tale, *Almoran and Hamet* (2 vols., 1762); translated Fénelon's *Télémaque* (1768); prepared an edition of the *Works of Jonathan Swift* (6 vols., 1755), and an unsatisfactory account for the Government of the voyages of Captain Cook and others in the southern seas. He was for some time intimate with Dr. Johnson, whose style he could imitate to perfection; and his portrait was painted four times by Sir Joshua Reynolds.

HAWKEYE. One of the names by which Natty Bumppo is called in Cooper's Leatherstocking novels.

HAWKEYE STATE. Iowa. See STATES, POPULAR NAMES OF.

HAWKING. See under FALCONRY.

HAW'KINS, ANTHONY HOPE (1863—). An English novelist, born in London. He was educated at Marlborough and at Oxford, where he took honors in classics. He studied law and was admitted to the bar in 1887, but gave up practice in 1894. In 1897 he visited the United States. His first book was *A Man of Mark* (1890), followed in quick succession by *Father Stafford* (1891); *Mr. Witt's Widow* (1892); *Sport Royal*, a collection of short stories (1893); and *The Prisoner of Zenda* (1894). This last book, the scene of which is laid in an imaginary principality of South Germany, is a happy combination of romanticism and modernity. To the same year belong the delightful *Dolly Dialogues*. Among the successful novels are *The Chronicles of Count Antonio* (1895); *Comedies of Courtship*, and *The Heart of Princess Osra* (both 1896); *Phroso* (1897); *Simon Dale* and *Rupert of Hentzau* (both 1898); *The King's Mirror* (1899); *Quisante* (1900); and *The Intrusions of Peggy* (1902). Mr. Hawkins writes with an animation and precision of touch that are admirable, and he is also notable for a keen if superficial psychology. The *Dolly Dialogues* (reprint with four additional dialogues, 1902) contain a shower of neat epigrams and extremely clever repartees.

HAWKINS, BENJAMIN WATERHOUSE (1807-89). An English artist and author, born in London. He lived at Knowsley, the seat of the Earl of Derby, for five years, where he studied animal painting. He was assistant superintendent of the International Exhibition of 1851, and in 1852 the Crystal Palace Company employed him to make restorations of extinct animals, in which he was an expert. In 1868 he lectured in New York City and other cities of the United States, and afterwards lived in this country. He was employed by the Central Park commissioners of New York City in restoring the forms of extinct creatures, but later administrations rejected his work, much of which was destroyed. He wrote: *Elements of Form* (1842); *Comparative View of the Human and Animal Frame* (1860); *Atlas of Comparative Osteology* (with Huxley, 1865); *Artistic Anatomy of Cattle and Sheep* (1867); and *Artistic Anatomy of the Dog and Deer* (1876).

HAWKINS, DEXTER ARNOLD (1825-86). An American lawyer, born in Camden, Maine. He graduated at Bowdoin College in 1848, after which he divided his time between teaching, traveling, and studying law until 1854, when he began to practice in New York City. He lectured

and wrote on various subjects, but especially on education, which engaged his chief interest. He was largely instrumental in securing the establishment of the National Bureau of Education, and his pamphlets did much to open the eyes of the people to abuses practiced under the educational laws of New York. His publications include: *Report on Compulsory Education* (1874); *The Duty of the State to Protect the Free Common Schools by Organic Law* (1871); and *The Roman Catholic Church in New York City, and the Public Land and Public Money* (1880).

HAWKINS, HAMILTON SMITH (1834—). An American soldier, born in South Carolina. He graduated at the United States Military Academy in 1855, and in 1861 entered the army. In 1883 he attained the rank of major, and in 1889 was promoted to be lieutenant-colonel. In 1888 he became commandant at the United States Military Academy, in 1894 colonel, and in the same year commandant of the Fort Leavenworth school. During the Spanish-American War he commanded the division which took San Juan Hill in the second day's battle at Santiago. In 1898 he was promoted to be brigadier-general, and retired.

HAWKINS, or **HAWKYNS,** Sir JOHN (1532-95). An English naval commander, the son of William Hawkins, a merchant and sea-captain of Plymouth, who had made several voyages to America. He was born at Plymouth. He followed the sea from an early age, and by 1561 had made several voyages as far as the Canaries. In 1562, with influential backing, he sailed from England with three ships, secured a cargo of 300 negroes on the coast of Sierra Leone, and then crossed the Atlantic to the West Indies, where he forced the Spaniards to take slaves in exchange for hides, spices, sugar, and ginger. He himself returned to England, but sent two shiploads of merchandise to Spain, where they were seized and the cargoes confiscated. This loss did not deter him from fitting out another expedition on a larger scale in 1564, in which the Earl of Pembroke and Robert Dudley, later Earl of Leicester, were among his partners, and in which Queen Elizabeth herself was interested to the extent of lending him her ship *Jesus*. With four vessels he sailed to the African coast, where his cargoes of negroes were obtained only after hard fighting. After a show of arms at Burburata, Venezuela, and at Rio de la Hacha, a 'satisfactory trade was opened,' and his negroes at length disposed of. Sailing northward, Hawkins relieved the French colony of Laudonnière, on Saint John's River, Florida, leaving them provisions and a small ship, and thence sailed homeward. The voyage was exceedingly profitable for all the partners, and Hawkins was granted a coat of arms for his skill. The protests of the Spanish were so great at this threat to their trade monopoly that it was not until 1567 that the Queen would consent to let Hawkins undertake another voyage. Then, indeed, she showed her favor so far as again to lend him the *Jesus*, quite likely becoming thereby a partner in the enterprise. On October 2d the little fleet of six ships, one of which, the *Judith*, was commanded by Francis Drake (q.v.), a kinsman of Hawkins, set sail from Plymouth. Following the course of his previous voyages, Hawkins sailed first to Sierra Leone, where about 500 negroes were obtained, and where some Portuguese merchantmen were plundered and more than 70,000 pieces of gold secured from them. Again force had to be used before the Spanish in the West Indies would trade with them. A large part of his cargo was disposed of at Rio de la Hacha, Carthagena, and other ports, and they had turned their prows toward home, when, according to Hawkins's account, a storm drove them into the harbor of San Juan de Lua (Vera Cruz) on the coast of Mexico. There, on September 17th, a day after they had entered the port, they were beset by a Spanish fleet of thirteen ships. After three days' negotiation a peaceful agreement was arrived at, and the Spanish fleet entered the harbor. The truce was short-lived, however, and on the 24th a conflict was precipitated. Hawkins defended his ships stubbornly, but the odds against him were overwhelming. The *Jesus* was disabled, and Hawkins transferred himself to the *Mission*, one of his smaller ships, in which he finally escaped to sea. The *Judith*, with Drake in command, was the only other English ship that got away from the harbor. After this disastrous voyage, Hawkins remained in England for some years, was elected to Parliament in 1572, and was made Treasurer and Comptroller of the Royal Navy, both of which offices he held for life. His practical experience as a navigator enabled him to bring about a number of important improvements in the rigging and construction of the ships of the navy; and in spite of charges of dishonesty in contract work, the navy was made more efficient than it had ever been before. In 1588 he took part as a rear-admiral in the defeat of the Spanish Armada, personally commanding the *Victory*, and winning knighthood for his bravery in action. In 1595 he accompanied Sir Francis Drake in his successful expedition to the West Indies, but died at sea off Porto Rico. He was one of the founders, with Drake, of the fund for disabled seamen known as 'the chest at Chatham,' and in 1592 built the Sir John Hawkyn's Hospital at Chatham. Consult: Campbell, *Lives of the Admirals* (London, 1812-17); Southey, *Lives of the British Admirals* (London, 1833-40); *The Hawkins's Voyages*, Hakluyt Society Publications (London, 1877); and Winsor, *Narrative and Critical History of America*, vol. iii. (Boston, 1884).

HAWKINS, Sir JOHN (1719-89). An English writer on music. He was born in London; became a lawyer, and devoted his leisure to his favorite study of music. His marriage to a wealthy woman in 1753 enabled him to indulge his passion for acquiring rare works of music, and he bought the collection formed by Dr. Pepusch, which he subsequently presented (1779) to the British Museum. On such materials he founded his celebrated work on the *General History of the Science and Practice of Music* (1776; republished 1853 and 1875), which, although badly written, contains much of historical value. Hawkins was a member of two of the small clubs which Dr. Johnson founded, though he was pronounced by the lexicographer a 'most unclubable man.' He drew Johnson's will for him and became one of his executors. Hawkins afterwards wrote a life of Johnson, which appeared with an eleven-volume edition of his works (1787-89), but was soon superseded by Boswell's biography.

HAWKINS, or **HAWKYNS**, Sir Richard (c.1562-1622). An English naval hero, only son of the more famous Sir John Hawkins (q.v.). He went to the West Indies for the first time in 1582 with an expedition commanded by his uncle, William Hawkins. In the fight against the Invincible Armada (1588) he commanded the Queen's ship *Swallow;* and in 1593 he started on a voyage around the world, which was to eclipse the achievements of all previous circumnavigators, as he meditated making a thorough investigation of the lands at which he might touch; their geography, their cities and peoples, and the prevailing conditions of trade. An account of the early part of this voyage was written by himself many years afterwards, and is therefore not to be too greatly relied upon. He touched at various places on the east coast of South America, passed through the Straits of Magellan, and then sailed northward to Valparaiso, which he captured and plundered; but on June 18, 1594, almost exactly a year after he had left England, he was attacked in the Bay of San Mateo by two Spanish ships under the command of Don Beltran de Castro, a brother-in-law of the Viceroy. The English numbered only about 75 men at this time, while the Spaniards are said to have been at least ten times as numerous. After three days of fighting, Hawkins surrendered on condition that the prisoners' lives should be spared, and that they should be sent back to England as soon as possible. In spite of this he was kept in Lima until 1597, and then sent to Spain, where he was imprisoned for a number of years. When at last released he returned to England, where he was knighted, elected a member of Parliament, and made Vice-Admiral of Devon. In 1620-21 he was vice-admiral under Sir Robert Mansell of the unsuccessful expedition against the pirates of Algiers. Consult Markham, *The Hawkins's Voyages* (London, 1878).

HAWKINSVILLE, hą'kĭnz-vĭl. A town and the county-seat of Pulaski County, Ga., 40 miles south of Macon; on the Ocmulgee River, at the head of navigation, and on the Southern and other railroads (Map: Georgia, C 3). It is the centre of a region which ships agricultural produce, melons, lumber, naval stores, and cotton, and has a cotton-mill, cotton gins and compresses, cottonseed-oil mills, carriage and wagon shops, barrel factories, etc. Population, in 1890, 1755; in 1900, 2103.

HAWK-MOTH. A moth of the family Sphingidæ. These moths have very stout bodies and long, narrow wings. The sucking-tube is usually very long, and when not in use is coiled spirally under the head. Most of the hawk-moths are large, strong on the wing, and fly at dusk. The larger species are not infrequently called 'humming-bird moths,' because while sipping nectar they have the same poised attitude of the body as the humming-birds, maintained by a rapid wing movement. They are all beautiful moths, but in quiet hues—olive, gray, or brown being the prevailing colors, with a bit of yellow or pink in some species. The larvæ have given the name Sphinx to the type genus of the family, because of the stiff, erect poise assumed by them when disturbed. Near the posterior end of the body a dorsal horn, tubercle, or knob is usually present. About 100 North American species have been described. The most common species are the tomato-worm, and the tobacco or 'horn' worm (qq.v.). Consult Beutenmüller, "Descriptive Catalogue of the Sphingidæ Found Within Fifty Miles of New York City," in *Bulletin of the American Museum of Natural History*, vol. vii. (New York, 1898).

HAWK-OWL. (1) A large and remarkable owl (*Surnia ulula*) of the subarctic region of both continents, occasionally seen in Central Europe and the Northern United States in midwinter. It is about 16 inches long, and mottled brown in color, the American specimens being darker as a rule than those of the Old World. There are no ear-tufts, the top of the head seems flat, and the face very hawk-like; it is also hawk-like in its manner of flight, and is often seen abroad in full daylight. It feeds upon birds and small mammals, and always appears in large numbers when the lemmings become plentiful and take to migrating. It usually nests in the hollow of a broken tree-top, and defends its five to eight white eggs or young with great courage. In Alaska it is not uncommon, and destroys many ptarmigan. See Plate of Owls.

(2) Any of the owls of the genus Ninox inhabiting Southeastern Asia and Australia, and also Madagascar, often distinguished as 'Oriental hawk-owls.' Their small heads, long tails, and hard plumage give them a very falconine appearance, and the Australian species (*Ninox strenua*) reaches a length of 24 inches.

HAWKS, Francis Lister (1798-1866). An American clergyman, born at New Berne, N. C. He graduated at the University of North Carolina (Chapel Hill) in 1815; studied law under Judge William Gaston of New Berne; was admitted to the bar; and was elected from New Berne to the State Legislature. He studied theology under the direction of the Rev. W. M. Green (later Bishop of Mississippi); was ordained to the diaconate in 1827; in 1830 was elected professor of divinity in Washington College (now Trinity, Hartford, Conn.); and in 1831 was instituted rector of Saint Stephen's Church, New York City; later in 1831 he was elected to the rectorship of Saint Thomas's parish, New York City, in which office he continued until 1843. He was appointed professor of ecclesiastical history in the General Theological Seminary in 1833; in 1835 and in 1836 visited England for the purpose of making copies of documents pertaining to the early history of the Protestant Episcopal Church in America. From the eighteen large folio volumes of manuscripts he prepared two works—on Virginia (1836) and Maryland (1839) respectively. Because of criticism of these, he then withdrew from the undertaking. A school, Saint Thomas Hall, established by him at Flushing, L. I., in 1839, became involved in financial embarrassments, and failed in 1843. Upon the establishment of the University of Louisiana, he was elected its first president. In 1849 he returned to New York City as rector of the Church of the Mediator, later merged with Calvary Parish, the rectorship of which he assumed. In 1862, owing to difference of opinion between his parishioners and himself regarding the Civil War, he resigned, and until 1865 he was rector of Christ Church, Baltimore, Md. He became rector of the newly organized parish of the Holy Saviour in New York City, in 1865. He was a scholar

of high attainment, particularly in ecclesiastical history, and an eloquent preacher. The long list of works written or edited by him further includes: *Commentary on the Constitution and Canons of the Protestant Episcopal Church in the United States* (1841); *Egypt and Its Monuments* (1849); *A History of North Carolina* (1857); *Narrative of Commodore Perry's Expedition, Compiled from Perry's Original Notes and Journal* (1856); and (with W. S. Perry) *Documentary History of the Protestant Episcopal Church in the United States of America* (vols. i. and ii., 1863-64). Consult the sketch by Richardson (reprinted from the *American Quarterly Church Review* for April, 1867) in a memorial volume (New York, 1867); also the commemorative discourse by Morgan (New York, 1867).

HAWKS'BEE, Francis. The name of two English physicists. See Hauksbee.

HAWKSBILL TURTLE, or Caret. A large carnivorous sea-turtle (*Eretmochelys imbricata*), so named on account of the shape of its bill, which is a formidable weapon. Its flesh is not good food, but its eggs are sweet. The species is valuable for the plates of its shell, which overlap each other, and furnish the 'tortoise-shell' of commerce. This turtle is common in tropical seas, especially the West Indies, the South Sea Islands, and in the Indian Ocean.

HAWKSHAW, hâk'shâ, Sir John (1811-91). An English civil engineer, born in Yorkshire, England. After a common-school education in Leeds, he turned to the practical study of engineering, went to Ireland in 1831 to serve under Alexander Nimmo, and in 1832 engaged in mining engineering in Venezuela. He returned in 1834, was connected with various English and German railroads, and settled in London in 1850 as a consulting engineer. His subsequent professional work was concerned with many branches of engineering, in all of which he displayed intimate knowledge and sound judgment; and he was consulted regarding almost all the great engineering projects of his time in Europe. He constructed the Charing Cross, East London, and Cannon Street railroads; a tunnel under the Severn River; the Clifton suspension bridge, the Londonderry bridge in Ireland, and the Nerbudda bridge in India; and the Amsterdam Ship Canal. He was often the Government commissioner in investigating sanitary and military matters, and was the engineer summoned to report finally upon the plans and site for the Suez Canal. In 1873 he was knighted. He became a member of the Royal Society in 1855, was president of the Institution of Civil Engineers from 1862 to 1864, was made president of the British Association in 1875, and was an honorary member of the American Society of Civil Engineers. His published works include: *Reminiscences of South America* (1838), and a large number of reports dealing with his varied professional labors.

HAWKS'LEY, Thomas (1807-93). An English civil engineer, born at Arnold, near Nottingham. He was educated at the Nottingham grammar school, and in 1822 began an apprenticeship to an architect and surveyor named Stavely, by whom he was finally admitted to partnership. His first important engineering work was the development of an increased water-supply for Nottingham in 1830. In 1847, with Lord Armstrong, he invented the well-known self-acting valve designed to close a pipe automatically when the velocity of the water reaches a certain limit. In 1852 he removed to London, where his fame and reputation grew rapidly, until he was recognized as the greatest authority on water-works engineering in England, and one of the foremost engineers in that branch in the nineteenth century. At one time or another he was engaged in some capacity, either as a consulting or constructing engineer, by almost every large city in the United Kingdom. His greatest achievements were in connection with the Sheffield water-works, the construction of the Thornton Park and Bradgate reservoirs at Leicester, the planning and construction of the Vyrnwy Valley dam and lake, for supplying water to the city of Liverpool—one of the most remarkable and important pieces of water-works engineering ever attempted. He was president of the Institute of Civil Engineers in 1872-73, president of the Institution of Mechanical Engineers in 1876-77, and was elected a fellow of the Royal Society in 1878.

HAWKS'MOOR, Nicholas (1661-1736). An English architect. He was born in Nottinghamshire, and at eighteen years of age began his professional studies under Sir Christopher Wren. Unusual aptitude in his profession procured him steady employment from the outset of his career, and under Wren's supervision he built several important structures. He became deputy surveyor at Chelsea Hospital (1682-90); clerk of the works of Greenwich Hospital in 1698, and deputy surveyor in 1705. Although at first working under the superintendence of Wren, he afterwards was associated on more equal terms with his former master and with Sir John Vanbrugh and Inigo Jones. He assisted Wren in building Saint Paul's Cathedral from 1675 to 1710, was associated with Sir John Vanbrugh at Castle Howard, Yorkshire, and also at Blenheim Palace, Oxfordshire. At Oxford he designed the library and the south quadrangle of Queen's College and also the north quadrangle (with the exception of the library) of All Souls' College. A scheme of building fifty new London churches at the close of Queen Anne's reign engaged a large share of Hawksmoor's attention. He was appointed one of the surveyors for that purpose, and designed six of the new churches, the best being that of Saint Mary Woolnoth, with a very fine interior, and Saint George's, Bloomsbury, noted for its portico. After the death of Wren in 1723, Hawksmoor was appointed surveyor-general of Westminster Abbey, and continued the works of the two western towers after his former master's designs. He also drew designs for monuments and bridges. He was not remarkable for creative genius, his chief excellence being a mastery of details and construction; but on the other hand, some of the buildings attributed to his more eminent associates, notably Sir John Vanbrugh, are believed to have been designed by him.

HAWKWEED (*Hieracium*). A genus of plants of the natural order Compositæ. The species are annual or perennial, with leafless scapes or leafy stems, one-flowered, or many-flowered; the leaves, stems, and involucres in many species are hairy. The hawkweeds are very numerous, natives of the temperate and colder

regions of the Northern Hemisphere, particularly abundant in Europe. The flowers are generally yellow. The orange hawkweed (*Hieracium aurantiacum*), a perennial, two feet high, is a native of the south of Europe, often cultivated in gardens for its rich orange flowers. It has been introduced into Canada and the New England States, where it has become one of the most troublesome weeds in grass-lands. Experiments conducted at the Vermont Experiment Station showed that it could be eradicated by salt sown at the rate of 300 pounds per acre. Every plant was killed, and the grass, a species of Festuca, was improved by the treatment. Plowing under and devoting the land to hoed crops will destroy it. There are about a dozen species, native or introduced, in the Eastern United States.

ORANGE HAWKWEED.

HAWK'WOOD, Sir JOHN DE (?-1394). An English soldier of fortune, born at Hedingham Sibil, Essex. He is reported to have fought with the Black Prince at Crécy and Poitiers, and to have been knighted by Edward III.; but by 1359 he was at the head of a body of freebooters, plundering Gascony and the northern parts of Italy. His thousand lancers, each with knight and page, came to be known as the 'White Company,' and, joined to double their number of foot soldiers, armed with stout bows of yew, they spread terror throughout Southern Europe, devastating villages, holding great noblemen for ransom, and exacting heavy toll from the clergy. After serving under the Marquis of Montferrat, the White Company went into the pay of the Pisan Republic, which was then engaged in a Florentine war. From that time onward, Hawkwood took a prominent part in the strife between the different Italian republics, fighting generally upon the side of Florence, by whom he was paid a pension. He fought both for and against Pope Gregory XI. He was endowed with an equal talent for strategy and for organization. He spent the last years of his life among the Florentines, who buried him with great pomp.

HAW'LEY, CHARLES B. (1858—). An American musician, born in Brookfield, Mass. He studied composition under Dudley Buck, Joseph Mosenthal, and C. B. Rutenber, and voice culture with G. J. Webb, P. A. Rivarde, and Gustav Federlein. He became bass soloist in the Calvary Episcopal Church, New York; assistant organist of Saint Thomas's; and in 1883 director of the choir at the Broadway Tabernacle. His compositions include many excellent and popular songs, and considerable church music.

HAWLEY, GIDEON (1727-1807). An American missionary among the Indians. He was born in Stratford, Conn., graduated at Yale in 1749; and under the supervision of Jonathan Edwards began missionary work among the Indians at Stockbridge in 1752. Two years later he undertook a mission to the Iroquois on the Susquehanna River, but he was driven out in 1756 by the French and Indian War. The latter part of his life was passed in missionary duties among the Indian tribes at Marshpee, Mass.

HAWLEY, JOSEPH (1723-88). An American statesman of the Revolutionary era. He was born in Northampton, Mass., was educated at Yale, and prepared himself to be a clergyman, but turned lawyer instead. He was a delegate to the Massachusetts Congress (1774-75), and a special pleader for popular rights.

HAWLEY, JOSEPH ROSWELL (1826—). An American politician and legislator, born in Stewartsville, N. C. His father, a Connecticut Baptist clergyman, returned to his native State in 1837, and there the son was brought up, and imbued with anti-slavery ideas. He was educated at Hamilton College (N. Y.), where he graduated in 1847, afterwards studying law, and beginning practice at Hartford, Conn., in 1850. He immediately entered politics as a Free-Soil Democrat, became chairman of the party's State Committee, and in 1852 editor of its principal State organ, the *Charter Oak*. The movement which resulted in the founding of the Republican Party received his support, and the first meeting for its organization in Connecticut was held in his office. In the next year he abandoned the law, and became editor of the *Hartford Evening Press*, the newly established Republican paper. Twenty-four hours after President Lincoln's first call for troops, Hawley recruited the first company of volunteers raised in the State, which became Company A of the First Connecticut Regiment, with Hawley as captain. He participated in the first battle of Bull Run, after which he became lieutenant-colonel of the Seventh Connecticut Volunteers, and with it took part in the Port Royal expedition. In January, 1863, as colonel, he took his regiment to Florida, and was present at the siege of Charleston and capture of Fort Wagner. In February, 1864, he commanded a brigade in the battle of Olustee, Florida, and later in the same year saw active campaigning in Virginia, being present at the siege of Petersburg. In September, 1864, he was promoted brigadier-general of volunteers. In 1865 he served as General Terry's chief of staff, was with Sherman in the Carolina campaign, and was mustered out of service in January, 1866, with the brevet rank of major-general. In April following he was elected Governor of Connecticut. In 1867 he was defeated for reëlection, and turned his attention to journalism, purchasing

the *Hartford Courant*, and uniting it with the *Press*. He became prominent as a Republican campaign speaker, was chairman of the Republican National Convention in 1868, and chairman of the Committee on Resolutions at the Convention of 1876. In November, 1872, he was elected to fill a vacancy in Congress, and was reëlected for a full term to the Forty-third Congress, serving from 1873 to 1875. He was defeated in 1874 and 1876, but was again elected in 1878, serving from 1879 to 1881, and at the end of the term was elected to the United States Senate. He was president of the United States Centennial Committee from its organization in March, 1873, to the completion of the work of the Centennial Exposition. In 1884 he was a candidate for the Presidential nomination before the Republican National Convention. He was reëlected to the Senate in 1887, 1893, and 1899, and continued to take a prominent part in legislation, and served as chairman of the Senate Committee on the Civil Service.

HAWORTH, hą'wērth, ADRIAN HARDY (1767-1833). An English entomologist and botanist, born at Hull. He studied law, but never practiced it. His place of abode was alternately Cottingham and Little Chelsea, and he was foúnder-in-chief of the Entomological Society of London, afterwards a section of the Linnæan Society, of which he was also a member. The Botanical Garden at Hull was begun under his direction, and he made collections of specimens, and wrote works upon botany and entomology, including: *Observations on the Genus Mesembryanthemum* (1794); *Prodromus Lepidopterorum Britannicorum* (1802), enumerating 793 species; the sixth volume of the *Botanist's Repository* (1803); and *Synopsis Plantarum Succulentarum* (1812), which is planned on the Linnæan system, and gives in Latin the description, habitat, date of introduction, and month of flowering of each species. A supplement to this work was issued in 1819.

HAWORTH, JOSEPH (1855—). An American actor, born at Providence, R. I. At the age of eighteen he became a member of a stock company in Cleveland, Ohio, where he was brought up, having already once appeared upon the stage there a year or two before with Charlotte Crampton in *Richard III*. During the season of 1882-83 he toured with John McCullough. Afterwards, for several years, he himself traveled as a star in *The Bells*, *The Leavenworth Case*, *Hamlet*, and other Shakespearean plays. In 1896-98 he supported Madame Modjeska, playing an exceedingly effective Macbeth to her Lady Macbeth. His subsequent rôles included those of John Storm in *The Christian*, Rafael in *The Ghetto*, Vinicius in Stanislaus Stange's version of *Quo Vadis*, and Cassius in Mr. Richard Mansfield's production of *Julius Cæsar*. Consult: Strang, *Famous Actors of the Day in America* (Boston, 1900); Clapp and Edgett, *Players of the Present* (New York, 1899).

HAW RIVER. A name sometimes applied to the upper course of Cape Fear River (q.v.) in North Carolina, above its confluence with Deep River, the two being regarded as the headstreams of the Cape Fear.

HAWSE (older form *halse*, from Icel. *háls*, neck, fore part of a ship, AS. *heals*, Goth., OHG. *hals*, Ger. *Hals*, neck; ultimately connected with Lat. *collum*, neck). (1) The part of a ship in which the *hawse-pipes*, or heavy castings forming the lining for the *hawse-hole* through which the anchor cable passes, are placed. (2) The direction of the cable by which the ship is riding. (3) The cables of a ship when moored. A vessel is *athwart the hawse* of another when she or her chain is ahead of the latter and across her stem or chain, or nearly so. When a ship is moored she is said to have a clear hawse when the chains lead from the hawse-pipes to the anchors without touching each other. The hawse is *open* when the chains lead away from the bows to their respective anchors and the ship rides to both of them. If a ship lying in this position swings through 180° she will have a *cross* in her hawse, the chain leading from its pipe across the stem to the anchor which is on the other side; another swing of 180° in the same direction gives an *elbow* in the hawse; the next, a *round turn;* the next, a *round turn and an elbow;* the next, *two round turns*, etc. A ship is said to have a *foul hawse* if her hawse is neither *open* nor *clear*. When the chains are in this condition the *hawse* must be cleared by unwrapping them. To effect this a chain pendant, called the *clear hawse pendant*, is led out of one of the hawse-pipes and by means of a large hook on the end firmly secured to one of the chains, usually the lee one (i.e. the one which is hanging slack—not the one by which the ship rides). The clear hawse pendant being made fast inside the ship, the lee chain is unshackled, and by means of a *dip-rope* the end is *dipped* underneath the other and unwound from it. It is then brought into the ship and shackled to its other part again. This seems a very simple operation, but, owing to the great weight of the chain cables of large ships, and to the fact that much of the work must be done in a boat, perhaps in quite rough water, it is a very laborious and troublesome one. To avoid the necessity of it, heavy swivels, called *mooring swivels*, are frequently used. This device has two shackles attached to the lower part and two to the upper. The chains are unshackled and the inner ends attached to the upper shackles of the swivel and the other ends to its lower shackles. The ship thus moored is free to swing without fouling her chains so long as the swivel is kept in order so that it will revolve with the ship. See MOOR; MOORING-SWIVEL.

THE HAWSE-BUCKLER is an iron plate, hinged to the upper edge of the hawse-pipe on the outside of the ship, and designed to close the hawse-pipe against the admission of water when at sea. The HAWSE-HOLE is the hole in sides of the ship through which the cable passes.

THE HAWSE-PIPE. A heavy casting which forms a lining for the hawse-holes and prevents the cables from tearing the plating of the bow.

HAWSER (older forms *halser*, *haulser*, *halsier*, OF. *haulserce*, from *haulser*, *hausser*, Fr. *hausser*, It. *alzare*, to raise, from Lat. *altus*, high). A rope of manila fibre four inches or more in circumference, or a wire rope exceeding three inches in circumference. It was formerly the custom to call heavy ropes hawsers only when they were *hawser-laid;* that is, when they consisted of three *plain-laid*, three-stranded ropes laid up left-handed. Large plain-laid ropes were called tow-lines. Present practice is, however, less precise, all large ropes being commonly re-

ferred to as hawsers; and rope which was formerly called hawser-laid is now called *cable-laid.*

HAWTHORN (from AS. *hægþorn*, Ger. *Hagedorn*, from AS. *haga*, Eng. *haw*, hedge + *þorn*, Eng. *thorn*), *Cratægus oxyacantha.* A shrub or small tree, native of Europe, Siberia, and Northern Africa, which reaches a height of 25 feet. It has roundish obovate three to five lobed deciduous leaves, and corymbs generally of white, rose-colored, or sometimes deep crimson flowers, succeeded by a small red fruit (*haw*) with yellow pulp, which, since they remain on the tree after the leaves have fallen, afford winter food to birds. Of the many varieties of hawthorn, the Glastonbury thorn—so named because supposed to have originated at Glastonbury Abbey—is remarkable for its early flowering, which in England often takes place in the middle of the winter. The common kind blossoms in May or June. The winter flowers are, however, not generally followed by fruit, and a second flowering often takes place in

HAWTHORN.

the same year. The common hawthorn is often popularly called 'may,' from the season of its flowering in England. It is also called 'whitethorn,' to distinguish it from the sloe or blackthorn. It is also sometimes employed as a stock on which to graft apples and other pome fruit. The wood is very hard, close-grained, and takes a fine polish, but is apt to warp. A fermented liquor, which is very intoxicating, is made from the fruit in many parts of France. The hawthorn is particularly valuable as a hedge-plant, for which purpose it is widely used in Great Britain, in consequence of its strong and plentiful spines, quick growth while young, its long life, and its ready adaptation to a variety of soils and especially to trimming. For this purpose it is propagated by seed. See CRATÆGUS; HEDGE.

HAWTHORNDEN. See ROSLIN.

HAWTHORNE, JULIAN (1846—). An American novelist, born in Boston, son of Nathaniel Hawthorne. He entered Harvard in 1863, but did not graduate. He studied civil engineering in America and Germany, was engineer in the New York City Dock Department under General McClellan (1870-72), spent ten years abroad, and on his return edited his father's unfinished *Dr. Grimshawe's Secret* (1883). While in Europe he wrote the novels, *Bressant* (1873); *Idolatry* (1874); *Garth* (1877); *Archibald Malmaison* (1879); *Sebastian Strome* (1880). Of many novels written after his return to America, perhaps the most noteworthy are: *Noble Blood* (1884); *John Parmlee's Curse* (1886); *The Professor's Sister* (1888); *A Fool of Nature* (1896); and *One of Those Coincidences and Other Stories* (1899). He also wrote: *Saxon Studies* (1876); *Nathaniel Hawthorne and His Wife* (1885); *Confessions and Criticisms* (1886); *American Literature* (1891); journalistic articles on the famine of 1897 in India, and on the Cuban War; and a *History of the United States* (1899).

HAWTHORNE, NATHANIEL (1804-64). An American romancer. He was born at Salem, Mass., July 4, 1804. He was of English descent, and his family had spelled their name 'Hathorne,' to which Nathaniel added the 'w.' His ancestor, William Hawthorne, had accompanied Winthrop in the *Arbella* in 1630. He settled first in Dorchester, and moved thence to Salem (1636), where he received a large grant of land. He seems to have been a man of strong and energetic will, and a Puritan of the grimmest type. John, his son, was like him in abilities and disposition, took an active part in the persecution of witches at Salem, and was a magistrate as well as a soldier. Two of the Hawthornes were privateersmen during the Revolution. The novelist's father, Nathaniel Hawthorne (1776-1808), was also a sailor and sea captain, and married Elizabeth Clark Manning, of Salem, whose ancestors had emigrated to America about 1680. They had three children, of whom Nathaniel was the second. Upon her husband's death, the mother took her children to her father's house, but of Nathaniel's boyhood we only know that he was fond of long solitary walks, and showed an hereditary longing for the sea. When he was fourteen his mother went to live with his uncle, Richard Manning, at Raymond, Cumberland Co., Maine. Nathaniel still cared more for nature than for study, hunted and roamed the woods, and jotted in his note-book impressions that show how close was his sympathy with nature, and how minute his observation. After a year here, he returned to Salem to prepare for college. He entered Bowdoin College in 1821, where he found two fellow-students who were destined to exercise much influence on his future, the poet Longfellow, and the future President, Franklin Pierce. His scholarship was good, especially in the classics. Upon his graduation (1825), he returned to Salem. Here he led a somewhat secluded life, and still indulged in long walks and in literary studies, in which he is said, at times, to have become so absorbed that food would be left for him before his locked door. He wrote much, but destroyed almost as much, for he could not satisfy his taste. *Fanshawe*, the first work of fiction that he committed to the press, was issued anonymously in 1828. His name was first attached to four "Tales," in the *Token* (1831), a holiday annual under the direction of S. G. Goodrich. They were favorably received, but hardly justly appreciated. Goodrich persuaded Hawthorne to do some hack work for an *American Magazine of Useful and Entertain-*

ing Knowledge, on which he worked also as editor (1836), at a salary of $500. For the same publisher he compiled a *Universal History*, by which he earned little. Meantime his genius had been discovered by the London *Athenæum*, which reprinted three of his most characteristic pieces, and with this encouragement Goodrich brought out in 1837 the first collection of *Twice-Told Tales*. These were generously reviewed by Longfellow, who praised the author's genius and the beauty of his style; but they were received by the public with languid appreciation.

The slight returns from literature prompted Hawthorne to accept from the Collector of the Port of Boston, George Bancroft, the historian, a post as weigher in the custom-house there, and in this office he measured coal, salt, and the like, at a salary of $1200. Salem was strongly Federalist in politics, and Hawthorne, an hereditary Democrat, owed this position less to his own abilities than to partisan policy. He performed his irksome work for two years (1839-41), but was dismissed on the advent of the Whigs to power. With a mind somewhat widened by this experience, he returned to Salem and to literature, and wrote a series of sketches of New England history for children, which he published as *Grandfather's Chair* (1841). In April of that year he was drawn to Brook Farm (q.v.). He invested $1000 in the enterprise, his savings from the custom-house, and charmed his associates by his modest manliness; but, like the Miles Coverdale of his *Blithedale Romance*, a hardly disguised picture of this experiment, he was rather a looker-on than a participant. The genius of Brook Farm was discipline through society. Hawthorne's taste was for solitude, and after a year's patient experiment he left it, married Miss Peabody, of Salem, and made a home for himself at Concord, in the house that he has made memorable by his *Mosses from an Old Manse*. Here he wrote a second part of *Grandfather's Chair* (1842), and in 1842 published a second collection of *Twice-Told Tales*. In that year he also edited the *African Journal* of his old classmate at Bowdoin, Horatio Bridge, and in the next year published two volumes of *Mosses from an Old Manse*, the fruit of his scholarly leisure. Many of these sketches, however, had first appeared in the *Democratic Review*, from whose irregular payments he derived most of his income, till it failed, much in his debt (1845). These stories include such masterpieces in miniature as: *The Celestial Railroad; The Procession of Life; Roger Malvin's Burial; Rappaccini's Daughter; The Birthmark; Young Goodman Brown; The Artist of the Beautiful*, which, with some of the *Twice-Told Tales*, notably the four *Legends of the Province House*, first represent his mature genius. But they did not afford him a living, and after four years at Concord he returned to the civil service, and accepted from the new Democratic Administration the post of surveyor of the custom-house at Salem. There his powers ripened for three years, and reached their fullest expression in *The Scarlet Letter* (1850), the first draught of which he wrote before leaving his post. He has told the story of this period in the introduction to the novel with an irony not a little resented by his fellow-citizens, to whom, indeed, he felt he owed no debt, having been, he said, "deliberately lied down" by them till he was at last removed from office.

The Scarlet Letter, as written at Salem, seemed to him so sombre that he submitted to his friend and publisher, James T. Fields, in Boston, a proposal to print with it some sketches in lighter vein, that may now be read in *The Snow Image* (1852), but Fields was so deeply impressed by the work that he persuaded Hawthorne to revise and extend it, though he was skeptical enough to have the type distributed without stereotyping. The first edition of five thousand copies was sold in two weeks. The book was immediately reset, at once reprinted in England, and on both sides of the Atlantic was received with the greatest enthusiasm. It was Hawthorne's first sustained effort, and his greatest. From this time till his death he devoted himself to writing, and found a ready market for his work. He moved in the summer of 1850 to Lenox, Mass., still eagerly seeking seclusion, save for the genial companionship of Herman Melville, who lived at Pittsfield. Here he wrote *The House of the Seven Gables* (1851), a story of subtle power. The same year brought forth the juvenile *Wonder Book*. In 1851 he left Lenox for West Newton, where he wrote *The Blithedale Romance* (1852), *The Snow Image*, and other *Twice-Told Tales* (1852); and in the spring of the next year went back to his old favorite Concord, where, with Alcott for his next-door neighbor, he wrote, by one of literature's ironies, a campaign *Life of Franklin Pierce* (1852), and also *Tanglewood Tales* (1853). He had declared that he would take no office in case of Pierce's election, but his friends made him think better of it, and he accepted from his old college mate the consulate at Liverpool.

The next seven years Hawthorne spent in Europe—five at the consulate, with little journeys to the English lakes and Scotland, two in France and Italy. A record of the English years remains in *English Note-Books* and *Our Old Home*. That of the Continent may be found in *French and Italian Note-Books*. The monumental work of this period is *The Marble Faun* (1860), published also in England under the title *Transformation*, a romance long popular, but which scarcely holds its own with the critics. When he returned to America on the eve of the Civil War, he found himself somewhat remote, both by nature and by political sympathy, from the intense passions of the period. He was, as he had ever been in public affairs, rather a looker-on than an actor. Very characteristic of his attitude is a little paper, "Chiefly About War Matters," printed in the *Atlantic Monthly* (1862), with some editorial excision and foot-notes, which, though ascribed to the editor, are Hawthorne's own. Characteristic, too, of his aloofness from the passion of the time was his dedication to the then unpopular President Pierce of *Our Old Home*. This book indeed well expressed the feeling of New England for the Old. That the English did not like the book rather enhanced the interest in it in America. This was Hawthorne's last book. *The Dolliver Romance*, begun in the *Atlantic Monthly*, was incomplete at his death, as was *Dr. Grimshawe's Secret*, first printed in 1882. *Septimius Felton* also was rescued from loose sheets and printed, not as he would have had it, in 1871. These, and even more inchoate fragments, add nothing to his fame or achievements. He did little after the spring of 1864. His health failed rapidly, and he received a shock, from which he never recovered, by the sudden death of his

friend and publisher, Ticknor, during a visit that they made together to Philadelphia. He had a premonition that his own death would be on a like journey, and so it befell. He went in May, with his friend Pierce, to the White Mountains; on the 18th they came to Plymouth, and there in his sleep Hawthorne died. He was buried in Sleepy Hollow Cemetery, Concord, on the 24th, where his body now lies, close to those of his friends Emerson and Thoreau.

Hawthorne's bearing and features were as noteworthy as his personality. His face had a romantic beauty, symmetrical, full and strong in feature, with a massive brow, and an expression that veiled power behind a poetic refinement. In manner he was shy but always self-possessed, quiet in conversation, and often silent in company. To the end, as in boyhood, he did not shun solitude, living much within himself and seeming to find no better company. The style was like the man, exquisite in its purity of diction, finely poetic, delicate, gentle; yet it had a manly gravity, that bore witness to the inherited Puritan conscience. These qualities, subtly and strangely blended, give to his style a unique literary quality, and make him one of the greatest masters of English prose, in spite of the fact that when read continuously his elaborateness is sometimes found to cloy. Turning from the man to his work, one finds the dominant note, alike of the short tales and of the novels, well described by Henry James as a "feeling for the latent romance of New England." He found the shadow and the mystery in the Puritan conscience with its oppressing sense of responsibility and ingrained sin. It is the hidden passion, the secret impulse, the double life, the weird and supernatural imaginations, religion grown fierce in the struggle and isolation of early New England, out of which his poet's fancy loved to create symbolic impersonations. In the early tales, and to the last, he preferred to explore the dark corners of the human heart rather than to describe the expression which they found in social relations. Something of this tendency could be detected in *Fanshawe*, but its quintessence is in the tales of old Massachusetts, *Goodman Brown*, the *Legends of the Province House*, or in the more whimsically humorous *Village Uncle*, and *A Rill from the Town Pump*. When he went abroad for his scenes, he carried New England with him. *Rappaccini's Daughter* has in it as little of the atmosphere of Italy during the Renaissance as *Roger Malvin's Burial;* and when we turn to the novels it is still the romance of the Puritan conscience in its self-tormenting of which we read first, and supremely in *The Scarlet Letter*, with its climax of penance and demoniac triumph at Dimmesdale's shame. And that study of sin festering in darkness, shunning the antidote, and seeking vainly the anodyne, has its counterpart there in Hester Prynne, who finds in sin itself the power of a higher spiritual life; while her child is a joyous and perennially fascinating mystery. *The House of the Seven Gables* is no less characteristic, though the noonday light is here softened to a mystic glow, and we breathe a ghostly atmosphere of vicarious sorrow and atonement. *The Blithedale Romance*, too, could have been dreamed only in New England, and of *The Marble Faun*, one must say with Henry James, that Hawthorne "took with him to Italy more of the old Puritan conscience than he left behind." One feels it in Donatello, and it is in every fibre of Hilda's being. Here, as always, moral guilt, and its effect upon the individual alone with himself, is the theme on which the reader's thought is concentrated with vague yet persistent shadowings of the supernatural and weirdly fascinating revelations of the depths of human souls, around which the Italian scene throws the glamour of antiquity. Hawthorne has caught the genius of the place, the sense and the spirit of the landscape. And as we find New England in this story of Italy, so we find it in the point of view of the *Note-Books*. While he was at home he sought relief from the present in the past; when he was abroad, he viewed the new scene from the standpoint of the old, always remote from the present, and looking at English, French, and Italian society with the same detachment and aloofness that marked his attitude toward American politics and the socialistic aspirations of the Transcendentalists. He was less a moralist than a dilettante in morals, without dogmatism, without insistence, "outside of everything, an alien everywhere, an æsthetic solitary" (Henry James).

BIBLIOGRAPHY. There are *Lives* of Hawthorne by his son Julian, *Nathaniel Hawthorne and His Wife* (Boston, 1885); by Henry James, in the English Men of Letters series (London, 1880); by M. D. Conway in the Great Writers series (ib., 1890); and by Woodberry, in the American Men of Letters series (Boston, 1902). There is also an excellent *Study of Hawthorne*, by George Parsons Lathrop, his son-in-law (Boston, 1876), and editor of his *Works*, with a *Memoir* (12 vols., Boston, 1883). Interesting, too, is the *Memories of Hawthorne* (Boston, 1897), by Rose Hawthorne Lathrop. There is an analytical index to the *Works*, by Evangeline M. O'Connor (Boston, 1882).

HAWTREY, CHARLES HENRY (1858—). An English actor-manager and playwright, born at Eton, and educated there and at Oxford. At the age of twenty-three he made his theatrical début. His plays include *The Private Secretary*, *Jane*, and *Mr. Martin*, the first of which was originally produced in Cambridge in 1883, and was an adaptation from Von Moser's *Der Bibliothekar*. It proved a tremendous success, and was performed 844 consecutive times. In 1884 a compromise was arranged by which William Gillette's adaptation of the same play could be produced in America. Several years ago Hawtrey got control of the Comedy and Avenue theatres in London. During the season of 1901-02 he brought his company to New York with *A Message from Mars*, which had already run for 500 performances in London.

HAXO, äk'sō', FRANÇOIS NICOLAS BENOÎT, Baron (1774-1838). A French general of engineers, born in Lorraine. He fought in the armies of the Republic, first in Germany and afterwards under the First Consul in Italy. His ability was recognized by Napoleon, who sent him to Turkey in 1807 to fortify Constantinople for the Sultan. At the end of the year he returned to Italy, and in 1808 was sent to Spain, where he took an active part in the capture of Saragossa. In 1811, as commander of engineers in the Army of Germany, he inspected the fortresses held by the French in Prussia and Poland. Many of them he strengthened, particularly those at Modlin and Danzig; and in the latter he in-

troduced casement batteries of his invention, which were later adopted for the fortresses of France. During the retreat from Moscow he received from Napoleon the brevet rank of general of division, and in June, 1813, he was made commander-in-chief of the engineers of the Imperial Guard. After the Peace of 1814 the Bourbons gave him employment, but on Napoleon's return from Elba he joined the Emperor and fought under him during the Hundred Days. Nevertheless, upon Napoleon's final overthrow, the Bourbons again received him into their service and made him inspector-general of fortifications. In the discharge of this office he worked so strenuously to modernize the fortresses of France that General Rogniat said of him: "Peace was for him more laborious than war." He proposed the method of fortifying Paris which, with some modifications, was finally adopted, and in 1832 he conducted the celebrated siege of Antwerp. He left a number of writings on military engineering and analogous subjects.

HAY (AS. *hig*, Goth. *hawi*, OHG. *hewi*, *houwi*, Ger. *Heu;* probably connected with AS. *hēawan*, OHG. *houwan*, Ger. *hauen*, Eng. *hew*). A term applied to a considerable number of cured crops used for feeding farm animals. The most important hays are made from the various grasses (timothy, meadow fescue, meadow foxtail, brome grasses, etc.), legumes (clover, alfalfa, etc.), and cereal grains (rye, oats, and barley). The different crops should be cut for hay before they have fully ripened seed, as, generally speaking, the nutritive value increases up to this time and decreases afterwards. (See GRASSES.) While most crops will not cure unless they are cut and treated in the usual way, some grasses, for instance Buffalo grass, dry in their natural habitat without appreciable loss of nutritive material, and constitute fairly good natural hay. If the cereal grains are allowed thoroughly to ripen before cutting, and the grain separated, the material is called straw, and is not as valuable for feeding as hay. Hay is cured by exposing the cut crop to the sun and air. The processes of hay-making vary with the crop and climatic conditions. The varying nature of the crops converted into hay, the dampness or dryness of the soil, the amount of moisture in the atmosphere, and the duration and intensity of the sunlight are all factors which influence the problem. At the present time hay-making is quite generally carried on by the aid of machinery. (See REAPERS, REAPING; IMPLEMENTS, AGRICULTURAL.) Generally speaking, hay is cured in the United States by spreading on the ground. In some parts of Northern Europe, in the Mackenzie River region of Canada, and elsewhere, where the rainfall is very abundant, hay is cured on racks. During the curing process the green crops lose water, which is, perhaps, the most marked change. However, there are other changes, which are due to the action of ferments. These modify more or less the composition of the hay and aid in developing the peculiar aroma. It has been found that grass which is merely dried does not have exactly the same composition as a similar sample which has been cured as hay. Fermentation, which begins in the field, often continues after the hay is stored. As in many other chemical changes, fermentation is accompanied by the liberation of heat, and in the case of hay the temperature may rise sufficiently to cause ignition. Many fires have been caused by the spontaneous combustion of hay owing to this cause. Though frequently a single grass or other crop is planted for hay, meadows often have a number of crops growing together as grasses and clovers, and these yield what is termed mixed hay. The hay from salt marshes consists of such plants as black grass (*Juncus gerardi*), fox-grass (*Spartina patera*), branch grass (*Distichlis spicata*), flat sage (*Spartina stricta maritima*), etc. The average composition of a number of sorts of hay follows:

AVERAGE PERCENTAGE COMPOSITION OF A NUMBER OF SORTS OF HAY FROM GRASSES, LEGUMES, AND CEREAL GRAINS

KIND OF HAY	Water	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
GRASSES						
Hay from mixed grasses	15.3	7.4	2.5	42.1	27.2	5.5
Timothy	13.2	5.9	2.5	45.0	29.0	4.4
Orchard grass	9.9	8.1	2.6	41.0	32.4	6.0
Kentucky blue grass	21.2	7.8	3.9	37.8	23.0	6.3
Meadow fescue	20.0	7.0	2.7	38.6	25.9	6.8
Salt-marsh hay	10.4	5.5	2.4	44.0	30.0	7.7
Rowen	16.6	11.6	3.1	39.4	22.5	6.8
CEREAL GRAINS						
Barley hay, cut in milk	15.0	8.8	2.4	44.9	24.7	4.2
Oat hay, cut in milk	15.0	9.3	2.3	39.0	29.2	5.2
Rye hay	10.6	9.3	2.5	8.7	23.6	5.3
LEGUMES						
Red clover	15.3	12.3	3.3	38.1	24.8	6.2
White clover	9.7	15.7	2.9	39.3	24.1	8.3
Crimson clover	9.6	15.2	2.8	36.6	27.2	8.6
Alfalfa	8.4	14.3	2.2	42.7	25.0	7.4
Cowpea	10.7	16.6	2.9	42.2	20.1	7.5
Soy bean	11.3	15.4	5.2	38.6	22.3	7.2
Pea-vine	15.0	13.7	2.3	37.6	24.7	6.7
Vetch	11.3	17.0	2.3	36.1	25.4	7.9
Serradella	9.2	15.2	2.6	44.2	21.6	7.2
Peanut-vines (without nuts)	7.6	10.7	4.6	42.7	23.6	10.8
Sanfoin	15.0	14.8	3.0	39.5	20.4	7.3
Alsike clover	9.7	12.8	2.9	40.7	25.6	8.3

Hay contains more nutritive material in proportion to its bulk than the green crops from which it is made. In other words, it has been concentrated by the evaporation of a large

amount of the water originally present. It contains fairly large amounts of carbohydrates, both nitrogen-free extract and crude fibre, and a considerable amount of protein. The latter constituent is especially abundant in hay from leguminous crops. The different sorts of hay are very important feeding stuffs for all classes of farm animals. They are valuable not only for the nutrients they contain, but because, like all coarse fodders, they furnish the needed bulk in the ration. In early times animals were wintered on hay alone, but experience has shown that although farm animals may be maintained without other feeding stuffs, if it is desired to produce gains in weight or abundant yield of milk, hay must be supplemented by grain or other concentrated feed.

Rowen, that is, hay made from second-growth grasses or aftermath, is especially rich in nutrients; but it is made at a time of the year when the ground is often damp, the days shorter, and the sun's heat less strong than earlier in the season. This renders the curing of rowen somewhat difficult, and the product is usually of less value for some purposes than first-crop hay. When cured under favorable conditions, aftermath hay is an excellent article for winter feeding. In Switzerland and other parts of Europe it is customary to cut the soft grasses which are often grown a number of times during the season. The resulting hay is fine, and is said to be especially relished by stock. New-made hay is laxative, and should not be fed to work-horses or to driving horses. Generally speaking, new-crop hay cannot be successfully fed until the sweating process in the mow is completed and the hay has cooled. The average coefficients of digestibility of a number of sorts of hay follow:

AVERAGE DIGESTIBILITY OF A NUMBER OF KINDS OF HAY, SHOWN BY THE PERCENTAGES OF DIGESTED CONSTITUENTS

KIND OF HAY	Dry matter	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
GRASSES						
Timothy	56.6	46.9	52.2	62.3	52.5	32.8
Timothy rowen	62.2	68.0	49.5	63.4	66.5	56.4
Orchard grass	56.6	59.5	53.8	55.4	60.4	
Pasture grass	72.6	73.4	67.3	74.2	76.1	51.8
Mixed grasses	57.1	58.5	48.5	58.7	59.7	
Salt-marsh hay	56.4	42.6	29.7	54.7	60.7	69.8
Rowen	64.4	69.1	47.4	66.2	66.6	46.6
CEREAL GRAINS						
Barley	61.2	65.2	40.5	69.3	61.7	44.8
Oat	49.3	54.2	61.9	52.0	43.5	34.6
LEGUMES						
Red clover	57.4	58.0	55.2	64.4	54.2	29.1
Red clover rowen	58.0	64.8	59.8	62.8	47.4	45.8
Alsike clover	62.3	66.1	50.2	70.7	53.5	52.2
Alfalfa	58.9	72.0	51.0	69.2	46.0	39.5
Cowpea vine	59.2	64.8	51.8	70.6	42.0	49.5

Hay is fed 'long,' i.e. whole, or 'chopped,' i.e. more or less finely cut. Where a large number of animals are fed, chopping has some advantages. If a little water is added to the chopped hay it lays the dust. Meal may be added to the moistened chopped hay. Such a ration is especially recommended for hard-worked horses which are in the stable only at night. If animals have abundant time for chewing and digesting, chopping is not very desirable. Growing pigs and breeding swine are often benefited by a reasonable allowance of steamed or boiled and chopped alfalfa or clover hay. The boiling or steaming increases the palatability of the feed, though it probably does not increase its digestibility. Cooked clover hay is often given to poultry with advantage. In general it does not pay to steam or cook hay for stock.

'Hay tea,' properly made, has been successfully used for rearing calves in place of milk. The tea should be supplemented by ground flaxseed and middlings cooked in it, or some other suitable material.

Hay is commonly stored under cover or in stacks in the open field. It is now generally baled for shipping, in which form it is conveniently handled and stored.

HAY, FRANCIS (?-1631). A Scottish nobleman, ninth Earl of Errol, identified with attempts to reëstablish the Roman Catholic religion in his native country. He became a convert to that religion, and after succeeding to the earldom in 1585 he joined Huntly in the attempt to induce Philip II. of Spain, after the defeat of the Armada, in 1588, to fit out another expedition for the conquest of England. On discovery of his treachery, he was summoned before the Council to answer the charge of attempting to subvert the Protestant religion, and upon refusing to appear he was denounced as a rebel. The Earl's career from 1589 to 1617 was little more than a series of attempts to carry out his main design, during which he engaged in conspiracies, fomented rebellions, was tried, imprisoned, and afterwards released. The Scottish King, James (afterwards James I. of England), was unwilling to exercise extreme severity upon Errol, though he knew of his guilt, and warned him of the futility of his attempts. After an abortive rebellion, in which the Earl and Huntly were the leaders, the former was sent to prison in Edinburgh Castle for an alleged share in Bothwell's attempt to capture Falkland Palace while the King was occupying it. In 1592 he was again denounced as a rebel for alleged complicity in Spanish intrigues, but was finally ordered to choose between exile and accepting the Protestant religion. Having failed to make a choice he was declared a traitor. The Earl and Huntly rebelled in 1594, and defeated a force sent against them by the King. Soon afterwards they fled the country, but returned in 1596, and the following year Errol, having complied with the King's conditions by abjuring his religion and subscribing

to the Confession of Faith, was restored to his rights and possessions. The genuineness of his profession was, however, doubted by the Scotch Kirk, and after various unsuccessful attempts to satisfy themselves on that point, Errol was imprisoned in Dumbarton Castle, but was finally released in 1617.

HAY, GEORGE (1729-1811). A Scotch Catholic bishop and polemical writer, born in Edinburgh, where he was educated and became a surgeon's apprentice. In 1778, after the death of Bishop Grant, he became Vicar Apostolic of the Lowlands. A year later his chapel-houses were mobbed and burned and his library ruined by fanatics, who were roused by the fear that Government purposed more lenient treatment of the Catholics. Hay was influential in the reëstablishment of the Scots College at Rome, and in building a Catholic seminary at Aquhorties (1799). His most important work was *The Scripture Doctrine of Miracles* (1775). A complete edition of his works was published in five volumes at Edinburgh.

HAY, JAMES, Earl of Carlisle (c.1575-1636). An English diplomat and favorite of James I. He was born at Pitscorthy, Fifeshire, and educated in France. James knighted him, took him to England, gave him a rich wife, Honora, heiress of Sir Edward Denny, and repeatedly paid off the debts which Hay, who was an easy-going spendthrift, was always making. In 1619, soon after his creation as Viscount Doncaster, he was sent on a mission to Bohemia, where James's son-in-law, Frederick of the Palatinate, was for a short time King. A little later we find him in France (1621-22), exerting himself unsuccessfully in an effort to make peace between Louis XIII. and the Huguenots. He was made Earl of Carlisle in 1622, and was sent back to Paris two years later to arrange a marriage between Charles and Henrietta Maria, and advised the King against promising Richelieu that there should, in event of the marriage, be any abatement of laws against Catholics. Carlisle seems to have distrusted the French alliance now as strongly as he had before desired it; and he retired from politics when it became apparent that the Court policy was for peace with France. The title of Carlisle became extinct on the death of his son James (1660). See HAY, LUCY.

HAY, JOHN (1838—). An American statesman, author, and journalist. He was born in Salem, Ind., of Scotch ancestry, October 8, 1838; graduated at Brown University in 1858; and then studied law at Springfield, Ill., where he became acquainted with Abraham Lincoln, then the acknowledged leader of his profession and of the Republican Party in the State. He was taken into the latter's law office, and in 1861 was admitted to practice in the Supreme Court of Illinois. He accompanied President-elect Lincoln on his memorable journey to Washington, and served as his assistant private secretary until his (Lincoln's) death, with the exception of a brief interval, during which he served as adjutant and aide-de-camp to the President, and of a few months, when he served in the army under Generals Hunter and Gillmore. In the latter capacity he rose to the rank of major, and was subsequently brevetted lieutenant-colonel and colonel. After Mr. Lincoln's death, he went to Paris as secretary of legation, which position he held for three years; he then served for more than a year as secretary of legation and chargé d'affaires at Vienna, and after a short interval went in the same capacity to Madrid, where he remained for another year. From 1870 to 1875 he was an editorial writer on the New York *Tribune*, and for a short time acted as editor-in-chief of that journal. In the meantime he had married the daughter of Amasa Stone, of Cleveland, Ohio. From 1879 to 1881 he served under President Hayes as First Assistant Secretary of State. He then was again engaged in literary pursuits until March 19, 1897, when he was appointed by President McKinley Ambassador to Great Britain, to succeed Thomas F. Bayard. His service in this capacity was marked by thoroughness, skill, and tactfulness. His public addresses were models of their kind and examples of diplomatic propriety. With excellent social gifts, he made a favorable impression on English society, and did much to promote friendliness between the two nations. On September 20, 1898, he was appointed Secretary of State, to succeed William R. Day, who had just resigned. His conduct of the foreign affairs of the nation was, from the first, characterized by unusual vigor, tact, and sagacious foresight. Perhaps his greatest diplomatic achievement was the maintenance of the 'open-door' policy in China, and the consequent postponement of the threatened dismemberment of that nation. Not content with verbal assurances from the European nations, Secretary Hay demanded and secured written guarantees that the 'open door' should be maintained in China. During the British war in South Africa he used his good offices to secure the neutrality of the Continental European powers. Other notable diplomatic achievements of Secretary Hay were the settlement of the Samoan dispute, as a result of which the United States secured Tutuila, with an excellent harbor in the Pacific; the settlement of the dispute with Great Britain over the Alaska boundary, temporarily by the conclusion of a *modus vivendi* in 1898, and by treaty in 1903; the negotiation of reciprocity treaties with Argentina, France, Germany, Cuba, and the British West Indies; the negotiation of a treaty with Great Britain relative to the construction of an interoceanic canal (see HAY-PAUNCEFOTE TREATY); the negotiation of new treaties with Spain; and the negotiation of a treaty with Denmark for the cession of the Danish West India Islands.

Colonel Hay won literary distinction by *Pike County Ballads* (1871) and *Castilian Days* (1891). With John G. Nicolay he wrote an authoritative life of Lincoln, entitled *Abraham Lincoln: A History* (10 vols., 1890). A once popular anonymous novel, *The Bread-Winners* (1883), is generally attributed to him, but thus far without sufficient evidence.

HAY, JOHN, Marquis of Tweeddale. See TWEEDDALE, JOHN HAY, Marquis of.

HAY, LUCY, Countess of Carlisle (1599-1660). An English political intriguer, daughter of Henry Percy, Earl of Northumberland. At the age of eighteen, much against the will of her imprisoned father, she married James Hay (q.v.). Cartwright, Herrick, Carew, and Suckling sang of her beauty and wit. She soon gained a high place in the favor of the Queen, and did much for Strafford with her influence. When Strafford was dead she became the spy and servant of the

Parliamentary Party, which she warned of the plan to arrest the five members. In both civil wars she was intimate with the aristocratic Presbyterian Party, and intrigued in behalf of Holland. In 1649 she was arrested, imprisoned, and threatened with the rack, and was held in confinement until 1652. She died suddenly in 1660, a few months after she had renewed her intrigues. Three portraits of her by Vandyck are engraved in Lodge's *Portraits*.

HAY ASTHMA. See HAY FEVER.

HAY-BOTE, or **HEDGE-BOTE** (from *hay*, AS. *hege*, *haga*, OHG. *hag*, Ger. *Hag*, Eng. *haw*, hedge + ME. *bote*, AS. *bōt*, Goth. *bōta*, OHG. *buoza*, Ger. *Busse*, Eng. *boot*, advantage, recompense). A common-law right of a tenant for life or years to cut timber for the repair of hedges and fences. It belongs to the class of rights known as estovers. See ESTOVER.

HAY'DEN, FERDINAND VANDEVEER (1829-87). An American geologist, born in Westfield, Mass. Graduating from Oberlin College in 1850, he studied medicine at Albany, N. Y., and in 1853 commenced the series of scientific explorations which have made his name famous, by an examination of the remains of extinct animals found in the Bad Lands of Dakota. The next three years were passed in a similar exploration of the Upper Missouri, resulting in the discovery of an important collection of fossils, which was afterwards divided between the academies of science of Saint Louis and Philadelphia. Being appointed geologist of a Government expedition to the Northwest, he acted in this capacity until the outbreak of the Civil War, when he entered the Union Army as a surgeon. He rose to be chief medical officer of the Army of the Shenandoah. In 1865, and until 1872, he was professor of geology and mineralogy in the University of Pennsylvania, vacating this post on account of his duties in connection with the United States Geological Survey of the Territories, which had been placed in his charge in 1867. He made important contributions to the geological, geographical, and botanical knowledge of the Western States, mostly included in the reports of the surveys issued by the Government. He was a member of many scientific societies in both America and Europe.

HAYDN, hī'd'n, JOHANN MICHAEL (1737-1809). An Austrian musician, brother of Josef Haydn, born at Rohrau. From 1745 to 1755 he was a chorister at Saint Stephen's, Vienna, and, after studying the violin and organ, assistant organist there. In 1757 he was kapellmeister at Grosswardein, in 1762 concert-meister to Archbishop Sigismund at Salzburg, and in 1777 organist of the cathedral and of Saint Peter's Church in that city. In 1800 his property was destroyed by the French occupation of Salzburg, but his brother and friends and the Empress Marie Therese came to his assistance, and he was enabled to open a school of composition. This enterprise was very successful, among its pupils being Weber and Reicha. His best works were his oratorios, masses, cantatas, and anthems, which his brother held in the highest estimation. He published little, but his compositions embrace almost every department of music, including operas, symphonies, songs, quintets, marches, serenades, etc. He died at Salzburg.

HAYDN, JOSEF (1732-1809). A famous Austrian composer. He was born at Rohrau, Lower Austria, March 31, 1732. His father was a traveling wheelwright, with a natural love of music. The sweetness of the boy's voice and his correct ear for pitch were noted early. His cousin, Matthias Frankh, a schoolmaster and choirmaster in Hainburg, took the lad, whom the father had destined for the Church, to his home for musical instruction. Though treated at times with much harshness, he undoubtedly was started on his career by Frankh.

From his eighth to his eighteenth year Haydn was a pupil in the choir school of Saint Stephens, Vienna, Kapellmeister Reuter having heard him sing in Hainburg. Though wretchedly poor and often without sufficient food, he studied diligently, and at thirteen composed a mass. When his voice broke, Reuter made his boyish prank in cutting off a fellow-pupil's queue the occasion for his dismissal. A former chorister whom he chanced to meet took him in and a kind-hearted tradesman, named Buchholz, loaned him 150 florins. Haydn not only repaid the loan, but years afterwards remembered Buchholz's granddaughter in his will. Gratitude, tolerance, and the never-failing good humor which is reflected in his music, and which even a wretched marriage could not mar, mingled in his nature.

Through Metastasio, the Italian poet and librettist, Haydn secured pupils, himself taking lessons in composition from Porpora, for which he paid by menial duties. In 1758 his circumstances changed for the better. Through Baron Fürnberg, for whom he had composed his first quartet, and Countess Thun, he was appointed musical director to Count Franz Morzin, for whose orchestra he wrote his first symphony. It was during this incumbency that he married the eldest daughter of a Viennese wigmaker, named Keller. He had loved the younger daughter, but she entered a convent, and urged by her father he married her sister instead. His wife was utterly unsympathetic and unworthy of him. She tore up his manuscripts for curl-papers and pie-forms, squandered his earnings for finery, and even selected a house to live in in anticipation of her widowhood. By an irony of fate Haydn survived her and went to live in this very house.

In 1760 he became kapellmeister to Prince Paul Anton Esterházy, and retained this position under his original patron's successors till near the time of his death. Prince Nikolaus played upon the barytone (a stringed instrument superseded by the 'cello), and for this instrument alone Haydn wrote nearly two hundred pieces. For operatic performances in the princely household he composed more than a dozen operas, and for concerts numerous symphonies, quartets, and sonatas. In 1772, at the summer seat, Esterház, he brought out the "Abschieds" (Farewell) symphony, under circumstances which are variously described. Most probably, however, the Prince had denied the orchestra leave of absence to visit their families, and they had decided to leave his service. Toward the close of the symphony one player after another extinguished his candle and left. Finally only the violin leader remained. Having played the last phrase, he too blew out his candle and departed. The music and the action of the players moved the Prince so deeply that he granted their request.

Haydn and Mozart became acquainted in 1781, and from then until Mozart's death a close and generous friendship existed between them. Beethoven (q.v.) was a pupil of Haydn's for about a year, but, despite the fact that the latter praised some of his compositions, he soon grew dissatisfied with his teacher. Hadyn's fame, however, steadily increased, and when, in December, 1791, he arrived in London under engagement to Salomon, the violinist, he was the musical lion of the season, as he was also on his second visit, in 1794. His *Salomon* symphonies were composed for his London concerts. The famous Austrian national anthem he composed in 1797, and in 1798 produced his oratorio *The Creation*, following it with *The Seasons* in 1801. His last years were ailing, and his undermined constitution could not stand the shock of the bombardment of his beloved Vienna by the French in May, 1809. After the third shot he fell into convulsions, and on May 31st he died.

Haydn was honored even during his lifetime by a monument erected near his birthplace by Count Harrach, in whose service his mother had been. He attended the unveiling on his return from his first London season. His musical output was enormous. It included over a hundred symphonies and nearly a hundred quartets. His chief service to music is that he expanded the sonata form of Philip Emanuel Bach, using it in the quartet and orchestra as well as on the piano, and thus in chamber music and in symphony was the precursor of Mozart and Beethoven. His *Seven Words on the Cross*, composed as an instrumental passion for the Cadiz Cathedral, is frequently given at church on Good Friday in his brother's (Michael Haydn's) arrangement as an oratorio.

Bibliography. Pohl, *Mozart and Haydn in London* (Vienna, 1867); Townsend, *Joseph Haydn* (London, 1884); Nohl, *Life of Haydn*, translated by Upton (Chicago, 1889); Pohl, *Josef Haydn* (vol. i., Leipzig, 1875-82, completed on the death of Pohl in 1887 by Mandyczewski); Karajan, *Josef Haydn in London, 1791 und 1792* (Vienna, 1861).

HAY'DON, Benjamin Robert (1786-1846). An English historical painter. He was born at Plymouth, January 26, 1786, the son of a printer and publisher. He was educated at Plymouth, where the headmaster encouraged his sketching, and at Plympton. As an apprentice to his father he worked three years, and during this time was attacked by a malady that caused a dimness of vision, which in after life prevented his executing small pictures. In 1804 he went to London and spent two years studying, drawing from the cast by himself, attending the academy schools and the lectures on anatomy by Charles Ball. He was one of the first of the English artists to appreciate the Elgin Marbles, and it was largely through his influence that they were acquired by the nation. From his studies of them he received inspiration for the painting "Dentatus" (1809), which brought him a premium of 100 guineas at the Academy Exhibition. Although his name was proposed for election as a member of the Academy, it was not accepted, owing probably to his action in withdrawing a picture, "Romeo and Juliet," because it was not given the place of honor which it deserved. His quarrel with the Academy was further aggravated by other slights, and by letters written by himself for publication, which alienated many of his powerful friends. In 1821 he married Mary Hymans, a beautiful widow, who did much to lighten his disappointments in life.

His life was an heroic struggle against adverse circumstances, partially the fault of others, but also as a result of his unscrupulousness in money matters, vanity, and egotism. His *Journal*, consisting of twenty-six manuscript volumes, contains a vivid record of this struggle. He painted only very large historical canvases, which involved him in debt, and he was several times an inmate of the debtors' prison. During his second confinement he painted the "Mock Election," which George IV. purchased for 500 guineas.

Although his ability was not recognized by the Academy, he numbered among his admirers such men as Keats and Wordsworth, both of whom wrote sonnets to him, Sir Walter Scott, Charles Lamb, Southey, Hazlitt, and Mrs. Siddons. They especially appreciated his ambitious plans for the promotion of English art, which he inculcated in his letters, pamphlets, books, and lectures. Among his published works the best-known is his *Lectures on Design* (London, 1844-46), delivered at the Mechanics' Institute at London, and often repeated, not only in the principal cities of England, but at the University of Oxford. As a teacher he was equally successful, numbering among his pupils Sir Charles Eastlake, Charles and Thomas Landseer, William Harvey, George Lance, and William Berwick. But although his ideas on schools of design and the decoration of the Houses of Parliament were adopted, he was neglected when it came to carrying them out. He struggled through life, mostly in great poverty, and finally, overcome by the mental strain consequent on the failure of the exhibition of his last two pictures, he committed suicide in the Thames, June 22, 1846.

Haydon's drawing shows great knowledge of anatomy, although it is often defective in proportions; his color, at times rich, is not always harmonious; his conceptions are always vigorous. The works which attracted most attention during his lifetime were: "Joseph and Mary Resting on the Road to Egypt" (1806); "Dentatus" (1809); "Romeo and Juliet" (1809); "Judgment of Solomon" (1814); "Christ's Entry into Jerusalem" (1820), now in Philadelphia; "Lazarus" (1822), now in the National Gallery; "Christ Blessing Little Children;" the "Anti-Slavery Society at Freemasons' Hall" (1840), now in the National Portrait Gallery. Among his other works are "Venus and Anchises," "Alexander and Bucephalus," "Napoleon," the "Reform Banquet," "Cassandra," "Xenophon," "Eucles" (National Gallery), "The Mock Election," "Maid of Saragossa," the "Banishment of Aristides," "Nero Playing the Lyre During the Burning of Rome." His smaller works are unimportant.

Consult: Haydon's *Correspondence and Table Talk*, edited by his son, Frederick Wordsworth Haydon (London, 1876); Tom Taylor, *Life of Haydon* (London, 1883); Redgrave, *A Century of Painters of the English School* (London, 1866).

HAYDUCKS, hī'dŭks. See Haiducks.

HAYEL, hä-yĕl', or **HAIL**, hä-ēl'. Capital of the Sultanate of Shomer, situated in the northern part of Arabia, about 250 miles northeast of Medina (Map: Asia, D 6). It is a walled town, and a place of considerable trade. Population, 25,000.

HAYEM, ä'yĕm', GEORGES (1841—). A French physician, born in Paris. He was educated at the University of Paris, where he afterwards became a professor in the faculty of medicine. He was made a physician of the Saint Antoine Hospital, and in 1886 was elected a member of the Academy of Medicine. From 1873 to 1898 he edited the *Revue des sciences médicales en France et à l'étranger*. His works include: *Des hémorragies intra-rachidiennes* (1872); *Du sang et de ses altérations anatomiques* (1889); and *Leçons de thérapeutique* (1887-93).

HAYES, hāz, AUGUSTUS ALLEN (1806-82). An American chemist, born at Windsor, Vt. He graduated at the Norwich Military Academy in 1823 and began the study of chemistry under Professor Dana at Dartmouth. Here he distinguished himself by his researches on the proximate constituents of American medicinal plants, and by his discovery of the organic alkaloid sanguinaria, a compound remarkable for the brilliant colors of its salts. He was for a time assistant professor of chemistry in the New Hampshire Medical College, and while there in 1827 investigated the compounds of chromium, and his paper on this subject was highly praised by Berzelius, the eminent Swedish chemist. He carried out several other interesting researches in organic chemistry, as well as on many questions in engineering. He was a contributor to the *Proceedings* of the American Academy and of the Boston Society of Natural History, the *American Journal of Science* and the *Annual of Scientific Discovery*. In 1837 his investigations into the generation of steam and the economy of fuel led to the construction of improved furnaces and boilers.

HAYES, ISAAC ISRAEL (1832-81). An American Arctic explorer, born in Chester County, Pa. He went with Captain Kane as surgeon on the second Grinnell expedition in search of Sir John Franklin (1853-55), and upon his return was fired with a desire to verify his conviction of the existence of an open polar sea. Through the influence of several scientific societies he succeeded in obtaining financial support, and set out from Boston in 1860, with two astronomers and but twelve other persons, on board the *United States*. The first winter he spent near Littleton Island, latitude 78° 18′ N., but the following spring, if his observations were correct, he reached latitude 81° 35′ N., longitude 70° 30′ W., farther north than any of his predecessors in this quarter of the Arctic regions had been. The result of his explorations was to confirm him in the opinion that an open route to the pole was practicable for steamships in summer from Cape Frazer. He made a voyage to Greenland in 1869, published *An Arctic Boat Journey* (1860); *The Open Polar Sea* (1867); *Cast Away in the Cold* (1868); and *The Land of Desolation* (1872), and was honored by medals from the geological societies of Paris and London.

HAYES, RUTHERFORD BIRCHARD (1822-93). The nineteenth President of the United States. He was born in Delaware, Ohio, October 4, 1822. His paternal and maternal ancestry, it is claimed, can be traced back, each to a Scottish chieftain of noble blood, and he was a descendant in the sixth generation of George Hayes, who left Scotland in 1680 and settled at Windsor, Conn. His grandfather, Rutherford Hayes, born in New Haven, Conn., in 1756, settled in Brattleboro, Vt. Here the father of the President, also named Rutherford, was born. His parents emigrated to Ohio shortly before his birth. When the boy was sixteen years old he was sent to Kenyon College, where he graduated at the head of his class in 1842. He studied law for two years in the office of Thomas Sparrow, of Columbus, and subsequently spent two years (1843-45) in the Harvard Law School. In 1845 he was admitted to the bar at Marietta, Ohio, and soon afterwards entered into practice at Fremont, the residence of his uncle Sardis Birchard, then a wealthy banker. In 1849 he removed to Cincinnati, where he soon gained a remunerative practice, and became prominent in his profession. In 1852 he married Miss Lucy W. Webb, daughter of Dr. James Webb, of Chillicothe, Ohio. In 1856 he was nominated as a candidate for judge of the Court of Common Pleas, but refused to accept the nomination, although later he served as City Solicitor. In 1861, when the Civil War broke out, he enlisted for the whole war, and on June 7th was commissioned as major of the Twenty-third Ohio, of which W. S. Rosecrans was colonel. To the regiment was assigned the duty, at Clarksburg, W. Va., of protecting the Baltimore and Ohio Railroad, and of defending the border from raids; and Major Hayes took a prominent part in various expeditions necessary for the defense of the position. He served for a time as judge-advocate of the Department of Ohio, and in August, 1862, he was promoted to the colonelcy of the Seventy-ninth Ohio, but he preferred to remain, with the rank of lieutenant-colonel, with the Twenty-third, which had been incorporated with Burnside's command in the Army of the Potomac. At South Mountain (q.v.) the Twenty-third, led by Hayes, was hotly engaged, more than a hundred of Hayes's men falling dead or wounded, and he himself being slightly wounded. There was a pause for reënforcements, when a dangerous flank movement of the enemy was discovered, and Hayes was again seen at the head of the regiment. He was finally carried, fainting with loss of blood, from the field. Upon his recovery he was promoted to the rank of brigadier-general, and placed in command of the Kanawha division, of which his old regiment formed a part. He remained at Kanawha Falls until March 15, 1863, when the division was ordered to Charleston, W. Va. After this he led in several important expeditions, notably in that which he himself organized to dispute the retreat of Morgan (q.v.) and his band after their raid through Ohio. By a quick movement he cut off Morgan's retreat and forced him to surrender. In the famous raid upon the Virginia and Tennessee Railroad, in May, 1864, he led the principal assault upon the enemy's fortifications with admirable boldness and success. He took an honorable part in the attack on Lynchburg, June 18th, covering the retreat of the Union forces under dangerous conditions with perfect success. In the campaign of the Shenandoah, under Sheridan (q.v.), his services were conspicuous and valiant. In the battle of Winchester especially he displayed great coolness and courage in the most trying circumstances. For his gallant services Hayes was brevetted major-general.

He was a Republican from the formation of the party, and had taken an active part in the

political campaign of 1860. His achievements in the war made his name popular in Ohio, and when the Republicans of the Second District felt the need of a strong candidate for Congress, he consented to accept the nomination, with the understanding that he would not take the seat unless the war should meantime be ended. When after the close of the war, he entered Congress, he at once attracted attention by his ability. He was reëlected in 1866, but had only served through his first term when the Republicans of Ohio, in 1867, nominated him as their candidate for Governor, under the conviction that he was the only man whom they could hope to elect. He was chosen by a majority of 3000, and reëlected in 1869 by a majority of 7518. He was elected for the third time in 1875, and while occupying the place was nominated by the Republican Party as its candidate for President of the United States, William A. Wheeler being nominated for Vice-President. The nominees of the Democratic Party were Samuel J. Tilden and Thomas A. Hendricks. The contest was severe and close, and disputes arose as to the electoral votes of several States. After a period of great tension all the contested cases were decided in favor of Hayes by the Electoral Commission (q.v.), and having a majority of one electoral vote (185 to 184), he was duly inaugurated on March 4, 1877. Aside from violent partisan disputes upon the questions adjudicated by the Electoral Commission, his administration was admitted by men of all parties to have been pure and honorable. An effort was made to reduce the evil of using appointments to office as rewards for partisan services, but this policy did not meet with hearty support. The President also failed to maintain close harmony with the party leaders in his attitude toward the 'reconstructed' States, from which he aimed to withdraw the Federal troops, even against the vigorous demands of the radicals for a continuation of the military supervision. He was generally recognized as a pacificator at a time when conciliation was essential to peace. Upon all political questions save those above referred to he was in full harmony with the Republican Party, and by his courageous and unflinching exercise of the veto power prevented the adoption of measures calculated to injure the credit of the country and hinder a return to specie payments. He also, by the interposition of the same power, prevented the repeal of the laws enacted by Congress, under the express authority of the Constitution, to guard the purity of national elections. After his retirement from public office President Hayes devoted himself as a private citizen to the support of philanthropy and education. As a member of the Peabody Education Board for the promotion of education in the South, as the first president of the States Board for the instruction of freedmen, and as president of the National Prison Association, he set an example of assiduity in attendance at the meetings of the boards and of patient and far-sighted counsel on the questions brought before him. He died January 17, 1893. Consult: Wilson (editor), *The Presidents of the United States* (New York, 1894); and a campaign biography by Howard, *Life, Public Services, and Select Speeches of Rutherford B. Hayes* (Cincinnati, 1876). For an account of the administration of Hayes, see the article UNITED STATES.

HAYESINE (named in honor of the American chemist A. A. Hayes). A hydrous calcium borate found in Peru and elsewhere in South America. It is a source of boric acid and borax (q.v.). Hayesine is now generally believed to be ulexite (q.v.).

HAYEZ, hä'ĕts, FRANCESCO (1791-1882). An Italian genre and historical painter, born in Venice. He studied under Maggiotto at the Venice Academy, and afterwards at the Academy of Milan and under Palagi in Rome. In 1820 he was appointed professor at the Milan Academy, and became head of the romantic movement in Italian art. He is a noted and vigorous colorist. Among his works are frescoes in the Vatican and the Venice Academy, and the following pictures: "The Two Foscari" (Vienna Museum); "Thirst of the Crusaders," "The Farewells of Pietro Rossi and His Family" (1820); "The Flight of Bianca Capello" (1854, National Gallery, Berlin); "The Battle of Magenta," and a portrait of Cavour.

HAY FEVER, HAY ASTHMA, HAY COLD, ROSE COLD, or AUTUMNAL CATARRH. A nervous affection which recurs annually at about the same time every year and lasts several weeks, characterized by a profuse flow of secretion from the nose, as well as of tears from the eyes, with frequent sneezing, general malaise, irritability, insomnia, increased perspiration, and in many cases asthma. The eyes flinch in bright light, headache occurs daily, appetite is lessened, and occasionally there is fever. In some patients the attack appears in June and lasts about a fortnight. This is termed *rose cold*. Many suffer first in July, during haying; but probably the greater number begin to suffer early in August, and are relieved only on the approach of frost in October. The cause appears to be threefold: (1) A central nervous disease, with the lesion probably in the floor of the fourth ventricle in the brain, as in spasmodic asthma. (2) Intra-nasal deformity, as a deviating septum, or distorted and chafing turbinates. (3) A special pollen, some plants affecting some and failing to excite others; while during the whole year fine dust causes in these patients sneezing, coryza, and slight rhinitis, lasting an hour or so. Removal to the seashore or a sea voyage benefits a few patients; while a sojourn in the mountains at an altitude of 1000 feet or more benefits a greater number. Of the mountains in the eastern part of the United States the White Mountains have the greatest reputation with regard to the effect of their atmosphere upon hay-fever patients. On returning home before frost, however, the affection recurs. It is said that most hay-fever patients are people of considerable intellectual development; certainly all are neurotics. Arsenic, iodides, bromides, and acetanilid benefit some. Nasal sprays and internal administration of extract of suprarenal gland (adrenalin) are serviceable in many cases, relieving the nasal stenosis. In England and on the Continent the disease appears to be of milder type, and to run a course of only a month. A Hay Fever Association, composed of sufferers from the disease, exists in the United States, which meets every year to compare results from new remedies.

HAY'GOOD, ATTICUS GREENE (1839-96). An American clergyman of the Methodist Episcopal Church (South), born in Watkinsville, Ga. He graduated at Emory College, Georgia, in 1858,

and soon afterwards entered the ministry. When General Sherman evacuated Atlanta, he was one of the ministers sent there to gather together the scattered Methodists and rebuild the churches. Between 1870 and 1875 he edited the Sunday-school publications of the Southern branch of the Church. He was president of Emory College from 1876 to 1894, and during a part of that time was editor of the *Wesleyan Christian Advocate*. Large sums of money were placed in his hands to promote various institutions, and in 1883 he was elected general agent of the Slater fund of $1,000,000 for the education of Southern negroes. He declined an election as bishop of the Methodist Episcopal Church (South) in 1872, but accepted another election in 1890. His published works include: *Our Children; Jacknife and Brambles* (1893); and *The Monk and the Prince* (1895).

HAYLEY, William (1745-1820). An English poet, born at Chichester. He was educated at Eton and Trinity College, Cambridge. After some ill success as a playwright, he began the production of poetical epistles to his friends, one on *Painting* to Romney (c.1777), for example, and one on *History* (1780) to Gibbon. In *English Bards and Scotch Reviewers*, Byron impales Hayley as the author of the eminently successful poems, *The Triumphs of Temper* (1781) and *The Triumphs of Music* (1804). His prose *Life of Milton* (1794) was a more creditable performance, and through the writing of it he became an intimate friend of Cowper, for whom he was influential in obtaining a pension. Blake's illustrations enhance the value of his *Ballads Founded on Anecdotes of Animals* (1805), and on the whole Hayley was more noted as the friend of great men than for being one himself. Therefore, his *Memoirs*, published in 1823, after his death, are his most interesting contribution to English literature.

HAYM, hīm, Rudolf (1821-1901). A German writer on philosophy and literary history, born at Grünberg, in Silesia. He studied at the universities of Halle and Berlin, and was a delegate to the National Assembly at Frankfort (1848-49). He wrote a number of biographies, among them: *W. von Humboldt* (1856); *Hegel und seine Zeit* (1857); *Arthur Schopenhauer* (1864); *Herder, nach seinem Leben und seinen Werken* (1877-85); and *Das Leben Max Dunkers* (1890). He also published *Erinnerungen aus meinem Leben* (1901), and edited *Briefe von W. von Humboldt an G. H. L. Nicolovius* (1894). Consult *Philosophische Abhandlungen dem Andenken Rudolf Hayms gewidmet von Freunden und Schülern* (1902).

HAYMARKET, The. A former market for hay and straw in London, founded in the first half of the seventeenth century, and discontinued in 1830. On the square of the same name, occupying the site of the market, stand the Haymarket and Her Majesty's theatres. Addison wrote *The Campaign* while living there.

HAYMARKET SQUARE RIOT, The. An occurrence at Chicago, May 4, 1886, in a square in Randolph Street, where an anarchist meeting was in progress. The attempt to disperse the gathering resulted in the killing of seven policemen and the wounding of twenty-seven others, by a bomb, thrown by an unidentified member of the mob, supposed to have been one Schnaubelt. The actual bomb-thrower was never caught, but August Spies, Adolph Fischer, George Engel, and Albert Parsons were hanged as accomplices on November 11, 1887; Samuel Fielden and Michael Schwab were sentenced to imprisonment for life, and Oscar Neebe for fifteen years; and Louis Ling escaped the gallows only by committing suicide in prison.

HAYMARKET THEATRE. One of the most famous playhouses in London. It was originally built in 1720 by John Potter, on the site of the King's Head Tavern, in the Haymarket, and leased to a French company, whence the appellation, 'the New French Theatre,' by which it was for some time known. Fielding produced his burlesque *Tom Thumb the Great* there in 1730, and in 1734 became manager. Ten years later Charles Machlin assumed its management, and was followed in 1747 by Samuel Foote. In 1776, however, Colman the elder purchased it, and it was managed by him until 1794. In 1820, under Harris's management, the theatre was abandoned and a new one was built near by, which was opened on July 4, 1821, with *The Rivals*. In 1880 it was again removed, its present site being the south end of the Haymarket, opposite Charles Street.

HAYMERLE, hī'mĕr-le, Heinrich Karl, Baron (1828-81). An Austrian statesman, born and educated at Vienna. He took part in the students' rising in the Revolution of 1848, and narrowly escaped execution. He served in the diplomatic corps at Athens, Dresden, and Frankfort; became Ambassador to Copenhagen in 1864; took part in negotiating the Treaty of Prague (1866); and from Berlin went to Constantinople (1868) and to Athens (1869), thence to The Hague (1872), and in 1877 to the Italian Court. In the following year he took part in the Berlin Congress, and in 1879 succeeded Andrássy as Minister of Foreign Affairs. In this post, which he held till his death, he was especially active in effecting friendly relations with Italy and cementing the alliance with Germany. Consult Arneth, *Heinrich Freiherr von Haymerle* (2d ed., Berlin, 1882).

HAYNAU, hī'nou, Julius Jakob, Baron (1786-1853). An Austrian general. He was the natural son of the Elector William I. of Hesse, and was born at Cassel, October 14, 1786. He entered the Austrian service in 1801, and was gradually advanced in rank, becoming colonel in 1830, major-general in 1835, and field-marshal lieutenant in 1844. During the Italian campaigns of 1848-49 he evinced great military talents, but acquired also an unenviable reputation for cruelty, especially in the repression of the insurrection at Brescia, March 31 and April 1, 1849. Haynau was engaged in the siege of Venice, when he was summoned to Hungary to command the Imperial forces in that country. He stormed Raab on June 28th, and on August 9th gained a decisive victory over the Hungarians near Temesvár. After the surrender of the Hungarian main army at Világos, he executed a number of the leading Hungarian generals. In 1850, however, after being loaded with honors, he was dismissed from public service for the intractability of his disposition. In the same year he made a tour of Europe, but so general was the hatred his acts had inspired that he was several times in great danger from mobs, and while in

London was assaulted and beaten by the infuriated draymen of Barclay's brewery. For this insult the British Government declined giving any satisfaction. In Belgium and France he was also received by the populace with strong dislike, but by the vigilance of the authorities was preserved from actual harm. He died at Vienna, March 14, 1853. Consult Schönhals, *Biographie des Feldzeugmeisters Julius Freiherrn von Haynau* (3d ed., Vienna, 1875), which seeks to vindicate him from charges of cruelty.

HAYNE, PAUL HAMILTON (1831-86). An American poet, born in Charleston, S. C. After the death of his parents he was reared by his uncle, Robert Y. Hayne (q.v.). He studied law after having been educated at South Carolina College, but did little practicing, because he was under no financial necessities, and because his bent was literary. When in his early twenties he edited *Russell's Magazine*, and was connected, as editor or contributor, with other Charleston and Southern publications, notably as contributor to the *Southern Literary Messenger*. He was a prominent member of the small literary coterie of which William Gilmore Simms and Henry Timrod (q.v.), were conspicuous ornaments. In 1855 a volume of his poems appeared; another followed in 1857, and a third in 1859. During the Civil War he saw active service and suffered greatly financially, among other losses being that of his library, which was burned. From 1865 to his death, he resided at a small cottage home near Augusta, Ga., which he called Copse Hill. His health was not good, but he maintained his spirits under his various misfortunes, and won a genuine though limited reputation as a poet, in both the North and his native section. His memory is still cherished warmly in Augusta and the surrounding region. His later publications include: *Legends and Lyrics* (1872); *The Mountain of the Lovers* (1873); and his complete *Poetical Works* (1882). He also edited, with a memoir (1873), the poems of his friend, Henry Timrod, and of Dr. F. O. Ticknor (1879), and wrote memoirs of R. Y. Hayne and H. S. Legaré (1878). Hayne's poetry is the work of a genuine artist, whose qualities, however, are not salient enough to attract greatly the general reader. Although he produced many good poems, in which much of the languorous sweetness of the South may be discovered, it was not his fortune to compose, like his friend Timrod, three or four lyrics of great power and popular appeal. Nevertheless he is one of the most important of Southern writers, and deserves more attention at the hands of historians of American literature than he has hitherto received.—His son, WILLIAM H. HAYNE (1856—), born in Charleston, inherited some of his father's poetical ability. His publications include *Sylvan Lyrics* (1893), and many occasional verses in the magazines.

HAYNE, ROBERT YOUNG (1791-1839). An American political leader, prominent as an exponent of the States' Rights view of the Federal Constitution. He was born in Saint Paul's Parish, Colleton District, S. C., on November 10, 1791; was educated in a private school at Charleston; studied law in the offices of Langdon Cheves (q.v.); was admitted to the bar at Charleston in November, 1812, and attained immediate prominence in his profession. During part of the War of 1812 he acted as a captain in the Third South Carolina Regiment. From 1814 to 1818 he was a Democratic-Republican member of the State Legislature, serving as Speaker of the House in the latter year; and from 1818 to 1822 was Attorney-General of the State. In 1823 he was elected as a States' Rights Democrat to the United States Senate, in which body he quickly became conspicuous as a pronounced strict-constructionist and an advocate of free trade and of 'States' Rights.' He vigorously opposed the tariffs of 1824 and 1828, denounced the anti-slavery programme of the Panama Congress, and in various debates upheld the view that slavery was purely a domestic institution, and as such should be wholly exempt from Federal legislation or interference. He is best known, however, for his great debate with Daniel Webster in January, 1830, arising out of the so-called 'Foote's Resolution,' but covering the important question of the relation of the States to the Federal Government. Hayne began the debate on January 19th, and Webster answered on the following day, while Hayne again spoke on the 21st, 25th, and 27th, and Webster on the 26th and 27th. In these speeches, besides attacking New England, and especially Massachusetts, for the part taken by that section in the War of 1812, he brilliantly upheld the theory that the Federal Government was in reality a compact between the various States, as such; that the Federal Government itself was a party with each of the individual States to the compact thus formed, and that any State, when convinced that that compact had been broken, could for its own protection nullify or arrest the enforcement within her borders of any law deemed to be in violation of the Constitution. He naturally supported South Carolina in her controversy with the Federal Government over the tariff measures of May, 1828, and July, 1832; was a member of the Nullification Convention which assembled at Charleston on November 19, 1832; and as chairman of the 'Committee of Twenty-one,' reported the famous Ordinance of Nullification, which was passed by the Convention on November 24th. Soon afterwards he resigned from the Senate, partly, no doubt, in order that Calhoun might take his seat in that body; and in December he was elected Governor of the State and commander-in-chief of the State forces. On the 13th he delivered his inaugural address, pledging himself to maintain at all hazards the principle of nullification, and on the 20th issued a ringing counter-proclamation to the famous proclamation issued by President Jackson on the 10th. During the whole crisis he administered the executive office with marked ability, and though firmly convinced of the correctness of the position taken by his State, he used his influence on several occasions to restrain the nullificationists from acts of violence. His term as Governor ended in December, 1834. He was Mayor (intendant) of Charleston in 1835-37, and president of the Louisville, Cincinnati and Charleston Railroad from 1836 until his death. He died at Asheville, N. C., September 24, 1839. Consult: Paul H. Hayne, *Lives of Robert Y. Hayne and Hugh Swinton Legaré* (Charleston, 1878); McDuffie, *Eulogy upon the Life and Character of the Late Robert Y. Hayne* (Charleston, 1840); and Lindsay Swift (editor), *The Great Debate Between Robert Y. Hayne, of South Carolina, and*

Daniel Webster, of Massachusetts (Boston, 1898), in the "Riverside Literature Series."

HAYNES, HENRY WILLIAMSON (1831—). An American archæologist, born in Bangor, Maine, son of Nathaniel Haynes, editor of the *Eastern Republican*. He graduated at Harvard, studied law, and practiced for a few years. Then he was appointed professor of Latin, and later of Greek, in the University of Vermont, a chair from which he resigned in 1873, to make archæological researches in Europe and in Egypt. His memoirs on the Paleolithic Age in Egypt (1878) won him a medal and a diploma from the Anthropological Congress of that year in Paris, and afterwards were published in the papers of the American Academy of Arts and Sciences. Haynes was long a fellow of the American Association for the Advancement of Science, and recording secretary of the Massachusetts Historical Society.

HAYNES, JOHN (?-1654). An English Colonial Governor in New England. He was born in Essex, but emigrated to Massachusetts with other Puritans in 1633, and the following year tried to found a colony on the Connecticut River. He tried again (1636), after he had been for two years the third Governor of Massachusetts Bay, and he ultimately succeeded, becoming the first Governor of Connecticut and one of the five framers of that Colony's Constitution. That the colonists approved his rule is evident from his reëlection as often as the law allowed. In Bancroft's *History of the United States*, vol. i., he is described as being "of a very large estate and large affections; of a heavenly mind and a spotless life; of rare sagacity and accurate but unassuming judgment; by nature tolerant, ever a friend of freedom."

HAY-PAUNCEFOTE TREATY. The name applied to the convention negotiated in 1901 by John Hay on the part of the United States, and Lord Pauncefote on the part of Great Britain, which abrogated the Clayton-Bulwer Treaty (q.v.), and declared the policy which would control the United States in the construction and maintenance of an Isthmian canal between the Atlantic and Pacific Oceans. The statement in President McKinley's annual message to Congress in 1898, that the construction of the canal had become a national necessity, led to diplomatic correspondence that resulted finally in the opening of negotiations, with the end in view of so modifying the Clayton-Bulwer Treaty that, without affecting the general policy of neutrality enunciated therein, the United States would be enabled to proceed with the canal's construction. The treaty then negotiated, and transmitted to the United States Senate by President McKinley on February 5, 1900, provided: (1) For the construction of the canal by or under the auspices of the United States Government; (2) for its neutralization on the same basis as the Suez Canal; and (3) for an invitation to other powers to join in guaranteeing such neutrality. The convention was finally ratified by the Senate on December 20, 1900; but with three amendments, the first of which provided that the restrictions contained in the second article, based on the Suez convention, should not apply to such measures as the United States might find it necessary to take for their own defense and the maintenance of public order; the second explicitly stated that the Clayton-Bulwer Treaty was thereby suspended; and the third struck out the provision in regard to the guarantee to be asked of other non-constructing powers. In its amended shape Great Britain refused to ratify the convention, and it expired by limitation on March 5, 1901. Negotiations for a new treaty were immediately started, however, by Secretary of State Hay and Lord Pauncefote; the new convention was signed by them on November 18, 1901, transmitted to the Senate by President Roosevelt on December 5th following, and ratified by that body, with but slight opposition, eleven days later. The principal differences between the first and final treaties were three in number: (1) No guarantees of the canal's neutrality were to be asked either of Great Britain or any other power; (2) the Clayton-Bulwer Treaty was specifically abrogated, although the general principle of neutrality contained therein was retained; (3) certain undefined rights of control were to be allowed to the United States in time of war, the exact nature and extent of which was not specified, but there was no requirement that the canal should be kept open and free in time of war as in time of peace, nor was there a prohibition of the erection of fortifications commanding the canal or its adjacent waters.

HAY RIVER. A river of Athabasca, Can., which rises in the Rocky Mountains, and flows northeast, emptying into the Great Slave Lake (Map: Northwest Territories, F 3). Its length is 350 miles, of which 140 are navigable. The two Alexandra Falls, averaging 900 feet wide and about 250 feet high, occur in its course.

HAYS. A city and the county-seat of Ellis County, Kan., 289 miles west of Kansas City, on Big Creek, and on the Union Pacific Railroad. It has grain-elevators, flour-mills, machine-shops, etc., and a trade in flour, grain, and live stock. Hays is the seat of the western branch of the State Normal School and of an agricultural experiment station, comprising some 2000 acres, of the State Agricultural College. Population, in 1890, 1242; in 1900, 1136.

HAYS, ISAAC (1796-1879). An American physician, born in Philadelphia. He graduated at the University of Pennsylvania in 1816, studied medicine there for four years, and subsequently devoted himself largely to editorial work on medical journals. He was sole editor from 1827 to 1869 of the *American Journal of the Medical Sciences;* was the founder of the *Medical News* in 1843, and of the *Monthly Abstract of Medical Science* in 1874; was president of the Academy of Natural Sciences in Philadelphia from 1865 to 1869; and was an active member of the Philosophical Society. He was also one of the founders of the Franklin Institute, was its secretary for several years, and at the time of his death was its oldest member. He was one of the oldest members, and for a time an officer of the College of Physicians of Philadelphia; also one of the founders of the American Medical Association, and author of its code of ethics, which has been adopted by all the medical societies in the country. He edited several important works on medicine.

HAYS, WILLIAM JACOB (1830-75). An American animal painter, born in New York. In order to paint animals, he visited the upper waters of the Missouri and Nova Scotia. Some of his pictures are: "The Herd in the Moor" (a herd of

buffaloes); "The Prairie-Dog Village;" "A Bison Bull at Bay;" "Prairie on Fire;" and "Herd of Caribou in Nova Scotia." Although Hays was not a colorist, his work is fresh and spirited.

HAY'TER, Sir GEORGE (1792-1871). An English historical and portrait painter, born in London. He was the pupil of his father, Charles Hayter, a miniature painter, and of the Royal Academy. Afterwards he traveled much abroad. On his return he became painter to Queen Victoria. A number of his works are official pictures painted in this capacity; they include "The Coronation of Queen Victoria." His work, executed in detail, is mannered and spiritless.

HAYTER, HARRISON (1825—). An English civil engineer. He was born at Falmouth, and was educated at King's College. His first appointment was upon the construction staff of the Great Northern Railway. Among the other works with which he became associated are the Severn Tunnel, the Charing Cross and Cannon Street bridges in London, and one in India nearly a mile long; he built harbors and railways in England, and upon the Continent. His principal achievements were the canal at Amsterdam, the docks at Holyhead, and those at Buenos Ayres.

HAYTI, hā'tī. See HAITI.

HAY'WARD. The county-seat of Sawyer County, Wis., 58 miles southwest of Ashland; on the Namakagon River, and on the Chicago, Saint Paul, Minneapolis and Omaha Railroad (Map: Wisconsin, B 2). It has a public library and a United States Government Indian School. Lumbering is the most important industry. Population (town), in 1900, 2720.

HAYWARD (AS. *hæigweard*, from *haga*, OHG. *hag*, Ger. *Hag*, Eng. *haw*, hedge + *weard*, OHG. *wart*, Ger. *Wart*, guard). The name originally given in England to one who kept the common herd of cattle of a town, or of a manor, when the copyhold or other tenants had the right of sending cattle to graze. In the New England villages, particularly of Massachusetts, the name hayward was given to the keeper of the pound for strayed horses and cattle. The word is not now in general use in the United States.

HAYWARD, ABRAHAM (1801-84). An English essayist, born at Wilton, near Salisbury. He received his education at home with a tutor, and afterwards in the fine library of the solicitor to whom he was articled. While a student at the Inner Temple, London, he attracted attention as the joint editor of a law magazine, and also as a debater in the same club with J. S. Mill, whom he wrote against in later years. As a result of two German sojourns, Hayward made an acceptable translation of Goethe's *Faust* (1833), of which a second and enlarged edition was published the following year, and was thus introduced into the society of such men of letters as Lockhart, Macaulay, and Sydney Smith. He wrote a book upon *The Art of Dining* (1852), besides numerous treatises upon legal subjects, a travel sketch, critical essays on the authorship of the *Letters of Junius*, on the Crimean campaign, and other topics of his time. He left the Tory Party for the Whigs in 1846, but not receiving from them the preferment he considered his due, he took revenge upon his enemies with tongue and pen. However, he had many warm friends, and was a noted club man, whist-player, and contributor of biographical and political essays to the leading reviews.

HAYWARD, Sir JOHN (c.1564-1627). An English historian. He was born and educated at or near Felixstowe, Suffolk, and graduated at Cambridge. His earliest production, *The First Part of the Life and Raigne of Henrie the IIII., Extending to the End of the First Yeare of his Raigne* (1599), placed him in the bad graces of Queen Elizabeth, who was easily persuaded that he was painting a moral for herself in his account of Richard II.'s downfall, and therefore had the historian imprisoned. Having learned policy, Hayward kept the favor of James I., dedicated books to him and his son, defended the divine right of kings, and advocated the union of England and Scotland. Among his works are: *An Answer to the First Part of a Certaine Conference Concerning Succession* (1603); *The Lives of the Three Normans, Kings of England* (1613); *The Sanctuarie of a Troubled Soule* (1616); *David's Teares* (1622-23); *Christ's Prayer Upon the Crosse for His Enemies* (1623); *Of Supremacie in Affaires of Religion* (1624-25); and *The Life and Raigne of King Edward the Sixth* (1630), published after the author's death.

HAY'WOOD, ELIZA (c.1693-1756). An English novelist and dramatist, born probably in London. Her maiden name was Fowler. She married when she was young, was deserted by her husband, and about 1715 appeared in Dublin and London as an actress. Steele's *Sappho*, in the *Tatler* of April 23, 1709, is usually identified with her, but wrongly it would seem from the dates. She rewrote *The Fair Captive* (1721); composed a comedy, *A Wife to Lett* (1723), in which she acted, and a tragedy, *Frederick, Duke of Brunswick Lunenburgh* (1729); and collaborated with Hatchett in *Opera of Operas* (1733). But she is best known for her novels, which brought upon her an attack by Pope in the *Dunciad* (book ii., 157 sqq.). Mrs. Haywood and Curll replied with a *Female Dunciad*. A collected edition of her novels, not including the famous *Memoirs of a Certain Island* (1725) and *The Secret History of the Present Intrigues of the Court of Caramania* (1727), appeared in 1724.

HAY-WORM. A lepidopterous larva (*Asopia costalis*), peculiar to North America, which has the strange habit of feeding normally upon dried hay, especially clover hay, but also upon timothy and alfalfa. In large numbers it attacks the hay, both in the mow and in the stack, cutting the leaves up into chaffy pieces and webbing them together with silken threads. The hay looks moldy, is infested with excremental pellets, and is distasteful to cattle. The larva is dirty white in color, and grows to a length of about three-fourths of an inch. The adult moth is lilac brown or purple, with two bands of a lighter shade on each fore wing. Old mows should be thoroughly cleaned out before putting new hay in a barn, and infested stacks should be burned.

HAY'YUG, JUDAH BEN DAVID (c.950-c.1000). A Jewish grammarian. He was born at Fez, near the middle of the tenth century, went to Cordova, and became a pupil of the grammarian Menahem ben Saruk. His theory that all Hebrew stems contain three letters was an important contribution at the time to Hebrew philology and lexicography. He died in the be-

ginning of the eleventh century. His two important grammatical works are: *The Book of Verbs with Weak Letters*, and *The Book of Verbs Containing Doubled Letters*, which are intended to illustrate his theory. In addition, he prepared a monograph on *Punctuation*, setting forth the features of the Hebrew vowel system. Of a fourth grammatical work only fragments have been found. Consult Jastrow's edition of Hayyug's treatises on *Weak and Geminative Verbs in Hebrew* (Leyden, 1897).

HAZARAS, hȧ-zȧ'rȧz. A semi-independent and partially nomadic people, of Mongolian ancestry, in the region between Herat and Kabul, Afghanistan, into which country they are said to have come, in the fourteenth century, in the wake of the great Mongolian movement of Genghis Khan. They profess Islam, the Hazaras proper to the east being Shiites, the western Hazaras, or Aimak (i.e. 'horde'), as they are sometimes called, Sunnites. Their language has been not a little influenced by Persian.

HAZARD (OF. *hazard, hasard*, Fr. *hasard*, from Sp. *azar*, unlucky throw of dice, misfortune, ace of dice, from Ar. *al*, the + *zār*, from Pers. *zār*, die). A game of dice, formerly very popular in England, where it is played both for amusement and for purposes of gambling. In the latter respect, however, a frequent player, by his knowledge of the peculiarities of the game, has the beginner at a considerable disadvantage. The game is played with two dice. The 'main,' which is called by the 'caster,' may be either 5, 6, 7, 8, or 9. Should he (the caster) throw the number called—or, supposing 6 or 8 is the main, he throws 12—he is said to 'nick,' and thus defeats his opponent, who is styled the 'setter.' The caster loses when, for instance, he throws 2, 3, or 12, when 7 is the main; but should he throw any other numbers (for example, when 7 is the main, and he throws 4, 5, 6, 8, 9, or 10) he has a 'chance,' which permits him to continue throwing until either the 'main' or the 'chance' is thrown. The game is decided in favor of the 'caster' if the 'chance' is thrown first; and in favor of the 'setter' should the 'main' be the first thrown.

HAZ'ARD, Caroline (1856—). An American educator, born at Peacedale, R. I. She was educated privately in the United States and abroad, contributed reviews, essays, and verse to magazines, published several volumes, and in 1899 was elected president of Wellesley College (Wellesley, Mass.). Her works include *Narragansett Ballads* (1894), and *The Narragansett Friends' Meeting* (1899).

HAZARD, ȧ'zȧr', Désiré. A nom-de-plume of Octave Feuillet (q.v.).

HAZ'ARD, Ebenezer (1744-1817). An American author, born in Philadelphia, and educated at Princeton. He went into the publishing business in New York in 1770, but left it five years later for a Government position, and from 1782 to 1789 was Postmaster-General. In 1791 he was once more in business—this time in Philadelphia, where he helped to establish the North American Insurance Company. Besides giving literary assistance in the compilation of two histories and a biblical translation, he published *Historical Collections* (2 vols., 1792-94), and a book about the Indians, in whose spiritual welfare Mr. Hazard took much interest. But his most valuable literary remains are the letters in the possession of the Massachusetts Historical Society.

HAZARD, Rowland Gibson (1801-88). An American manufacturer and author. He accumulated a fortune in the woolen business at Peacedale, R. I., and was for three terms a member of the State Legislature. Among his writings are: Essays on *Language: Its Connection with the Constitution and Prospects of Man* (1836); on *The Resources of the United States* (1864); and two letters addressed to John Stuart Mill, on *Causation and Freedom in Willing* (1869). His granddaughter, Caroline Hazard, has edited a collected edition of his works in four volumes.

HAZE. Any comparatively slight obscuration of distinct vision due to the opacity of any medium, such as the atmosphere, through which the object is seen. The thickest haze in the atmosphere obscures the light of the sun to such an extent that his disk is but just distinguishable from the surrounding background; any greater obscuration than this is usually spoken of as cloud. This hazy effect may be produced in several ways: (1) When the air is filled with small masses of very different densities, such as rising currents of hot air and descending currents of cold air over a heated soil. In this case the beam of light is by refraction broken up and diffused so that a hazy effect, or even complete opacity, may be produced, as in a mixture of air-bubbles and water. Such a mixture is also partly opaque to sound. The haze thus produced is ordinarily spoken of as *heat-haze*. (2) The ordinary hazy effect in the atmosphere produced by the presence of foreign particles, either solid or liquid. Minute particles of ice or water form an *aqueous haze;* all other material is included under the term *dust-haze*. The dust is raised from the ground by strong wind, by currents of hot air, and especially by volcanic eruptions; particles of salt left by the evaporation of salty water also produce dust-haze. The most delicate dust-haze is produced by myriads of shells and fragments of shells of diatoms and other microscopic forms of life living in fresh-water ponds and in marshes that are dried up at certain seasons of the year. The principal source of this dust is the interior of North Africa, whence it is carried outward in all directions, but especially westward and southward by dry Harmattan winds. A red dust-haze of a much coarser grade is carried by southerly winds from Northern Africa over into Europe, and in rare cases, as in March, 1901, this is carried to Northern Germany and England. Over India a cloud of yellowish dust-haze rises day by day higher and higher during the dry season, attaining a general level of from 2000 to 4000 feet, above which the air is comparatively clear. Dust-clouds of less extent are formed over the loess formations of China and North America. The great clouds of smoke from prairie and forest fires, as they subside, leave a hazy atmosphere due to the presence of fine particles of carbon, and it appears likely that each of these gathers to itself a special atmosphere of aqueous vapor, just as spongy platinum absorbs hydrogen. This haze occurs during Indian summer in America, and is known as the Moor-Rauch in Europe.

The finest dust-haze ordinarily produces a whitish or grayish tint in the sky; coarser particles produce buff and reddish tints. When the dust particles are exceedingly small and of regular

size, as when they are composed of a few molecules of water, so that their diameters are comparable with some wave-length of light, they produce the phenomena of selective reflection and refraction, giving to the sky its ordinary blue tint and forming glories of colored rings around the sun and moon. When they are a little larger they show the colors of thin plates, and when larger still they may by diffraction give rise to small glories and larger halos. The vapor-dust from the eruption of Krakatoa in 1883 spread over the north temperate zone, producing for a year or two magnificent sunset and sunrise tints and the Bishop's Ring, so called after its first observer, Sereno, Bishop of Honolulu. The eruption of Skaptar Jökul in 1783 furnished a similar cloud of aqueous haze and red sunsets to the greater part of Europe and North America; and the same phenomenon, although on a somewhat more restricted scale, followed the eruptions of Pelée on Martinique, and the Soufrière, on Saint Vincent, in 1902. The colors due to aqueous haze have been most thoroughly investigated by Prof. Carl Barus (see his "Colors of Cloudy Condensation," *United States Weather Bulletin* No. 12). The haze produced by volcanic eruption is described most fully in the *Report of the Krakatoa Commission* (London, 1887).

HAZEBROUCK, äz'brōōk'. The capital of an arrondissement in the Department of Nord, France, on the Bourre, 37 miles southeast of Calais by rail (Map: France, J 1). It has canal communication with the Lys, and is an important railway junction of lines to Calais, Lille, Ypres, Dunkirk, and Arras. It is a well-built town, with several fine buildings, including a sixteenth-century Augustinian convent, various sections of which are used for a hospital, a linen market, college lecture-rooms, and a tobacco warehouse; the Church of Saint Eloi, dating from 1493 is noted for its openwork spire, 260 feet high. There are several educational institutions and a public library. Linen, leather, beer, salt, soap, oil, and lime are manufactured, and an active agricultural trade is carried on. It is one of the most typical of Franco-Flemish towns, where the Flemish language still lingers. Its Flemish name, signifying 'the marsh of the hares,' is derived from the marshland on which the town is built. Population, in 1901, 13,261.

HAZELNUT, FILBERT, or COBNUT (AS. *hæsel*, Icel. *hasl*, OHG. *hasala*, Ger. *Hasel*, hazel; connected with Lat. *corulus*, OIr., Welsh *coll*, hazel), *Corylus*. A genus of trees and shrubs of the natural order Cupuliferæ, of which the fruit is a nut in a leafy and laciniated cup, the enlarged involucre of the female flower. The male flowers are in cylindrical catkins; the female flowers mere clusters of colored styles at the extremities of buds. The common hazel (*Corylus avellana*), Lambert's filbert (*Corylus tubulosa*), and the Constantinople hazel (*Corylus colurna*) are natives of all the temperate parts of Europe. Two species are native to the United States, the American hazel (*Corylus Americana*), and the beaked or California hazel (*Corylus rostrata*), neither of which is cultivated. Most of the cultivated varieties of the hazelnut are known by the names of cobnuts and filberts; the former generally of a roundish form, the latter characterized by the greater elongation and laciniation of the fruit-cup. The finer kinds of hazel are propagated by grafting and by layers. Hazel-plants for copses are obtained from seed. A Himalayan species of hazel (*Corylus ferox*) has a spiny fruit-cup and an excessively hard nut. Barcelona nuts are the nuts of a variety of the common hazel, kiln-dried before their exportation from Spain. This process preserves their agreeable flavor; indeed, without it the nuts could not be kept long, except in air-tight cases, a satisfactory method, without losing or exchanging this flavor for one of evident rancidity. The larva of a weevil (*Balaninus nucum*) feeds on the kernels of hazelnuts. The parent female makes a hole into the nut by means of her long snout, and there deposits an egg. Great numbers of nuts are thus destroyed.

HAZELNUT (LEAVES AND FRUITS).

Hazelnuts of improved varieties are grown to a considerable extent in the south of Europe, but only to a slight extent in America. Hazelnuts yield, on pressure, about half their weight of a bland fixed oil, often called *nut-oil*. Hazelnut oil has drying properties, and is much used by painters; it is also used by perfumers as a basis with which to mix expensive fragrant oils, and it has been employed medicinally in coughs. The wood of the hazel, although seldom large enough for the purpose of the carpenter, is very tough and flexible, and hazel rods are therefore much used for making crates, hurdles, hoops for small barrels, etc. The thicker stems of hazel are used for making charcoal, which is in demand for forges, and is much esteemed for the manufacture of gunpowder and for artists' crayons.

HAZELTINE, hā'zel-tīn, MAYO WILLIAMSON (1841—). An American journalist and reviewer, born in Boston, Mass. A graduate of Harvard and post-graduate student at Oxford, England, he practiced law until 1878, when he became literary editor of the New York *Sun*. His original publications include *Chats About Books, Poets, and Novelists* (1883), but he is best and very widely known for his reviews in the New York *Sun*.

HA'ZEN, WILLIAM BABCOCK (1830-87). An American soldier. He was born in West Hartford, Vt.; graduated at West Point in 1855, and served for a time on the frontier. In the spring of 1861 he was promoted captain in the regular

infantry; but he raised the Forty-first Regiment of Ohio Volunteers and went to the front as its colonel. He defended the Ohio border, fought in Kentucky, commanded a brigade in the movement by way of Nashville to Pittsburg Landing, won distinction at Shiloh, Corinth, and the battle of Stone River, and at Missionary Ridge captured eighteen pieces of artillery. He served through the Atlanta campaign, and commanded the Second Division of the Fifteenth Corps in Sherman's march through Georgia. He was promoted major-general of volunteers in 1864, for his services at the capture of Fort McAllister, and in the summer of 1865 he commanded the Fifteenth Army Corps. At the close of the war he was brevetted major-general, United States Army. He served on the frontier as colonel of infantry from 1865 to 1880, except during his stay in France, in the Franco-Prussian War, and at Vienna, as military attaché to the United States Legation during the Turko-Russian War. In 1880 he became chief signal officer, with the rank of brigadier-general. He did much to raise the character of the signal service, by employing expert physicists, electricians, and meteorologists, and by coöperating with State weather bureaus and scientific societies. By his efforts the present standard-time meridians were adopted. He also introduced the 'cold-wave' signals and the system of hourly weather bulletins. His publications include: *The School and the Army in Germany and France, with a Diary of Siege Life at Versailles* (1872); *Our Barren Lands* (1875); and *A Narrative of Military Service* (1885).

HA'ZLETON. A city in Luzerne County, Pa., 104 miles northwest of Philadelphia; on the Lehigh Valley, and other railroads (Map: Pennsylvania, E 3). It has a picturesque site at an elevation of 1700 feet, and enjoys some popularity as a summer resort. It is the seat of a State hospital for miners, and has a park. Hazleton is the centre of the anthracite coal district, and is extensively interested in coal-mining. Its silk-mills have become of considerable importance, and there are also knitting-mills, cornice-works, and coffin and casket factories. Settled in 1820, Hazleton was incorporated as a borough in 1840, and in 1890 was chartered as a city. The government is administered by a mayor, elected every three years, and a bicameral council. Most of the subordinate officials are chosen by the executive with the consent of the council, or elected by the council. Town meetings are held frequently on matters of political and general public interest. Population, in 1890, 11,872; in 1900, 14,230.

HAZLITT, hăz'lĭt, WILLIAM (1778-1830). A distinguished English critic and essayist. He was born at Maidstone, in Kent, April 10, 1778, where his father was then a Presbyterian minister, though afterwards a Unitarian. The latter went to America when Hazlitt was five years old, but returned three years later and settled at Wem, in Shropshire. The son was at first privately educated, and then sent to the Unitarian College at Hackney. He did not take kindly to Dissenting theology, and, after leaving college in 1795, spent the next few years at his father's house, dabbling in metaphysics and painting. His intellectual life, on the one hand, was keenly stimulated by his meeting with Coleridge in 1798, and by hearing the last sermon preached by the philosopher, which profoundly impressed him. His artistic tastes, on the other hand, led him to Paris in the winter of 1802. He spent his time there copying pictures in the Louvre, and, returning to London, took up the profession of portrait-painting. He attained no great success in this, but it brought him into literary and artistic society, of which on the latter side his *Conversations with Northcote* (1830), though belonging to a later period, are the best memorial, while on the former the association with Lamb, Hunt, and Godwin brought out the taste for pure literature, in which he was to win the triumphs denied him in the two fields of his earlier predilection. His grave *Essay on the Principles of Human Action* (1805), though his own favorite work, did not please the public. In 1808 he married, and settled at Winterslow, near Salisbury; but neither he nor his wife seems to have been well adapted for domestic life in the country. "Never, I suppose," writes his grandson, "was there a worse-assorted pair." The divorce, however, which finally separated them did not come until 1822. In 1812 Hazlitt came back to London, where at first he was Parliamentary reporter and dramatic critic for the *Morning Chronicle*. Presently, however, he found the line that suited him, and began to pour forth the remarkable series of literary criticisms on which his highest fame rests. With Leigh Hunt he tried in the *Examiner*, in 1815, to revive the glories of the *Spectator* and the *Tatler;* the best of the essays thus produced were published in 1817 under the title of *The Round Table*. Of high significance, also, are *Characters of Shakespeare's Plays* (1817); *A Review of the English Stage* (1818); *Lectures on the English Comic Writers* (1819); and *Lectures on the Dramatic Literature of the Reign of Queen Elizabeth* (1821). Coming at a time when Coleridge had just begun really to make people see what was in Shakespeare, and aiding Lamb and Hunt to recall to the memories of Englishmen the glories of their half-forgotten golden age, his criticism was of the highest importance; and he joined with the two last named in establishing an easy, flowing, familiar style of prose which was to have great results throughout the remainder of the century. Saintsbury has recently said unhesitatingly that "long before Sainte-Beuve, Hazlitt had shown a genius for real criticism, as distinguished from barren formula-making, which no critic has since surpassed;" and Stevenson, the most charming practitioner in the same prose style, takes his leave of him with "though we are mighty fine fellows nowadays, we cannot write like Hazlitt." He and his group show in criticism the effects of the Romantic movement—a widening of the judgment, an importation of human sympathy and the personal equation, and a combination of philosophic discussion of life with bookish details. His temperament was uneven and self-tormenting; it estranged him more or less from all his friends, even for a time from Lamb. One of the most curious episodes in his career is the romantic passion which he conceived for a very ordinary girl, Sarah Walker by name, of a menial station and no attractions that others could see; Hazlitt recorded his emotions during its progress in a little book of extreme interest as a psychological document, called *Liber Amoris, or the New Pyg-*

malion (1823; new ed. New York, 1902). Soon after his divorce, he married a widow, apparently on a sudden impulse, but after a year's travel on the Continent they, too, separated. The most important literary works of his later life are: *Table Talk* (1821); *The Spirit of the Age* (1825); *The Plain Speaker* (1826); and *Sketches and Essays* (1829). His *Life of Napoleon*, of whom he was an ardent admirer, was neither a literary nor a financial success. Disappointed and harassed by anxieties, he died on September 18, 1830, with Charles Lamb at his bedside; his last words, despite all that he had suffered, were, "Well, I've had a happy life." Consult: W. C. Hazlitt, *Memoirs* (London, 1867); an excellent volume of selections in the Cavendish Library (ib., 1889), with introduction by A. Ireland, who has also compiled a *List of the Writings of Hazlitt and Hunt* (ib., 1868); his *Life* by A. Birrell, in the "English Men of Letters Series" (ib., 1902); also essays by Saintsbury in *Essays in English Literature, 1780-1860*, 1st series (ib., 1890), and by Leslie Stephen in *Hours in a Library*, 2d series (ib., 1877). A complete edition of his works, in 12 vols., was published in 1902, with an introduction by W. E. Henley.

HAZLITT, William (1811-93). An English writer, son of the essayist. He became a lawyer and was appointed registrar of the Court of Bankruptcy in London in 1854. He edited the writings of his father, and made translations of some of the works of Guizot, Thierry, Huc, and others. He also reëdited *Johnson's Lives of the Poets*, and assisted in compiling a *Manual of Maritime Warfare*. Consult W. C. Hazlitt (his son), *Four Generations of a Literary Family* (London, 1897).

HAZLITT, William Carew (1834—). An English man of letters, grandson of the essayist. He was born in London, studied law and civil engineering; but became a journalist, and finally devoted himself to literature, including bibliography, history, archæology, and numismatics. His works include: a *History of the Venetian Republic* (4 vols., 1860); *Memoirs of William Hazlitt* (2 vols., 1867); *Poems* (1877); *Offspring of Thought and Solitude*, essays (1884); *The Livery Companies of London* (1892); *Coins of Europe* (1893-97); *Coin Collector* (1896); *Four Generations of a Literary Family* (2 vols., 1897); *The Lambs: Their Lives, Their Friends, and Their Correspondence* (1897); and *Lamb and Hazlitt* (1899). He also edited a large variety of dramatic and poetical works, such as *Dodsley's Old Plays* (15 vols., 1874-76), and *Shakespeare's Library* (5 vols.); has edited *Lamb's Letters* (1886), and a number of volumes of *Bibliographical Collections and Notes* (1867-92).

HEAD. See Skull; Nervous System.

HEAD, Barclay Vincent (1844—). An English numismatist, born at Ipswich, and educated there at Saint Elizabeth's School. He was made assistant in the British Museum in 1864, and in 1893 keeper of the department of coins and medals. He was a member of the Imperial German Archæological Institute, a *lauréat* of the French Institute, and joint editor of the *Numismatic Chronicle*. He wrote: a history of Greek coinage, in single volumes (1874-1901); a *Guide to the Coins of the Ancients* (1881); *The Young Collector's Handbook of Greek and Roman Coins* (1883); the very valuable manual, *Historia Numorum* (1887); and *A Guide to the Principal Gold and Silver Coins of the Ancients in the British Museum* (4th ed. 1895).

HEAD, Sir Edmund Walker (1805-68). An English Governor-General of Canada. He was born near Maidstone, Kent, was educated at Winchester and Oxford, and was a fellow at Merton College (1830-37), a University examiner, and a law student. Succeeding to his father's title in 1838, he was a Poor-Law Commissioner in 1841, went to New Brunswick six years later as Lieutenant-Governor, and from 1854 to 1861 was Governor-General of Canada. By that time the different provinces controlled their own affairs, so that the personal character of the Governor was a matter of small moment; but during Sir Edmund's term of office the clergy reserves and seigneurial tenures were abolished, the Victoria Bridge at Montreal built, and Ottawa was chosen by the Queen as capital of Canada. After his return to England he was made a civil-service commissioner. He published a *Handbook of Painting of the German, Dutch, Spanish, and French Schools* (1848); *The Temple of Serapis at Pozzuoli* (1858); *Viga Glum*, a translation of an Iceland story (1866). His poetical contributions to *Fraser's Magazine* were published posthumously in 1868.

HEAD, Sir Francis Bond (1793-1875). An English colonial Governor and author, of Portuguese-Jewish descent. He was born at the Hermitage, Higham, Kent, and was educated at Rochester and in the Woolwich Military Academy, where he was made first lieutenant of engineers in 1811. He saw service on the Continent, and was at the battle of Waterloo, but retired on half pay in 1825, when he went to South America to prospect in gold and silver mines. His first work recounted his experiences under the title, *Rough Notes of a Journey in the Pampas and Andes* (1828), and the rapidity of his traveling gained him the nickname 'Galloping Head.' In 1835-37 he was Lieutenant-Governor of Upper Canada. Knowing nothing of the political situation of the country, he opposed the union of the provinces, and assumed that a popular desire for responsible government merely indicated a desire for annexation to the United States. He fancied he could govern without the aid of his council, and through his bad judgment and want of tact seems to have been largely to blame for the Upper Canadian share in the rebellion of 1837. He was made a baronet in 1837. Among his published works are: *Life of James Bruce* (1830); *Bubbles from the Brunnen of Nassau* (1833); *The Emigrant* (1846); *Stokers and Pokers* (1849); *Defenceless State of Great Britain* (1850); *Fagot of French Sticks* (1852); *The Horse and His Rider* (1860); *The Royal Engineer* (1869); *Sketch of the Life of Sir J. M. Burgoyne* (1872).

HEAD, Sir George (1782-1855). An English traveler, elder brother of Sir Francis Bond Head. He was born in Higham Parish, Kent, was educated at the Charterhouse School, and went to the Peninsular War as a commissary clerk, rising gradually to be next to the head of the commissariat in 1814. This experience provided material for his *Memoirs of an Assistant Commissary-General* (1837), while from his five years' service in Halifax he gleaned *Forest Scen-*

ery and Incidents in the Wilds of North America (1829). William IV. knighted him (1831), and Queen Victoria made him her deputy knight-marshal. He was known best as the author of *A Home Tour Through the Manufacturing Districts of England*, and *A Home Tour Through Various Parts of the United Kingdom*, reprinted, in one volume, in 1840.

HEADACHE, medically termed CEPHALALGIA. A pain in any part of the head except the face. It is a symptom of heat-stroke, cerebral apoplexy, eye-strain, nasal disease, middle-ear or internal-ear disease, uterine disease, neurasthenia, etc. Treatment of headache as a disease, or by the use of 'headache powders' so commonly sold, is therefore ridiculous. The most severe headaches are those accompanying meningitis or brain diseases, tumor of the brain usually causing great suffering; these are generally brow or vertex headaches. Many fevers, such as typhoid, have a severe general headache as a symptom. Sufferers from Bright's disease have daily frontal headache in many instances. Eye-strain and gastric dyspepsia cause headache referred to the brows. The headache of constipation or of caries of front teeth is generally experienced over the brows and temples; that of anæmia, or bladder disease, or endometritis, at the vertex; that of carious back teeth, eye-strain, and middle-ear disease, at the temple as well as at the mastoid cells behind the ear; that of neurasthenia generally at the base of the occiput, though also at the brow; while derangement of the liver causes pain which may be felt over the whole occiput. Syphilis and malaria are also causes of headache of irregular distribution. Migraine (q.v.) is a headache affecting one side of the head and accompanied by nausea and vomiting and other symptoms, and is due to nerve fag, gout, indigestion, or eye-strain, or malaria in people of nervous diathesis. Gout is a frequent cause of headache, as is also alcoholic indulgence. Domestic treatment of headache should begin with copious draughts of water and a cathartic, with rest in the recumbent position in the dark, and abstinence from food for a few hours. Drugs, especially narcotics, should be taken only upon a physician's advice after study of the sufferer's environment, vocation, diet, and physical condition. Frequent use of strong alleviatives is often undermining and damaging. Among the drugs used are aconite, belladonna, antipyrin, acetanilid, codeia, morphia, phenacetin, bromides, chloral, cannabis indica, ergot, ichthyol, apiol, mineral acids, creosote, salol, salicylic acid, iodides, strychnine, nitroglycerin, quinine, alkalies, digestants, and cathartics. See HEMICRANIA.

HEADDRESS. Among sociological badges, the headdress is of great interest. At first view its importance is not apparent, but its connections with the advancement of humanity are numerous and varied. As distinguished from the clothing of the body, which may arise from the desire for ornament, for comfort, or for protection, the headdress was a distinctive mark, representing the organization of groups of men in primitive times. The sexes also were thus discriminated. This feature has persisted to this day, though it is now giving way before the unifying powers at work on the race.

In the study of headdresses there must be taken into consideration the varieties of natural head-covering, which determine the extent of the use of the artificial headdress, the environment regulating the materials and the need of protecting the head from cold, heat, rain, etc. To these must be added the degree and course of the advancement of the peoples, their religious beliefs and customs, and in greatest measure the æsthetic sense which pervades and modifies all these classes. It will be seen that the treatment of the headdress of different peoples requires the closest attention to these details, which render it one of the most difficult and elusive subjects connected with the study of man.

As Deniker remarks, the nature of the hair in the different divisions of mankind furnishes the broad groundwork for headdress. People with woolly hair, as the negroes, arrange it in the most complicated fashion. Smooth-haired peoples allow it to flow behind, as the Malays and some Americans, or gather it in plaits, whorls, chignons, rolls, as among the Eskimo, Koreans, Japanese, Chinese. The fuzzy-haired peoples of North Africa and Melanesia reach the acme with their great mops fantastically arranged. Following the almost instinctive desire of the human race to improve on nature, to alter and make distinctive the hair, we have dyeing, plastering with clay or oils, and the wearing of wigs practiced by many tribes. On the other hand, among lower tribes, as the Australians and Veddahs, little attention is paid to the hair, which remains in its primitive luxuriance and untidiness. To the hair are also attached feathers, flowers, etc., often as ornaments, but most frequently as a badge or token, familiar in the plumes of the North American Indians.

Perhaps the most primitive headdress, well nigh universal among smooth-haired peoples, is the fillet, originating in the need of securing the hair, and by its material, color, and other characters serving as a badge. The fillet thus appears to be the ancestor of all hats. The ancient Chinese, as well as the Greeks, were fillet-makers, and the custom survives in the present, while many people have discarded the custom within recent times. The turban is a development of the fillet. From the fillet most headdresses arose by additions horizontally or vertically, the structure remaining crownless for a long period. Witness the well-known intolerance of open-air peoples for that feature. It is probable that devices for holding the feather or bunch of feathers in the hair may have developed certain types of headdress. The types of headdress in most instances, instead of being the result of caprice or fashion, as the word is understood at present, have each an extended history. Petrie found recently in Egypt a specimen of headgear similar in style to the present Panama hat, dating about one century before the Christian Era. The history of this hat may, in geographical terms, be expressed thus: Egypt, Morocco, Spain, the New World, a line of the migration of customs and costumes that will answer for many transplantings in the Western Hemisphere. The more important of man's activities that have distinctive classes of headdress are the chase, war, rank, social position, and religious ceremony. Protection may also be mentioned as more particularly an outgrowth of environment, the ears rather than the head being covered from both heat and cold. The headdress of hunting tribes embraces features connected with stalking of

game and fetishism, as well as the shading of the eyes and of the head.

The headgear of war, originally designed to strike terror into the enemy, as well as to show rank, is represented by the helmet. A much wider range of headdress marks rank and social position. This class has its highest development in the Orient, as in Eastern Turkestan and Korea, for instance, where the headdress of each individual is an index of his standing. In ceremony the most extensive and interesting phase of this subject is presented. We have here repeated the ranks from priest-king, through priest to worshiper, the head-covering for different ceremonies, and as belonging to the hosts of spiritual beings. With this also are connected the class of masks, which are largely, if not entirely, to be taken as headdresses. It will be found that each of the divisions presented has its own ceremonial headdresses, as in the chase the Aleut hunter wears a large visor covered with ivory representations of game animals.

HEAD-HUNTING. See DYAK.

HEADLEY, hĕd'lĭ, JOEL TYLER (1813-97). An American historical writer. He was born in Walton, N. Y.; graduated at Union College in 1839; studied at the Auburn Theological Seminary; and was for a time pastor of a church in Stockbridge, Mass. His health soon failing, he traveled in Europe, and then joined the editorial staff of the New York *Tribune*. Soon, however, he was compelled to spend a considerable portion of every year in the Adirondacks for his health. His newspaper letters on the region, afterwards published as *The Adirondacks, or Life in the Woods* (1849), are said to have been the first to attract attention to that region as a health resort. Among his works are: *Napoleon and His Marshals* (2 vols., 1846); *Washington and His Generals* (1847); *Life of Cromwell* (1848); *Life of Washington* (1857) which was at one time exceedingly popular; *Chaplains of the Revolution* (1861); *The Great Rebellion* (2 vols., 1864); *Grant and Sherman: Their Campaigns and Generals* (1865); *Farragut and Our Naval Commanders* (1867); and *The Achievements of Stanley and Other African Explorers* (1877).

HEADLEY, PHINEAS CAMP (1819-1903). An American clergyman and biographer, born in Walton, N. Y. He was admitted to the bar before studying for the ministry at Auburn Seminary. In 1850 he published *Historical and Descriptive Sketches of the Women of the Bible*, and his other publications include: *Empress Josephine* (1851); *Kossuth* (1852); *Lafayette* (1853); *Ericsson* (1863); *General Sheridan* and *Admiral Farragut* (1864); *General Sherman* (1865); *General Grant* (1866); and *Public Men of To-Day* (1882), besides contributions to periodical literature and books suitable for Sunday schools, such as *Half-Hours in Bible Lands* (1867).

HEADLONG HALL. A satirical novel, interspersed with lyrics, by Thomas Love Peacock, published in 1816.

HEAD-MONEY TAX. The term applied to a tax levied by an act of Congress, passed in August, 1882, which provided that there should be collected "a duty of fifty cents for each and every passenger, not a citizen of the United States, who shall come by steam or sail vessel from a foreign port to any port within the United States. . . . The money thus collected shall be paid in to the United States Treasury, and shall constitute a fund to be called the Immigrant Fund, and shall be used, under the direction of the Secretary of the Treasury, to defray the expense of regulating immigration under this act, and for the care of immigrants arriving in the United States," etc. This act of Congress is similar in its essential features to statutes enacted by many States of the Union for the protection of their own citizens, and for the good of the immigrants who land at seaports within their borders. A statute of New York covering this ground was, however, held void as infringing upon the ground of national legislation (92 U. S. Rep., p. 259, and 107 U. S. Rep., p. 59). The questions arising under the act of Congress were considered by the Supreme Court of the United States in what were called the Head-Money cases (112 U. S. Rep., p. 580), and the act was held valid. In 1894 the tax was increased to $1 per head. See IMMIGRATION.

HEADSMAN, THE. A novel by J. Fenimore Cooper (1833), the story of the hereditary executioner of Berne, in the course of which scenes in Switzerland and Italy are introduced.

HEADSTONE, BRADLEY. A schoolmaster in Dickens's *Our Mutual Friend*, with the physique of a giant and the sensitiveness of a child. As the teacher of young Hexam, he meets Lizzie, falls in love with her, and attempts to murder Wrayburn, her lackadaisical sweetheart, through jealousy.

HEALD. See HEDDLE.

HEALEY, GEORGE PETER ALEXANDER (1808-94). An American historical and portrait painter. He was born at Boston, July 15, 1808, and studied in Paris under Gros and Couture. At the Paris Salon in 1840 he received the third-class medal, and at the Exposition of 1855 the second-class medal. He returned to the United States in 1858, going to Chicago, where he resided until 1867. After this he went to Rome, and in 1885 he opened a studio in Paris, where the last years of his life were spent. He died at Chicago, June 24, 1894.

Healey is one of the best American portrait painters of the French school; his style is vigorous, but his color is not good. His chief historical works are: "Franklin Urging the Claims of the American Colonies Before Louis XVI." (1855); "Webster's Reply to Hayne," Faneuil Hall, Boston, containing 130 portraits. Some of the best-known portraits are: M. Guyot (1841, Smithsonian Institution); Pius IX. (1871); Louis Philippe, General Grant (1878); Webster, Clay, Calhoun; Presidents Quincy Adams, Jackson, Van Buren, Tyler, Taylor, Fillmore, Pierce, Polk, Buchanan, and Lincoln, all in Corcoran Gallery, Washington; William H. Seward, State Library, Albany; James Lenox (1851), in the Lenox Library, New York. In the Metropolitan Museum are the portraits of Archbishop Hughes, "A Lady," Comte de Paris, and "The Artist."

HEALTH (AS. *hælþ*, from *hāl*, Goth. *hails*, OHG., Ger. *heil*, Eng. *whole;* connected with OChurch Slav. *cĕlŭ*, whole, OPruss. *kailāstikan*, health, OIr. *cēl*, augury, and probably with Skt. *śiva*, healthful, kind). The condition of a living body in which all the tissues are in a state of

soundness or integrity, and the organs perform their functions normally; in which waste and repair go on progressively, and in which proper growth or retrograde metabolism occurs, according to the age of the individual, disease being absent. Disease is present when the integrity of the blood or of other tissues is impaired, where function is disordered, or where excessive growth or abnormal retrogression and decay occur. Perfect health is rarely seen, and never continues for any considerable portion of life in the artificial conditions of modern existence among civilized people. Health is therefore a comparative term.

Health officers are elected or appointed in all towns of any size in the United States, whose duty it is to limit the spread and prevent the invasion of disease, to enforce sanitary laws, and take all precautions to safeguard the health of citizens.

The reports of occurrence of disease and death are recorded by county, State, and national health officials. For the records of the most dangerous diseases, see VITAL STATISTICS. For the consideration of measures to safeguard the public health, see SANITARY SCIENCE; and for a consideration of the laws of health, see HYGIENE.

HEALTH, BILL OF. In shipping, a certificate of a consul, etc., as to the health of the crew, when the ship has come from a suspected port. A clean bill, a suspected bill, and a foul bill, are the three short names given to the several degrees of health.

HEALTH, BOARDS OF. Institutions organized under Government and deriving powers from the laws for the purpose of protecting the health of the citizens.

MUNICIPAL BOARDS OF HEALTH. These are created for the purpose of controlling and repressing agencies which undermine the health of the residents of a city or a municipality. The function of such a board is to adopt ordinances which compose a sanitary code, under which certain measures may be enforced, and the authority of the officers of the board may be maintained. Such a code includes provisions for the prevention of fraud and pretense in the preparation and sale of medicines, or of the sale of poisons except for lawful uses and purposes; of adulteration of coffees, teas, and other preparations from which beverages are made; for the control of the construction of buildings, ventilation, drainage, and plumbing; for the control of the sale of food and drink, to prevent stale, unwholesome, or unhealthy food, as well as adulterated or watered milk, from being offered in the market; to control the passage of cattle, horses, or any dangerous or offensive animals through the public streets; to regulate slaughtering and slaughter-houses; to exercise care over sidewalks in streets; to regulate the sanitary condition of pounds; to kill animals afflicted with hydrophobia; to prevent or limit offensive odors and liquids from any source; to provide for proper accumulation and removal of filth and dirt; to prevent diseased animals from being brought into the city, or dead, sick, or injured animals to be left in the streets; to provide for the notification of contagious and infectious diseases; to control the unloading of vessels, the removal of sick persons, vaccination, exposure to disease, handling and interment of dead bodies; to outline the duties of coroners; to secure the reporting of vital statistics; to regulate matters relating to vehicles used for passenger transportation; and to control noise, expectoration in public conveyances, life-lines at bathing-places, etc.

As an example of a municipal board of health, the organization of the Health Department in New York City may be described, as it has existed since the adoption of the charter creating the Greater New York. In chapter xix. of this charter the several powers and duties of the health officers are set forth in detail. The head of the department is called the president of the Board of Health. The board consists of a single Commissioner of Health, Commissioner of Police, and the Health Officer of the Port. The Commissioner of Health is appointed by the Mayor (as is also the Commissioner of Police), and is the president of the board, and the executive officer. He may or may not be a physician. The first appointee in 1902 was a chemist and sanitary expert, Dr. Ernest J. Lederle.

Two bureaus have been established under the act of Legislature. The chief executive officer of one is called the Sanitary Superintendent, who at the time of his appointment must have been for at least ten years a practicing physician, and for three years a resident of the city. The chief officer of the second bureau is the Registrar of Records. An office of the Board of Health is established in each of the different boroughs of the city, wherein the business of the department is transacted. An assistant sanitary superintendent and an assistant registrar of records are appointed for each borough. Similar municipal boards of health exist in other cities.

STATE BOARDS OF HEALTH. These are institutions established by State legislative enactments, having many specific relations to the public health, and intended to have a central advisory relation to the local sanitary organizations, and also to supervise a State system of vital statistics. In 1900 there were 43 State boards in existence in the States and Territories of this country. The first organization under this name in the United States was established in Louisiana in 1855, but under the present acceptation of the term it was not to be classed with the average State Board of Health, as it was created for the sole purpose of maintaining a quarantine for the protection of New Orleans. Following are the dates in which boards of health were established in the different States and Territories: Massachusetts, 1869, under a law for which successive Legislatures had been asked since 1856; California, 1870; Virginia and Minnesota, 1872; Michigan, 1873; Maryland, 1874; Alabama and Georgia, 1875; Colorado and Wisconsin, 1876; Mississippi, New Jersey, Tennessee, and Illinois, 1877; Connecticut, Kentucky, Rhode Island, and South Carolina, 1878; Delaware and North Carolina, 1879; Iowa and New York, 1880; Arkansas, Indiana, West Virginia, and New Hampshire, 1881; Missouri, 1883; Maine, Kansas, and Pennsylvania, 1885; Ohio and Vermont, 1886; Florida and North Dakota, 1889; Nebraska, Washington, Oklahoma, and South Dakota, 1891; Nevada, 1893; New Mexico, 1895; and Utah, 1898.

As an example of the organization of a State Board of Health that of New York may be mentioned, which is composed of a single commissioner, assisted by a secretary, a chief clerk, a

medical expert, a pathologist and bacteriologist, a director of the Bureau of Chemistry, a director of the Cancer Laboratory, a director of the Antitoxin Laboratory, a registrar of vital statistics, a consulting ophthalmologist, and a consulting engineer.

NATIONAL BOARD OF HEALTH. A National Board of Health was organized in 1879. At the end of four years this board went out of existence, having investigated diseases of food-producing animals, adulteration of food and drugs, disposal of sewage, establishing quarantine, and securing consular reports regarding disease and sanitation. At present these labors are performed by the Bureau of Animal Industry, various food commissioners, and the United States Marine Hospital Service, which is connected with the Department of the Interior. Some Congressmen favor a proposition to create a National Board of Health, at whose head shall be a Secretary of Health, who shall be a member of the Cabinet.

HEALTH ASSOCIATION, AMERICAN PUBLIC. On April 18, 1872, an informal conference was held in the city of New York of representatives of five States and five cities, at which a committee was appointed to draw up a constitution for the organization of a national institution for the promotion of sanitary science. The committee made its report at a subsequent meeting, held September 12th and 13th, at which there were representatives from New York, Pennsylvania, Ohio, Illinois, Louisiana, Connecticut, Rhode Island, and the District of Columbia. A constitution was adopted and officers elected. This constitution was slightly amended at the next annual meeting, held in New York, November, 1873, and contained among its provisions the following: "The officers shall be a president, a first and second vice-president, a secretary, and a treasurer. All the officers shall be elected by ballot annually, except the secretary, who shall be elected for a term of three years." A standing executive committee consists of "the president, first vice-president, secretary and treasurer, and six members annually elected by ballot." The objects of the association are to a great extent served by annual meetings, when matters of importance relating in various ways to sanitary science are discussed, the essays and addresses being published in an octavo volume of from four to five hundred pages. Meetings of this body have been held regularly up to the time of the publication of this volume. Regular proceedings have been published, which may be consulted for the details concerning the papers read and discussed. The association has exerted considerable influence in the improvement of the sanitary condition of the country.

HEALTHS, DRINKING. See DRINKING USAGES; TOASTS.

HEA'LY, TIMOTHY MICHAEL (1855—). An Irish Nationalist and member of the British Parliament. He was born at Bantry, Ireland, and until thirteen years of age was educated at the Christian Brothers' School, Fermoy; after which he became a clerk in a business house, and then a stenographer on the North Eastern Railway, at Newcastle-on-Tyne. Previous to 1878 he had been a frequent contributor to the press, but in that year went to London to write a weekly letter for the Dublin *Nation*. In 1880, associated with Mr. Parnell and Mr. Dillon, he made a lecture tour of the United States. On his return to England he was arrested for utterances made in a speech at Bantry; was elected unopposed from Wexford Borough; went to his trial in December, and was acquitted. The 'Healy Clause' in the Land Act in 1881, enacting that no landlord should levy rent on improvements made by the tenant, was due to him. He attended the Land League Convention in Chicago in 1881, when $250,000 were voted to aid the Irish cause. After speaking in all the principal cities in America he returned to England, was cited to appear before the Queen's Bench, and, refusing to give bail, was sentenced to six months' imprisonment, but released at the end of four months. He has represented Wexford, Monaghan, South Derry, and North Louth in Parliament. In 1891 he opposed Mr. Parnell; and in 1895 was expelled from the Parliamentary Committee. He was made King's Counsel in 1899, having been admitted to the Irish bar in 1884. In 1900 he was instrumental in ending the Parnellite difficulties by the nomination of Mr. Redmond as chairman of the reunited Irish Party. He wrote *A Word for Ireland* (1886), and text-books on the Land Acts.

HEANOR, hē'nēr. A town in Derbyshire, England, 8 miles northeast of Derby (Map: England, E 4). It has important coal-mining and iron-manufacturing industries. Population, in 1891, 13,600; in 1901, 16,250.

HEAP, CHARLES SWINNERTON (1847—). An English musician, born at Birmingham. He won the Mendelssohn scholarship, and studied at the Leipzig Conservatory under Moscheles, Hauptmann, and Richter, and became on his return to England, in 1867, a pupil of the distinguished organist W. T. Best. He was conductor of the Birmingham Philharmonic Society (1870-86), the Stafford Society, the Wolverhampton Musical Festival, the North Staffordshire Festival (1888—), and in 1897 became chorus-master of the Birmingham Festival. He received the degree of Doctor of Music from Cambridge in 1872. Among his compositions are the cantatas, *The Maid of Astolat* (1886) and *Fair Rosamond* (1890), the oratorio, *The Captivity;* numerous sonatas, anthems, organ-pieces, and songs.

HEAP, DAVID PORTER (1843—). An American engineer, born in San Stefano, Turkey. He was educated at Georgetown College, District of Columbia, and at West Point, where he graduated in 1864. During the remainder of the Civil War he served with the engineer corps of the Army of the Potomac, and was brevetted captain on April 2, 1865. Two years afterwards he received his commission as captain; in 1883 he was made a major, and in 1895 a lieutenant-colonel of engineers. After the war he was chiefly employed in building fortifications and improving harbors. He explored the Yellowstone National Park in 1871, and ten years afterwards was the military representative of the United States at the Paris Congress of Electricians. His publications include: *History of the Application of the Electric Light to Lighting the Coasts of France* (1883); *Electrical Appliances of the Present Day* (1884); *Ancient and Modern Lighthouses* (1887).

HEARING (from *hear*, AS. *hȳren*, *hēran*, Goth. *hausjan*, OHG, *hōrren*, Ger. *hören*, to hear,

connected with Gk. ἀκούειν, *akouein*, to hear, and possibly ultimately with Eng. *ear*). In its broadest sense, any judicial examination of the issues in a legal proceeding, whether those issues are presented in a formal action at law, in a suit in equity, or upon a motion, or upon the appearance of one party only. Specifically, however, the term 'hearing' signifies the proceeding in an equity suit, which corresponds to a 'trial' in an action at law. See TRIAL; PROCEDURE.

HEARING. See AUDITION; EAR.

HEARN, hērn, LAFCADIO (1850—). An American author, born in the Ionian Islands, the son of an Englishman and a Greek woman. He was educated in England and France, came to the United States, and engaged in journalism, first in Cincinnati, then in New Orleans, and New York. After winning quite a reputation for his powers of picturesque description, he went to teach in the University of Tokyo, and became a citizen of Japan. Among his writings are: *Chita: A Memory of Last Island* (1889); *Two Years in French West Indies* (1890); *Youma, the Story of a West Indian Slave* (1890); and, since his going to Japan, *Out of the East* (1894); *Glimpses of Unfamiliar Japan* (1895); *Reveries and Studies in New Japan, Kokovo* (1896); *Hints and Echoes of Japanese Inner Life, Exotics and Retrospectives, Gleanings in Buddha Fields* (1897); *Shadowings* (1900); and *Kotto* (1902).

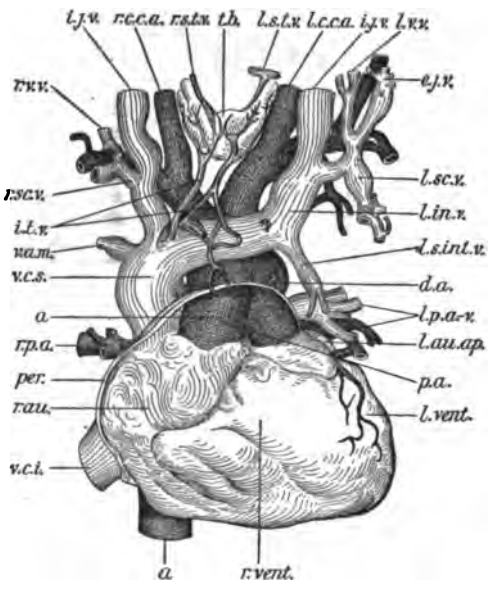
HEARNE, THOMAS (1678-1735). An English antiquary, born at White Waltham, Berkshire, and educated at Oxford, where he passed his life at Saint Edmund Hall. He was appointed second keeper of the Bodleian Library in 1712, but lost his post and all hope of university preferment, owing to his inability to swear allegiance to the House of Hanover. He superintended the publication of a large number of chronicle histories and similar works; as Leland's *Itinerary* (1710-12); Alred's *Annales* (1716); Camden's *Annales* (1717); and Robert of Gloucester's *Chronicle* (1724). From 1705 to within a few days of his death, he kept an extensive diary, the manuscript of which fills 145 volumes. The most valuable parts of it are being published for the Oxford Historical Society under the editorship of C. E. Doble. Pope gave Hearne an undeserved place in the *Dunciad* (iii., 185-90).

HEARSAY EVIDENCE. See EVIDENCE.

HEARSAY RULE. In the law of evidence, the rule that excludes hearsay testimony upon the trial of an action; i.e. second-hand evidence, or that in which the materiality depends upon facts stated to the witness by another and not those observed by himself. Thus, if A as a witness testifies that B told him that C was present at the scene of an accident, this evidence is inadmissible, if the material fact is the presence of C at the accident; but if the material fact were that B made the statement to A, the evidence would be material. See further under EVIDENCE.

HEARSE, or **HERSE** (OF. *herce*, Fr. *herse*, It. *erpice*, ML. *hercia, hersia*, harrow, from Lat. *hirpex*, harrow). A name now used to designate the conveyance in which a coffin is borne to the grave. It had originally quite a different meaning. The term was formerly applied to a metal grating or spike fence with upright spikes for the reception of candles for illumination and the hanging of decorative draperies around a tomb, or at a gateway. Afterwards it was used at the ceremonies of the Church and at funeral services. It was very simple in form, but in the fifteenth and sixteenth centuries hearses of great splendor came into use, and were erected in the churches over the bodies of distinguished personages. They were often of metal, and the permanent adjunct to tombs. At other tombs they were around the altar. The framework was of wood, iron, or brass, sometimes of beautiful workmanship, square, octagonal, etc., in plan, with pillars at the angles and arched framework above forming a canopy. The whole was hung over with rich cloths and embroidery, banners, and coats of arms, and lighted up with hundreds of wax candles and decorated with wax images. Such hearses were used at public funerals and set up in the streets. They were temporary. From this the transition to the modern funeral hearse can be easily traced. In Roman Catholic churches of the present day the hearse still exists as a triangle with spikes, on which candles are placed.

HEART (AS. *heorte*, Goth. *haírtō*, OHG. *herza*, Ger. *Herz;* connected with Lat. *cor*, Gk. καρδία, *kardia*, Lith. *szirdis*, OChurch Slav. *sridĭce*, Arm. *sirt*, heart; probably connected with Skt. *hṛdaya*, Ar. *zərəδaya*, heart, or with Skt. *śraddhā*, Lat. *credere*, to trust). A muscular



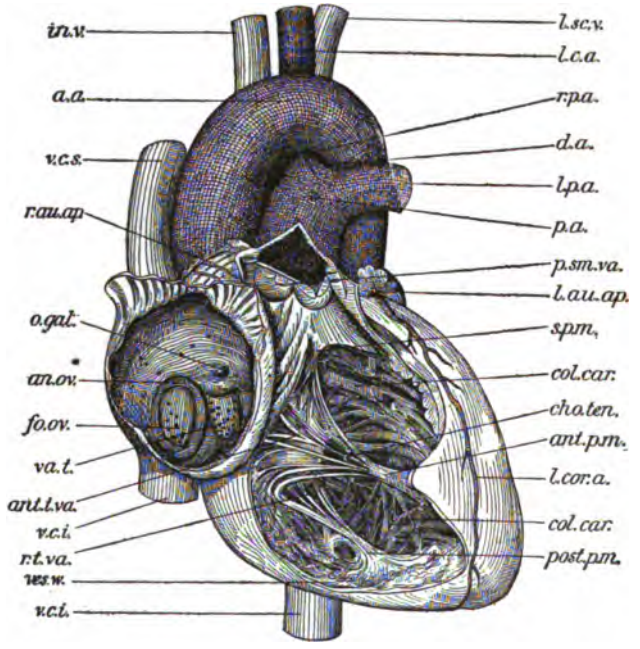
ANTERIOR VIEW OF THE HEART WITH THE LARGER BLOOD-VESSELS.

l.j.v., internal jugular vein; *r.c.c.a.*, right common carotid artery; *r.s.t.v.*, right superior thyroid vein; *r.v.v.*, right vertebral vein; *i.j.v.*, internal jugular veins; *r.s.c.v.*, right subclavian vein; *l.t.v.*, inferior thyroid vein; *v.a.m.*, vena azygos major; *v.c.s.*, vena cava superior; *a.*, aorta; *r.p.a.*, right pulmonary artery; *per.*, cut edge of pericardium; *r.au.*, right auricle; *v.c.i.*, vena cava inferior; *r.vent.*, right ventricle; *t.b.*, thyroid body; *l.s.t.v.*, left superior thyroid vein; *l.c.c.a.*, left common carotid artery; *l.v.v.*, left vertebral vein; *e.j.v.*, external jugular vein; *l.sc.v.*, left subclavian vein; *l.in.v.*, left innominate vein; *l.s.int.v.*, left superior intercostal vein; *d.a.*, ductus arteriosus; *l.p.a.-v.*, left pulmonary artery and vein; *l.au.ap.*, left auricular appendix; *p.a.*, left pulmonary artery; *l.vent.*, left ventricle.

organ situated in the thorax, occupying part of the space between the lungs, and acting as a pump for propelling the blood to all parts of the

body. It is a four-chambered organ, consisting of two upper parts, the right and left auricles, and two lower parts, the right and left ventricles. This article will be confined to a description of the human heart. It is cone-shaped and flattened, and in the adult lies obliquely behind the lower two-thirds of the sternum, projecting considerably to the left. Its base is upward, and directed somewhat backward, and is situated practically at the level of the third intercostal space. Its apex is directed to the left, downward and forward, and reaches the space between the fifth and sixth costal cartilages. The heart is so tilted that the margin of its right ventricle lies upon the central tendon of the diaphragm. The adult heart is about five inches from base to apex, by three and one-half inches across the base, by two and one-half inches thick. Its weight is, in the male eleven ounces, and in the female about nine ounces.

The right auricle receives the venous blood from the venæ cavæ and empties it into the right ventricle. The auricle presents a central cavity or sinus of nearly quadrangular shape and a small appendix somewhat resembling a dog's ear, and called the auricular appendix. The walls of the auricle are composed of two layers of muscular fibre and are very thin. The left auricle resembles its fellow of the right side. It receives the blood from the lungs through the four pulmonary veins, which empty, without valves, by four distinct openings. It opens into the corresponding ventricle by means of the left auriculo-ventricular orifice. Each auricle holds within its cavity, moderately distended, about two ounces of fluid. The ventricles, which constitute the bulk of the heart, are characterized by the great thickness of their walls and their large capacity relatively to the auricles. The cavity of each ventricle is conoidal, that of the right being broader and shorter and a trifle more capacious than that of the left. Prominent muscular ridges and papillæ, the *columnæ carneæ*, arise from the inner surface of each ventricle, and from them the *chordæ tendineæ*, fibrous cords, pass to the free border of the valves which close the openings between auricles and ventricles. There are four valves in the heart. The mitral valve closes the left auriculo-ventricular opening, and consists of two segments. When these are closed together the blood is prevented from regurgitating from the left ventricle into the left auricle. The tricuspid valve, situated in the right ventricle, closes the right auriculo-ventricular opening. It consists of three segments, each triangular in shape and adherent to each other at the portion of their free margins which is nearest the fibrous ring from which they arise. The largest of the segments is nearest the pulmonary artery. The semilunar valves are found at the aortic and pulmonary orifices of the heart. The aorta (q.v.) springs from the left ventricles, and through it passes the blood to the arterial system. The pulmonary artery springs from the right ventricle, and through it blood passes to the lungs. The closure of the flaps of the semilunar valves prevents regurgitation of the blood into the aorta and pulmonary artery when the heart expands during the diastole. These valves are well supplied with fibrous material and possess great rigidity, so that they retain their shape. They open out of the ventricles and not in their cavities.



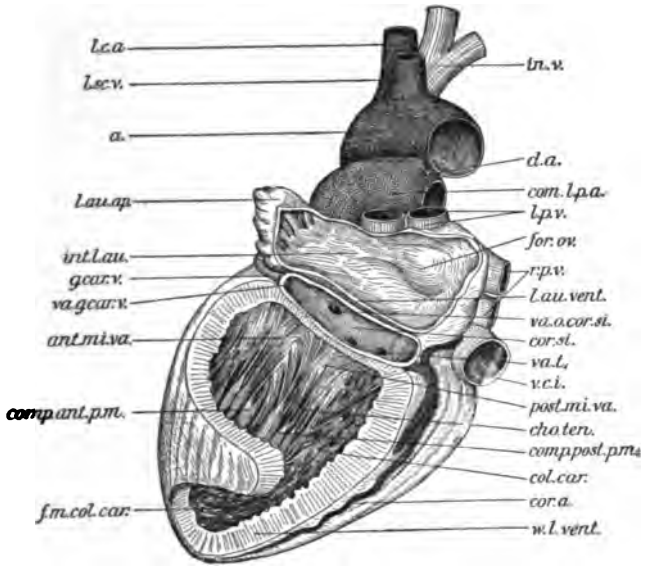
ANTERIOR VIEW OF THE RIGHT CHAMBERS OF THE HEART, WITH THE GREAT VESSELS.

in.v., innominate vein; *a.a.*, arch of aorta; *v.c.s.*, vena cava superior; *r.au.ap.*, right auricular appendix; *o.gal.*, orifice of vein of Galen; *an.ov.*, annulus ovalis; *fo.ov.*, fossa ovalis; *va.t.*, valve of Thebesius; *ant.t.va.*, anterior segment of tricuspid valve; *v.c.i.*, vena cava inferior; *r.t.va.*, right segment of tricuspid valve; *ves.w.*, section of vesthricular wall; *l.sc.v.*, left subclavian vein; *l.c.a.*, left carotid artery; *r.p a.*, right pulmonary artery; *d.a.*, ductus arteriosus; *l.p.a.*, left pulmonary artery; *p.a.*, pulmonary artery; *p.sm.va.*, pulmonary semilunar valves; *l.au.ap.*, left auricular appendix; *s.p.m.*, small papillary muscle connected with septum; *col.car.*, columnæ carneæ; *cho.ten.*, chordæ tendineæ; *ant.p.m.*, anterior papillary muscle; *l.cor.a.*, left coronary artery; *post.p.m.*, posterior papillary muscle.

The heart receives its nourishment from blood conveyed to it by the coronary arteries during the diastole of the heart. The veins of the heart accompany the arteries and return their blood into the cavity of the right auricle. The nerves of the heart run into the *deep* and *superficial cardiac plexuses*, and also the *posterior* and *anterior coronary plexuses*. These plexuses are formed by sympathetic nerve-fibres and by filaments from certain cranial nerves. The heart and the roots of the great vessels are enveloped in the pericardium (q.v.), a sac of conical shape with base below lined with serous membrane (which is reflected over the heart) and containing a very small amount of fluid.

The contraction of the heart, which occurs from 70 to 80 times a minute, begins in the auricles, which empty their blood into the ventricles. The ventricles then contract, the left to empty itself through the aorta, the right to empty itself through the pulmonary artery. The mitral valve

in the left heart prevents regurgitation of blood into the right auricle, and the tricuspid valve in the right heart prevents a like accident in the case of the left auricle. The semilunar valves, as stated, prevent regurgitation at the end of the contraction, or systole. The diastole, or expansion, of the heart begins at once, and the auricles dilate, the right one receiving blood from the two venæ cavæ, which carry venous blood from the upper and lower parts of the body; the left one receiving arterial blood from the lungs through the four pulmonary veins. The ventricles then expand, and the blood passes through the auriculo-ventricular orifices from the auricles until they are full, and the diastole is then complete. (See CIRCULATION.) Previous to birth, the circulation in the infant differs, because of structural differences. See FŒTUS; EMBRYO.



POSTERIOR VIEW OF THE LEFT CHAMBER OF THE HEART, WITH THE GREAT BLOOD-VESSELS AND CORONARY SINUS LAID BARE.

l.c.a., left carotid artery; *l.sc.v.*, left subclavian vein; *a.*, aorta; *l.au.ap.*, left auricular appendix; *int.l.au.*, interior of left auricle; *g.car.v.*, great cardiac vein; *va.g.car.v.*, valve of great cardiac vein; *ant.mi.va.*, anterior segment of mitral valve; *comp.ant.p.m.*, compound anterior papillary muscle; *f.m.col.car.*, fine mesh-work of columnæ carneæ at the apex of ventricle; *in.v.*, innominate vein; *d.a.*, ductus arteriosus; *com.l.p.a.*, commencement of left pulmonary artery; *l.p.v.*, left pulmonary veins; *for.ov.*, concave edge of the foramen ovale; *r.p.v.*, right pulmonary veins; *l.au.vent.*, left auriculo-ventricular opening; *va.o.cor.si.*, valve orifice of vein in coronary sinus; *cor.si.*, coronary sinus; *va.t.*, valve of Thebesius; *v.c.i.*, vena cava inferior; *post.mi.va.*, posterior segment of mitral valve; *cho.ten.*, chordæ tendineæ; *comp.post.p.m.*, compound posterior papillary muscle; *col.car.*, columnæ carneæ; *cor.a.*, coronary artery: *w.l.vent.*, section through wall of left ventricle.

SOUNDS OF THE HEART. On applying the ear to the cardiac region of a living man or mammal, in a state of health, two successive sounds are heard, each pair of which corresponds with one pulsation. These are known as the *first* and the *second* sound. The *first* sound is dull and prolonged, while the *second* is short and sharp, and the difference between them is well expressed by articulating syllables, lubb, dŭp. The first sound continues during three-tenths of the pulsation, then follows the 'short pause' lasting one-tenth, next the second sound lasting two-tenths, lastly the 'long pause' lasting four-tenths.

The cause of the first of these sounds has been a subject of much discussion. During the first sound several distinct actions are taking place, to which it is ascribed by physiologists. Thus we have (1) the impulse of the apex of the heart against the side of the chest; (2) the contraction of the muscular walls of the ventricles; (3) the tension of the auriculo-ventricular (tricuspid and mitral) valves and of the chordæ tendineæ. (See CIRCULATION.) The second sound is caused by the sudden closure of the valves of the aorta and of the pulmonary artery as the currents of blood reverse at the instant the heart relaxes and begins to dilate.

When the valves are changed by disease, the sounds undergo special alterations, which are of the highest importance in diagnosis. The normal sounds may be intensified or weakened, or they may disappear entirely and be replaced by murmurs; or abnormal sounds may be heard simultaneously with, or in the intervals between, the normal ones. Thus we find murmurs of regurgitation in valvular insufficiency; murmurs of obstructed flow of blood in valvular stenosis; aneurismal murmurs; friction sounds in pericarditis, etc.

HEART, DISEASES OF THE. Heart disease is a term including many affections of the organ as well as disturbances in its action due to disease elsewhere. Galen (q.v.) was the first to write of disease of the heart, which Hippocrates (q.v.) had denied, though to Vesalius (q.v.) is due the credit of accurate and intelligent grasp of the subject. The discovery of the circulation of the blood by Harvey (q.v.) in 1628 led the way for the investigations which, nearly a century later, gave clinicians absolute knowledge of certain affections of the heart. Vieussens, Lancisi, Morgagni, Sénac, and Auenbrugger deserve mention in the history of this subject. Lænnec (q.v.), who, in 1819, added the method of auscultation to that of percussion, advanced by his teacher Corvisart, and who invented the stethoscope, opened the field to all explorers. Richard Bright (q.v.) detected the enlargement of the organ which accompanies Bright's disease of the kidneys. Kreysig and Bouilland recognized endocarditis. Virchow (q.v.), in 1856, elucidated thrombosis and embolism.

Diseases of the heart are either (1) functional, or (2) organic. In *functional* diseases there is no discoverable alteration in structure, and the disorder of function is due to nervous influences. In *organic* diseases structural alteration is present.

FUNCTIONAL HEART DISEASES.

These include disorders in the beating of the heart and in the nature of its contractions, as well as neuralgic pains in the heart. Palpitation is the term given to a rapid and more or less distressing beating of the heart, in which the pulse may be accelerated from the normal 75 to 80 beats a minute to 150 or more a minute. This condition may be due to organic

disease, or it may be due to emotional disturbance (as fright or embarrassment), or to excessive physical strain, or to indigestion, with a production of gas and toxins, or to nervous disorder such as neurasthenia, or to tobacco, tea, coffee, alcohol, or certain drugs, or to hemorrhage, or to certain diseases, such as Basedow's disease (q.v.). Generally nervous excitability, apprehension, shortness of breath, increased perspiration, and flushing of the face accompany palpitation. Acute pain in the heart is experienced by some patients during attacks of hysteria, for example; neuralgia of that organ also occurs. Cardiac pain also accompanies fermentative dyspepsia. Disease of the coronary arteries causes, it is believed, the exquisitely painful angina pectoris (q.v.).

ORGANIC DISEASES.

Besides angina pectoris, these include pericarditis, endocarditis, myocarditis, hypertrophy, dilatation, embolism, aneurism, and degenerative changes without inflammation. More than one disease may be found co-existing, and both functional and organic diseases may be present together.

PERICARDITIS is an inflammatory disease in which the pericardium is thickened and roughened. The pericardium is a loose sac in which the heart lies, and its lining membrane is reflected over the external surface of the heart. The disease often coexists with gout or articular rheumatism, and is due to the same cause; or it accompanies Bright's disease. It may also be caused by injuries, exposure to cold and dampness, infectious diseases, etc. The normal serous fluid which should exist in the pericardium disappears and a sero-fibrinous fluid exudes from the blood-vessels, sometimes greatly distending the pericardial sac, generally causing adhesions between the two layers of the pericardium. If the amount of pericardial distension be great, the patient suffers with rapid pulse, oppressed breathing, and faintness. Occasionally the fluid must be drawn off by tapping. The attacks are always serious; and, if recurring, are generally fatal. There is pain felt, from the rubbing of the roughened surfaces as the organ beats, accompanied by what is called a friction sound. The area of heart dullness, as shown by percussion, increases with the production of fluid. In favorable cases the fluid is absorbed, and the sac regains, in great part, its normal condition. In very bad cases the inflammatory exudate consists of pus; such cases usually terminate fatally; evacuation of the pus affords the only hope of recovery.

DEGENERATIVE CHANGES IN THE HEART MUSCLE. Parenchymatous degeneration, or cloudy swelling, as it is often called, is the form of degeneration which usually accompanies the infectious diseases such as diphtheria or typhoid fever. The heart walls are somewhat softer than normally, and rather paler in color. The changes in the heart muscle cells are quite similar to the changes of parenchymatous degeneration in the cells of other organs. (See DEGENERATION.) The heart cells become more granular than normal, and in proportion to the extent of the granulation lose part or all of their normal striated appearance. 'Hyalin,' 'amyloid,' and 'calcareous' degeneration may occur in heart muscle. *Fatty degeneration* of the heart muscle is a quite common lesion. Its causes are: anæmia, old age, wasting diseases, prolonged infectious fevers, certain poisons, such as phosphorus, etc. It consists in the replacement of the heart muscle cell protoplasm by, or its transformation into, fat, to a greater or lesser extent. The degeneration is often not distributed uniformly throughout the heart muscle, but occurs in patches. The degenerated muscle looks pale in color and is softer than normally. The fat droplets within the cells may be large or small, may be few in number, or in such numbers as to entirely destroy the normal appearance of the tissue. What is known as 'fatty infiltration of the heart' is not a lesion of the heart muscle itself, but consists in an accumulation of fat beneath the pericardium and in the connective tissue between the muscle-fibres. The amount of fat may be very large, causing atrophy of the muscle-tissue and interfering with the functions of the organ.

MYOCARDITIS. This is an inflammation occurring in the middle or muscular layer of the heart walls and involving also the blood-vessels and interstitial connective tissue. The acute form is frequently suppurative in character, and occurs as an extension from an ulcerative endocarditis or pericarditis, or as a complication of one of the infectious diseases. It may be diffuse, or, as is more commonly the case, circumscribed with the formation of abscesses. In the chronic form of myocarditis the lesion consists in an increase in the connective tissue elements of the heart, with more or less atrophy of the muscular elements. The condition is usually associated with lesions of the coronary arteries. Opinions differ as to the primary lesion, some holding that the atrophy of the heart muscle is dependent upon the increase in connective tissue, a true productive inflammation; others that the degeneration of the heart muscle occurs first, the connective tissue proliferation being of the nature of a replacement hyperplasia. Syphilitic myocarditis and tubercular myocarditis sometimes occur. Myocarditis may give rise to few or no symptoms.

ENDOCARDITIS. The lesion in endocarditis is an inflammation of the endocardium, or lining membrane of the heart. While any portion of this membrane may be involved, it is common for the inflammation to be confined to that part of it which covers the valves of the heart and to result in an impairment of their efficiency. For this reason it is often referred to as 'valvular heart disease' or 'valvular endocarditis.' *Simple acute endocarditis* is a frequent complication of rheumatism. It may also be caused by some of the acute infectious diseases, especially scarlet fever and pneumonia. There may be simply thickening of the valves of the heart, their surfaces remaining smooth; or the valves may be rough and either eroded or studded with new growths, called vegetations, which give them a warty appearance. Microscopically the vegetations are seen to be made up of granulation tissue, covered on the surface with a layer of fibrin. There is usually more or less proliferation of the cells in the subendothelial connective tissue. *Malignant* or *ulcerative endocarditis* is due to the action of bacteria. The streptococcus and staphylococcus pyogenes are the most common incitants. More rarely the pneumococcus, the gonococcus, or the bacilli of anthrax, tuberculosis, or typhoid fever are present. The condition may be either primary or, as is more frequently the case, it may

exist as a complication of one of the infectious diseases. The valves of the heart may be covered with vegetations, or there may be suppuration or necrosis with destruction of tissue. The vegetations consist of granulation tissue covered with fibrin and containing many micro-organisms. It is most common on the mitral and aortic valves. More rarely, instead of occurring on the valves, it involves the walls of the heart, when it may lead to perforation either of a septum or of the external wall itself. Detachment of bits of the vegetations or necrotic tissue is not uncommon. Entering the circulation, they form infectious emboli, setting up foci of infection in distant parts of the body. *Chronic endocarditis*, the usual forerunner of valvular diseases of the heart, consists in sclerosis of one or more of the valves of the heart. The sclerosis may be primary, but is usually secondary, to the acute form of the disease. In this again, the cause is primarily in most cases rheumatism; gout, syphilis, alcoholism, and Bright's disease are also important etiological factors. A common cause, especially in the case of the aortic valve, is constant and excessive muscular exertion. There may be small vegetations on the valves representing remains of acute inflammation. The valves are thickened, opaque, and shrunken. This shrinkage produces deformity; the edges become curled so that the valve is incapable of perfect closure. In this way the valve may become insufficient without any degree of stenosis (narrowing of the opening), or, as the process goes on and the thickening becomes greater, the stenosis may be marked. In the later stages of the disease lime salts are frequently deposited in the new connective tissue of the valves, forming a dense mass of calcareous tissue. Chronic endocarditis may affect the walls of the heart, forming patches of fibrous tissue. Tuberculous endocarditis sometimes occurs.

Endocarditis, whether due to rheumatic inflammation (and the heart complication is said to occur in over 40 per cent. of the cases of rheumatism), or whether due to other causes, produces difficulty with the action of the valves of the heart. The thickening of the cusps or flaps of the valves, due to deposits between the layers of endocardium which cover them, makes them clumsy and unyielding. They may obstruct the flow of blood through them, causing *stenosis*. The valve-flaps may become shortened from contraction of the fibrous structure newly developed, and allow the blood to flow back through the valves when they are shut as tightly as possible, causing *regurgitation*. Alteration of the normal heart sounds reveals to the trained ear information which will determine the condition. (See *Sounds of the Heart*, in the article HEART.) A rough surface on the valve-flaps may lead to a deposit of fibrin from the blood, and the formation of a thrombus (q.v.). A thrombus, or a vegetation (a fringe or small lump of granulation tissue), may become broken off and be carried up into an artery of the brain, plugging it, with dire results. Such a plug is called an *embolus*, and the occurrence is termed *embolism* (q.v.). The result of embolism of a cerebral artery may be immediate death, paralysis, convulsions, or secondary softening, with consequent mental deterioration in course of time. Chronic endocarditis may exist for a considerable length of time without causing any symptoms; the heart becoming hypertrophied in one or another of its parts, and being thus enabled to meet the extra amount of work that is thrown upon it by the valvular stenosis or insufficiency. Sooner or later, however, the disease causes the appearance of symptoms, of which the most characteristic are: Shortness of breath, hemorrhage from the lungs, blueness of the lips and finger-nails, dropsy of the hands and feet, dyspepsia, headaches, vertigo, and fainting spells. The prognosis depends upon the particular valve affected, the existence or non-existence of compensatory hypertrophy, the age of the patient, etc.

HYPERTROPHY OF THE HEART. This consists in thickening of the heart walls, the cavity of the heart remaining of normal size (*simple hypertrophy*), contracting (*concentric hypertrophy*), or dilating (*eccentric hypertrophy*). The muscle tissue in hypertrophy of the heart is enlarged, probably both by increase in the number of fibres and by increase in size of the individual fibres. The hypertrophied muscle is dense, firm, and dark in color. If the hypertrophy affects both ventricles, there is an increase in both length and breadth of the heart. If the left ventricle alone is affected, there is an increase in the length of the heart, while hypertrophy of the right ventricle broadens the heart on the right side. Hypertrophied hearts may weigh from two to three pounds or more. Dilatation of the heart may, as already mentioned, be associated with hypertrophy. This is known as active dilatation. Or dilatation may occur with thinning of the heart walls, which is known as passive dilatation. The dilatation may affect any one or all of the cavities. The right side of the heart is more frequently affected than the left side.

Dilatation with compensating hypertrophy, if the valves of the heart are competent, is of little moment. The heart is the stronger for the hypertrophy. Mountain-climbing may cause it, as well as mental emotion with oft-repeated increase of the heart's action, or obstacle to the circulation. When the heart has become enlarged as a sequel of kidney disease, it is the latter that causes death when it comes. The ventricles are far more often dilated than the auricles, though all four cavities may be dilated. Should the hypertrophied heart become fatty, a grave danger arises; progressive cardiac failure may occur, with weakening of the circulation and dropsy of the lower extremities.

In the main, heart diseases are rare, and they are an infrequent cause of death. One with valvular trouble of a mild degree may fulfill the ordinary expectation of life, if he is content to live on a level, avoiding violent exercise, running or lifting, and avoiding anger, grief, and general emotional conditions. Cases of sudden death, called death from heart disease, are often due to cerebral embolism.

ANEURISM OF THE HEART is very rare. It is always fatal. Consult: Strümpell, *Text-Book of Medicine* (New York, 1901); Osler, *Practice of Medicine* (New York, 1901).

HEARTH-BURIAL. See MORTUARY CUSTOMS.

HEART-LYMPH. See CIRCULATORY SYSTEM, EVOLUTION OF.

HEART OF ENGLAND. A name of Warwickshire, as the middle county of England.

HEART OF MIDLOTHIAN, mid-lō'THI-an. One of Scott's *Tales of My Landlord*, purporting to have been written by a schoolmaster, Peter Pattison, and on his death to have been edited by his friend Jedediah Cleishbotham. It was published in 1818, and its title was taken from the popular name of the Tolbooth, an Edinburgh prison, which had been torn down the year before. It represents the best side of the Covenanting temper, and the scene opens in Edinburgh at the time of the Porteous Riots, September 7, 1736.

HEARTS. A game of cards, most frequently played by four persons. The whole pack is ordinarily dealt, in succession, one to each of the four, until each player has thirteen cards. The first player to the left of the dealer plays any card he likes, the rest following suit, if possible. The highest card of the suit played wins the trick. If the player cannot follow suit, he may play any card he pleases, and, when hearts are not led, he has the opportunity of getting rid of them. The winner of the first trick leads for the second; and so on until all the thirteen tricks have been taken. Then the players in turn expose their hands, count the number of the hearts, and pay into the pool one chip or unit for each one they have, and the pool is divided as provided for under the rules, or it remains, under some circumstances, as an added stake for the next hand. But if the settling is according to Hoyle's rule, each player also pays in addition as many other chips as there are other players (in every four-handed game there are, of course, three other players, and a player who has two hearts has to pay six chips, and so on all round). There will always, therefore, be thirty-nine chips in the pool. Then each player draws out of the pool one chip for every heart *not* taken by him in the play. Thus if one player has not taken any hearts he draws thirteen chips. The man who has taken three hearts takes ten chips, he who has taken four hearts takes nine chips, and he who has taken six hearts takes seven chips. This exhausts the pool. It is impossible to discuss in detail the reasons which will operate in a player's mind in the various heart games; even to the determination to endeavor to take all the hearts. 'Progressive hearts' is played after the manner of progressive euchre, so far as the arrangement of players, tables, and scoring is concerned. In the double, or *eagle game*, each player gives for an ace, 14; a king, 13; a queen, 12; a knave, 11; and for each of the other cards, the equivalent of the spots they stand for. This is instead of paying the pool one chip for each heart taken. It may also be played so that the ace counts 5; queen, 3; knave, 2; and all other cards 1. The variations of the game include 'six-handed hearts,' 'three-handed.' 'sweepstake,' 'auction,' 'spot,' 'drive,' 'joker,' and 'jack pot.'

HEART'S CONTENT. A port of Newfoundland on Trinity Bay (Map: Newfoundland, G 5). It is an excellent harbor and noted as the landing-place of three Atlantic telegraph cables from Valentia, Ireland. Population, in 1891, 1186; in 1901, 1079.

HEART'S-EASE. See VIOLET.

HEART-URCHIN. See SEA-URCHIN.

HEAT (AS. *hæu*, OHG. *heizi*, heat; connected with AS. *hit*, Icel. *hiti*, Goth. *heito*, OHG. *hizza*, Ger. *Hitze*, heat, and AS. *hāt*, Icel. *heitr*, OHG. *heiz*, Ger. *heiss*, Eng. *hot*). A definite sensation, known as 'warmth,' is felt when one places his hand near a flame, exposes it to the sun, rubs it with the other hand, etc. A different sensation is experienced when the hand is placed on a block of ice, or is when wet exposed to a draught of air, etc. These sensations are due to two sets of nerves, which correspond to the 'temperature' sensations. If natural objects are exposed to conditions similar to those just described it is observed that they undergo certain changes; in fact, as a rule, all of their physical properties excepting inertia and weight are affected; their size, shape, state, electrical and magnetic properties, elasticity, etc. These changes, when produced in this manner, are called 'heat-effects.'

From the time of the Greek philosophers, Epicurus and Democritus, until about 1800, heat-effects were believed to be due to the addition of a substance to the body experiencing the effects; or, in other words, heat was considered a form of matter. Such an idea was furthered when Professor Stahl (1660-1734), of the University of Halle, announced the theory of 'phlogiston,' which was represented as a material substance emitted from a burning body. That the theory of the material nature of heat, which in this form was called caloric, was generally accepted in the eighteenth century, is shown by the fact that prizes of the French Academy of Science, offered in 1738, for essays on the Nature of Heat, were granted to scientists who took this view of the question. Although the material idea of heat prevailed during the seventeenth and eighteenth centuries, it must be mentioned that, by some physicists of these and earlier times, it was considered as a mode of motion in some form or other, just as a few philosophers at similar times believed in the undulatory theory of light, and in a crude way formulated their theories. Such men as Descartes, Amontons, Boyle, Francis Bacon, Hooke, and Newton believed that heat must be due to motion of the substance, but could not substantiate their theories by experimental proof, or urge them with such force as to secure their adoption. At a time when experimental knowledge was exceedingly limited, that these men should have arrived at such results by pure reasoning, is a matter of great wonder, and if they had continued and verified their theories by actual experiments, it is safe to assume that the dynamical theory would have been established on a definite basis far earlier.

Caloric, according to the eighteenth-century physicists, was a fluid of an elastic and self-repellent nature, which permeated all matter. The various heat-effects were very plausibly explained on this basis, and it was a long time before the theory was overthrown. The first serious opposition came from Count Rumford (1753-1814), whose experiments on the production of heat by friction were published in 1798. These led him to believe that heat, instead of being a material substance, was merely motion. In fact, in 1804 he wrote to Pictet: "I am satisfied that I shall live a sufficiently long time to have the satisfaction of seeing caloric interred with phlogiston in the same tomb." Experiments by Humphry Davy (1778-1829), in which two pieces of ice were melted by friction, caused him also to think that heat was merely the vibration of the corpuscles of the body. In 1812 he asserted that the

immediate cause of the phenomenon of heat is motion, and "the laws of its communication are precisely the same as the laws of the communication of motion." Rumford and Davy were also assisted by Thomas Young (1773-1829) in their attempts to displace the theory of caloric, but, in spite of their efforts, the old theory continued to be accepted for many years, and, in fact, Sadi Carnot (1796-1832) in his famous treatise, *Reflexions sur la puissance motrice de feu*, reasoned on this basis, although later he became finally convinced of the truth of the dynamical theory. It is to the experiments of Joule, however, that we owe the most complete evidence in favor of the idea that heat-effects are due to energy. (It should be borne in mind that no experiments can *prove* this relation between cause and effect; they can simply be shown to be in accord with the theory.) The modern theory that heat-effects are due to energy alone is founded largely on the work of Carnot and Mayer. (See THERMODYNAMICS.)

The researches on heat are more or less closely connected with the development of the thermometer first made and used by Galileo (1564-1642), as described under THERMOMETER. There was also the stimulus of the invention of the steam-engine, and from the time of the construction of the first practical steam-engine (1711) many of the inventors who improved that machine carried on investigations in heat. Joseph Black (1728-99), who was among the foremost of these, was an assistant of James Watt, the great Scotch inventor, and later a professor of chemistry at Edinburgh. He derived the idea of latent and specific heats, and was the first to use proper methods for calorimetry (q.v.); Lavoisier (1743-94) and Laplace (1749-1827), working along lines somewhat similar, determined specific heats of a number of substances and devised calorimeters.

NATURE OF HEAT-EFFECTS. One of the simplest modes of producing heat-effects is by means of friction. If two pieces of ice are rubbed together they will melt; if two pieces of metal are rubbed violently their temperature rises—as detected by the 'temperature-sense'—they also increase in volume; if a paddle is turned rapidly enough in a vessel of water it may be made to boil. It requires work to produce friction; and the energy thus lost by the agency doing the work is gained by the bodies on which the work is done and which manifest the heat-effects. Similarly, in every known case, if such heat-effects as rise in temperature, expansion, boiling, melting, etc., are produced by any external agency, the latter can be proved to have lost energy; and the 'amount of the heat-effect' is proportional to the energy received. If, on the other hand, a body experiences the reverse changes, such as fall in temperature, contraction, condensation, freezing, etc., it may be proved that it loses energy. This energy which the body gains or loses is not kinetic energy of the whole body or of its visible parts, nor potential energy of strains of the entire body; it is energy associated with the minute portions of the body—its molecules and atoms. The energy of the body considered by itself—omitting any kinetic and potential energy of the whole body that it may have—is called its 'intrinsic' energy. This energy of the molecules and atoms is partly the kinetic energy of their irregular motions and vibrations, and partly potential energy in case it requires work to change their relative positions. In ordinary language a flame is called a 'source of heat;' when a body is brought near it is said to receive 'heat;' and the effects produced are said to be due to heat. These expressions are most unscientific and misleading. A flame is a source of energy; when a body is brought near, energy passes from the flame to it; part of this energy is spent in increasing the intrinsic energy of the body, and part in enabling the body to do external work, e.g. if it expands it pushes back the atmosphere or whatever rests against it, thus doing work. It is proper to speak of the energy which the body receives as 'heat-energy;' and in accordance with the conservation of energy one may say that 'heat-energy received' = 'increase in intrinsic energy' + 'external work done.' One can speak of the intrinsic energy in a body (although no idea can be formed of its amount or even nature); but it is as improper to speak of the amount of 'heat' in a body as it is to refer to the amount of sound in a horn or the amount of light in a candle.

ENERGY OF A GAS. One of the most important facts in regard to a gas is that, if it is allowed to expand under such conditions that it does no external work, there is no sensible change of temperature, showing that it has required no work to separate the molecules, and that the molecules themselves have not lost energy. In other words, there are no sensible forces either of attraction or of repulsion between the molecules of a gas, and so the energy of the molecules is entirely kinetic. This fact was first shown by Gay-Lussac and later by Joule; and, although the more elaborate experiments of Thomson and Joule showed that there were minute changes in temperature when a gas expanded freely, they indicate that the molecular forces are extremely small. If a gas is allowed to expand in such a manner as to do external work, the energy required for the work is taken from the kinetic energy of the molecules; a fall in temperature is always observed under these conditions when external work is done; and therefore the temperature of a gas depends upon the kinetic energy of its molecules.

TEMPERATURE. The units to be used in the measurement of the quantities involved in heat-effects are in most cases self-evident: the 'heat-energy' itself should be expressed in ergs or joules (q.v.); changes in volume, in cubic centimeters; melting or boiling, in number of grams experiencing the change, etc. The difficulty comes in giving a numerical value to 'temperature.' Primarily this is a question of sensation; and, although our senses give us a rough idea as to hot and cold bodies, they do not enable us to give numbers to the property of these bodies which corresponds to these sensations. Recourse must be had to the changes which some natural object undergoes under the conditions when the senses recognize differences in temperature, changes which may be measured. One of the simplest of these changes is alteration in volume. Two standard thermal states must be chosen arbitrarily, e.g. the thermal state of a mixture of pure water and ice at normal barometric pressure, and that of the vapor rising from pure water boiling under normal barometric pressure, because experiments have shown that these conditions are perfectly definite and unvarying. Let v_1 and v_2 be the volume of any definite body, e.g. a piece of

iron or nitrogen gas initially at a certain density; under these two thermal conditions, no other external condition having changed—in particular the pressure on the body must remain unchanged. Let v be the volume of the selected body under the thermal condition for which a numerical value is desired, e.g. a vessel of water, the air of a room. Let it be agreed to take n 'degrees' or steps between the two standard thermal states, then $\frac{v_2-v_1}{n}$ is the change in volume corresponding to one degree; and the number of degrees corresponding to the change in volume $v-v_1$, is

$$\frac{v-v_1}{\frac{v_2-v_1}{n}} \quad \text{or} \quad n\frac{v-v_1}{v_2-v_1}.$$

Therefore, if it is agreed to give the number t_1 to the first thermal state, the proper number for the temperature of the state to which the volume v corresponds is

$$t = t_1 + n\frac{v-v_1}{v_2-v_1}.$$

In this method for giving a numerical value to the temperature the following steps are arbitrary: (1) Choice of property of body, which varies with the temperature. (2) Choice of body to serve as 'thermometric substance.' (3) Choice of two standard thermal states. (4) Choice of number of degrees between the temperatures of these states. (5) Choice of number for first state. There are, consequently, an indefinite number of methods for giving numerical values to temperature. (See THERMOMETRY.) The scientific world has agreed to use numbers depending upon the change in volume or pressure of hydrogen gas initially at a pressure of 100 centimeters of mercury, the standard thermal states being those of melting ice and vapor rising from boiling water under normal atmospheric pressure, the number of degrees between the temperatures of these states being taken as 100, and the temperature of melting ice being taken as 0. (Therefore the temperature of the other standard state is 100.) Then, in the above formula, the numerical value of t becomes

$$t = 100\frac{v-v_0}{v_{100}-v_0}.$$

This is, then, the temperature on a constant pressure hydrogen thermometer, Centigrade scale.

[If change in pressure of a gas kept at constant volume is the property measured, the temperature is

$$t = 100\frac{p-p_0}{p_{100}-p_0},$$

where p_0, p_{100}, p are the pressures of the gas at 0°, 100°, t°. Experiments show that using hydrogen the temperature defined this way has the same numerical value as that defined by the change in volume at constant pressure.]

It is seen, then, that in order to give a numerical value to a thermal state, e.g. to that of water in a vessel, three measurements are necessary, those of the volume of the hydrogen when the bulb containing it is immersed in melting ice (v_0), in vapor rising from boiling water (v_{100}), and in the water (v). The fact should be emphasized that temperature is not 'measured' in the proper sense—the volume is measured; we have simply defined a method for giving a number to temperature. In ordinary laboratory practice mercury-in-glass thermometers are used; and divisions with numbers are marked on them, which are designed to correspond to proportionate increases in volume. These numbers have no meaning until the instrument is compared with a hydrogen thermometer; and a table of values connecting the numbers and the true temperatures—as defined above—is prepared. See THERMOMETER.

MECHANICAL EQUIVALENT OF HEAT. Since, in practice, heat-effects are rarely produced by mechanical work, the erg is not a convenient unit in terms of which to measure heat-energy. Almost invariably the energy required to produce a given heat-effect or the energy given out when the opposite effect occurs, is measured in terms of the change in temperature of water: thus, to find how much energy is required to make ice melt, a quantity of ice of known mass is put into a known mass of water at a known temperature, and the fall in temperature is observed. Therefore a practical unit for the measurement of heat-energy is the "energy required to raise the temperature of one gram of pure water from 15° to 16° Centigrade;" this is called the 'calorie.' The limiting temperatures must be defined, because it is not necessarily true that the same amount of energy would raise the temperature of one gram of water from 10° to 11°, or from 60° to 61°, as from 15° to 16°—in fact, it does not. This definition of a practical unit for measuring heat-energy is not an ideal one, because it makes the unit of energy depend upon so many extraneous conditions, viz. all those involved in the definition of temperature. It would be much better theoretically to choose some heat-effect which was independent of temperature, e.g. the energy required to make one gram of water boil away at normal atmospheric pressure; but such a unit could not be used practically. Experiments show that the amount of energy required to raise the temperature of one gram of water one degree at any temperature is nearly one calorie; and so for all practical purposes this is assumed. The number of ergs equivalent to one calorie has been called the 'mechanical equivalent of heat.' Its value is 4.187×10^7, according to the best determinations. There are in general two experimental methods for measuring this most important quantity: a mechanical one, depending upon the production of the rise of temperature of the water by a paddle revolving in it; an electrical one, in which the rise in temperature is produced by the heating effect of an electric current. In the first method the amount of work done is measured directly in ergs by a suitable dynamometer; in the second, the electrical quantities, current resistance, and electro-motive force are measured and the number of ergs calculated (energy $= E\,i\,t$). (See ELECTRICITY.) The mechanical method was first used accurately by Joule (1843-45), and more recently by Rowland (1878), and by Reynolds and Moorby (1897). (The last two investigators did not measure the calorie directly, however.) The electrical method was also first used by Joule; and within recent years it has been perfected by Griffiths (1893), Schuster and Gannon (1894), and Calendar and Barnes (1899). (For a full discussion of these experiments reference should be made to an article by Ames in *Reports of the*

International Congress of Physics, vol. i., Paris, 1900.) It should be noted that previous to the experiments of Joule both Carnot and Mayer had made calculations of the mechanical equivalent of heat, using the numerical values found for certain properties of gases.

SPECIFIC HEAT. It is found by experiment that the heat-energy required to raise the temperature of bodies varies greatly with the material of the body, with the external conditions, and slightly with the initial temperature. The number of calories required to raise the temperature of 1 gram of a substance from $t°$ to $(t+1)°$ under given conditions is called the 'specific heat' of that substance at $t°$ and under the specified conditions. Ordinarily, these conditions are those of constant atmospheric pressure; but it is possible to make the condition one of constant volume in the case of gases. (Methods for the measurement of specific heats are described under CALORIMETRY.) The specific heat of a gas at constant pressure is greater than that at constant volume by an amount equivalent to the energy required to expand the gas against the constant pressure, because, as has been stated, no appreciable work is necessary to produce the expansion of the gas itself. The ratio of these two specific heats of a gas is a most important constant for that gas, and may be determined directly by several methods. Its value for hydrogen, oxygen, and nitrogen is almost exactly 1.4. (See ELASTICITY.) The specific heat of a substance varies with its temperature. Its value for water at different temperatures is now known quite exactly owing to the recent experiments of Callendar and Barnes. Its value for solids at different temperatures is hard to obtain; and under ordinary conditions the variations are not important. Boron, carbon, silicon, and iron, however, have specific heats, which increase markedly with increase of temperature. The specific heat of a substance which can exist in several allotropic forms varies with the modification: thus at ordinary temperatures the specific heat of graphite is 0.202, of charcoal is 0.241, of diamond is 0.147. When a substance changes its state from solid to liquid and then to vapor its specific heat changes too; thus the specific heat of ice is about 0.50, of water it is 1.00, of steam it is 0.48. Owing to this change in the specific heat of a substance when its molecular arrangement is altered, there is a curious property observed in the case of iron. If an iron wire is raised to a 'red heat' in a flame, then removed and allowed to cool, its color disappears, then reappears, and soon disappears again for good. This is called *recalescence*. It is due to the fact that as the iron first cools from its red heat it comes to a state when the molecules rearrange themselves owing to some internal condition of instability, and in so doing liberate energy, which is at once manifest by the iron becoming red-hot again, but at a lower temperature than before.

It was observed by Dulong and Petit that, if the specific heats of different solids are compared, there is an approximate connection between them and the atomic weights of the solids. In fact, the product of the specific heat of a substance in the solid condition and its atomic weight is approximately the same for all substances, viz. 6.4. This product for any substance is called its 'atomic heat,' because by the definition of 'atomic weight' it is proportional to the heat-energy required to raise the temperature of one atom one degree. The agreement between the values of the atomic heat for different substances is not very exact, partly no doubt due to the fact that the conditions of temperature under which the specific heats were measured were not such as to make the other conditions of the solids comparable, e.g. one solid is nearer its melting-point than is another at the same temperature. This law of Dulong and Petit has been extended by Woestyn to the idea of 'molecular heats;' he thinks it probable that the heat-energy required to raise the temperature of a molecule one degree equals the sum of the amounts of energy required to raise the temperature of the individual atoms. This extension of the law is not verified in the case of most compounds.

TABLE OF SPECIFIC HEATS

SUBSTANCE	Specific heat	Temperature
Water	1.000	15°C
Mercury	0.033	20°
Copper	0.092	50°
Iron	0.110	50°
Zinc	0.093	50°
Platinum	0.032	50°

SPECIFIC HEATS OF GASES

	Constant pressure	Constant volume
Air	0.2374	0.1721
Carbon dioxide	0.2169	0.1730
Hydrogen	3.4090	2.402
Nitrogen	0.2438	
Oxygen	0.2175	

EXPANSION. In general when heat-energy is added to a body its volume is changed; and experiments prove that an approximate relation connects the change in volume of any substance and its change in temperature. If v_0 is the volume at 0°, and v is the volume at $t°$, the external pressure remaining constant, $v - v_0 = v_0 \beta t$ or $v = v_0 (1 + \beta t)$, where β is approximately a constant for any one substance (with certain marked exceptions). It is called the *coefficient of cubical expansion at constant pressure*, referred to 0°. [A more exact relation would be $v = v_0 (1 + a_1 t + a_2 t^2 + a_3 t^3 + \text{etc.})$.] If the change in length of a linear dimension of the body—e.g. an edge of a cube, if it is in that form—is considered, it will satisfy a similar formula. Let l and l_0 be the final and initial lengths; then $l = l_0 (1 + \alpha t)$, where α is called the *coefficient of linear expansion*. If the body is in the form of a cube, whose edges have the length l_0 at 0° and l_1, l_2, l_3, respectively at $t°$, $v_0 = l_0^3$, $v = l_1 l_2 l_3$. Hence, if

$l_1 = l_0 (1 + a_1 t)$, $l_2 = l_0 (1 + a_2 t)$, $l_3 = l_0 (1 + a_3 t)$
$v = v_0 [1 + (a_1 + a_2 + a_3) t + (a_1 a_2 + a_2 a_3 + a_3 a_1) t^2 + a_1 a_2 a_3 t^3]$.

But since a_1, a_2, a_3 are all extremely small in general this may be written $v = v_0 [1 + (a_1 + a_2 + a_3) t]$; and it follows that $a_1 + a_2 + a_3 = \beta$. If the body is isotropic, $a_1 = a_2 = a_3 = \frac{1}{3} \beta$; but if the body is crystalline the coefficients of linear expansion in different directions may be different, and may even be of opposite sign. In this last case it might happen that the contraction in one direction would be so great as to make β negative, i.e. produce a diminution of volume with rise in temperature. The change in volume of

water as the temperature changes is peculiar, inasmuch as it decreases while the temperature increases from 0° to about 4° C., and then it increases as the temperature continues to increase. This fact plays a most important part in the economy of nature, as, owing to it, when the temperature at the surface of a pond or lake falls below 4°, the cold water, being lighter, stays on the surface, and ice is formed. Ordinarily, of course, the colder a liquid is the denser it is; and so, if the surface of a liquid standing in a tall vessel is cooled, the top layers will sink and the lower ones will rise. There will thus be *convection currents* until the whole liquid is at the same temperature. Similarly, if the bottom of a vessel of an ordinary liquid is warmed, there will also be convection currents. The motion of these liquid masses is evidently due to the force of gravity, making the denser liquid come below the lighter. The coefficients of cubical expansion at constant pressure are different for different liquids and solids; but for all gases they are practically the same, viz. 0.003662. This most important property of gases is called the 'law of Gay-Lussac,' although its accurate verification is due to Regnault. If Boyle's law is true for a gas, viz. at constant temperature the product of the pressure and volume of a given mass of gas remains constant, it follows at once that the change in pressure of a constant volume of a gas as the temperature is raised from 0° to $t°$ obeys the law $p = p_0(1+\beta t)$, where p_0 is the pressure at 0°; p that at $t°$; and β is the same coefficient as that for changes in volume, viz. 0.003662. The law that the coefficient of change in pressure at constant volume for all gases is practically the same is sometimes called the 'law of Charles.' If both the pressure and temperature of a gas are changed—assuming Boyle's and Gay-Lussac's laws—it may be shown that under all conditions $\frac{p}{\rho\ (t+273)}$ is a constant for the gas, where ρ is the density at $t°$ and pressure p. This may be written

$$\frac{pv}{m\,(t+273)} = \mathrm{R},$$

where R is a constant for any one gas, and evidently equals $\frac{1}{273}\frac{\rho}{\rho_0}$ where ρ_0 is the density of the gas at 0° C., and at pressure p. It is evident further from the formula that, *if it could be supposed to apply to gases at very low temperatures*, at $t = -273°$, $pv = 0$, an equation which in itself is meaningless. A lower value of t would lead to a negative value for pv, which is absurd. Therefore, the temperature —273 C. is sometimes called 'absolute zero on the gas scale of temperature;' and $t + 273$, or T as it is written, is called the 'temperature on the absolute gas scale.' (A more accurate determination of the coefficient of expansion makes the absolute zero—273.1° C.)

Methods for the measurement of coefficients of expansion are described in all treatises on heat. See Preston, *Theory of Heat*.

COEFFICIENTS OF CUBICAL EXPANSION

SOLIDS	
Platinum	0.000027
Copper	0.000051
Steel	0.000033
Brass	0.000056
Glass	0.000027
Zinc	0.000087
LIQUIDS	
Mercury	0.000182
GASES	
For all gases	.003662 approximately

CHANGES IN STATE. FUSION AND VAPORIZATION. If a flame is applied to a vessel, such as a glass beaker, in which there is a block of ice at a low temperature, at first the temperature will rise, but finally a temperature is reached when there is no longer any change and the ice begins to melt. If during the process the mixture of ice and water is stirred the temperature will remain unaltered until all the ice is melted; then the temperature will again rise until the water begins to boil, when the temperature is again constant until all the water is boiled away; and then the temperature of the steam will rise. Conversely, if the steam is cooled, it will begin to condense into water at the same temperature as that at which it boiled, *provided its pressure is the same;* but so long as it is condensing there is no change in temperature; then when all is condensed the temperature of the water will fall until it begins to freeze, as it will at the same temperature as that at which the ice melted, *provided the pressure on it is the same;* and during the process of freezing there is no change of temperature, but when it is completed there is again a fall. This course of events is common to all crystalline solids; but many solids, such as waxes, have no definite temperature at which they melt, but pass through a pasty condition from solid to liquid, the temperature continually rising; and the converse happens when they become solids. There is, then, in the case of ice and similar bodies, a temperature at which the solid and liquid states are in equilibrium together, unless there is addition or withdrawal of heat-energy. This is called the 'fusion-point.' There is also a temperature at which the liquid and the vapor are in equilibrium unless there is addition or withdrawal of heat-energy. This is called the 'boiling-point.' Both these equilibrium temperatures vary with the pressure on the bodies. As the pressure is increased on a liquid its boiling-point is raised, and conversely, e.g. in the case of water, a change of pressure from 76 to 77 centimeters of mercury changes the boiling-point from 100° to 100.37°. As the pressure on most solids is increased, their melting-point is increased also; but there are certain exceptions, viz. those substances which on melting occupy smaller volumes in the liquid than in the solid states. Such solids are ice, cast iron, bismuth. This change in the freezing-point is, however, most minute. In the case of ice, the melting-point is changed from 0° to —0.0075° C. if the pressure on the ice is increased from one to two atmospheres.

FUSION AND BOILING POINTS

Fusion-point		Boiling-points at normal pressure	
Platinum	about 1800° C.	Sulphur	444.5° C.
Copper	" 1096	Mercury	357.
Gold	" 1092	Water	100.
Silver	" 985	Ethyl alcohol	78.
Zinc	415	Ethyl ether	34.6
Bismuth	268	Carbon dioxide	—79.
Sulphur	115	Oxygen	—183.
Mercury	—39	Nitrogen	—194.
		Hydrogen	—238.

The phenomenon of 'regelation' is due to this last fact. When the pressure on a piece of ice is

increased its melting-point is lowered. Therefore, if two blocks of ice at 0° are pressed together, the ice under pressure at the point of contact has a melting-point less than 0°, but being at 0° is at a temperature which is higher than its melting-point, and so melts. The water which results from this is at a temperature lower than 0°; and so as it flows out from under the pressure it freezes again, because now its freezing-point is 0°. The motion of glaciers depends on this phenomenon.

The presence of nuclei greatly facilitates the processes of solidification, boiling, and condensation. A drop or a bubble cannot be formed without some nucleus (see CAPILLARITY); and a liquid can be cooled far below its freezing-point if there is no nucleus and if the liquid is not disturbed or jarred. A liquid exposed in an open vessel will evaporate, i.e. will pass slowly into the form of vapor, at all temperatures below its boiling-point. If, however, a large closed vessel is placed over the one containing the liquid, the evaporation will soon cease apparently—there is equilibrium between the liquid and the vapor. The process does not in reality stop; but the evaporation of the liquid is exactly balanced by the condensation of the vapor. Experiments show that this state of equilibrium is reached at a certain temperature when the pressure of the vapor is a definite quantity, viz. at the 'boiling-point' for that pressure; if the temperature is changed, so is the pressure which corresponds to equilibrium. If the temperature in the above experiment is lowered, some vapor will condense; illustrations of this are the formation of dew, formation of drops of water on ice-pitchers, etc. Again, if in the above experiment the volume of the space over the liquid is made smaller, some of the vapor will be condensed. Thus there are two methods for the liquefaction of a gas or vapor: to lower the temperature and to decrease the volume. It was established by Andrews in 1869 that a vapor cannot be liquefied by any decrease in volume, however great, unless the temperature is below a certain limit, which is different for different substances, and which is called the 'critical temperature.' But by lowering the temperature sufficiently and by making the volume small enough, all known gases have been liquefied with the exception of helium. (See LIQUEFACTION OF GASES.) The critical temperatures of a few gases are given below:

CRITICAL TEMPERATURES

Carbon dioxide	30°.92	Hydrogen	—234
Sulphur dioxide	156.	Oxygen	—118
Sulphuric ether	194.4	Nitrogen	—146
Water	365		
Ammonia	130		

If substances are dissolved in a pure liquid, both its freezing and its boiling points are altered; the former is lowered and the latter is raised, the amount of the change varying directly with the quantity of substance dissolved. In most cases, however, both the solid and the vapor formed are those of the pure liquid. If the dissolved substance is volatile, then it will evaporate also. Common salt and water serve as an illustration. If salt is added in small amounts to a vessel of water, a time will come when the water will no longer hold the salt in solution, but will deposit it; the solution is said to be 'saturated.' The amount of salt required to produce saturation varies directly with the temperature. If an unsaturated solution has its temperature lowered below 0°, the freezing-point of the solution will finally be reached, pure ice will separate out, leaving the solution more concentrated; the freezing-point of this solution is lower than that of the first; and so as the temperature gets lower and lower, the solution becomes more and more concentrated until finally it is saturated. If now heat-energy is removed, ice will form, but salt will be deposited also in equivalent amounts; this mixture of ice and salt is called the 'cryohydrate,' and the temperature of its formation is —22° C. (Other salts and liquids have different cryohydrates and different temperatures of formation.) In this cryohydrate of common salt there are 23.8 parts by weight of the salt and 76.2 parts of ice. Therefore, if a mixture is made of salt and ice in this proportion, it will form a solid whose melting-point is —22° C.; and if it actually is at the temperature —5° or —10°, it will of course melt, and in so doing heat-energy will be abstracted from surrounding bodies, because energy is required for two reasons, to melt the ice and to make the salt dissolve in the water. For this reason such a mixture is called a 'freezing-mixture.'

The fact that heat-energy is required to make a solid melt or a liquid evaporate is familiar from many experiments. Similarly heat-energy is liberated when a liquid freezes or vapor condenses. The number of calories corresponding to the change in state of one gram of a substance under a definite pressure is called the *latent heat* for that change at the given pressure. Similarly, when one substance dissolves in another, there are as a rule changes in temperature showing that heat-energy is liberated or absorbed. The 'heat of solution' is defined to be the number of calories produced when one gram of a substance dissolves in a great mass of a given solvent, a quantity so great that any further increase in it would not affect the heat-energy liberated or absorbed. Values for latent heats and heats of solution are given in the following tables:

LATENT HEATS

SUBSTANCE	Fusion	SUBSTANCE	Vaporization
Water	80.02	Water	536.6
Sulphur	9.37	Ammonia	297.
Benzene	30.35	Benzene	92.9
Mercury	2.82	Ether	90.
Silver	21.07	Chloroform	58.5

HEATS OF SOLUTION IN WATER

Ammonia gas	+495.6
Ethyl alcohol	+ 55.3
Sulphuric acid	+182.5
Caustic potash	+223.3
Sodium chloride	— 18.22
Potassium chloride	— 59.7
Silver chloride	—110.

\+ Means rise in temperature.
— Means fall in temperature.

There are, of course, other changes of state than those mentioned; among these are sublimation, when a solid passes directly into the state of vapor; dissociation of a gas, when the molecules of a gas break up into other parts; etc. It is found, however, in all these cases that there will be equilibrium at a definite temperature only when a certain pressure is reached, and conversely.

TRANSFER OF HEAT. There are three processes

by which the energy used in producing heat-effects is conveyed from one point to another: convection, conduction, radiation. It should be particularly noted that in all cases a difference of temperature is essential for a transfer of energy, and that it is the body at the lower temperature which gains heat-energy, while the body at the higher temperature loses it. *Convection* has already been described. It consists in applying a flame or 'source of heat' to the lower portion of a column of some fluid; this portion expands, becoming less dense; then under the influence of gravity it rises to give place to some heavier portion of the fluid above it. The motion of the wind, of draughts of smoke in chimneys, of water in hot-water systems of heating, etc., are illustrations of this process. *Conduction* is illustrated when one end of a long metal rod is raised to a high temperature, while the other is maintained at a lower one. There may be observed a steady increase of temperature from the latter end up to the former; the heat-energy required to produce this temperature coming from the 'source of heat' which keeps the hot end at its high temperature by a process of 'conduction' from particle to particle down the rod. Some bodies conduct better than others, meaning that the effect of the source of heat at the hot end is felt farther down the rod. Metals are all good conductors; but silver, copper, and aluminum are the best. Woods and cloths are poor conductors; so are all liquids, with the exception of molten metals, and gases also, relatively to their volumes. The principle of the miner's safety lamp depends upon conduction, because the temperature of the gases escaping from the flame through the gauze envelope of the lamp is made so low by the conduction away of heat-energy by the gauze and the metal base that the exterior gas is not ignited. *Radiation* is the process by which heat-energy is conveyed from one body to another by a wave-process in the luminiferous ether. (See RADIATION; ABSORPTION; ETHER.) Illustrations are afforded when the hand is held beside a stove or exposed to the sun. All bodies in the universe, so far as is known, are emitting these ether-waves, owing to vibrations inside the molecules. These waves have lengths varying from less than 0.00002 of a centimeter to a few hundredths of a millimeter. They carry energy; and if they are absorbed by any body upon which they fall, this energy is as a rule distributed throughout the minute portions of the body, and it manifests heat-effects. The total amount of energy radiated by a body increases as the temperature is raised; and, further, as the temperature rises, the body emits shorter and shorter waves—finally the body may become visible. If two bodies are allowed to radiate to each other, each loses energy by radiation and gains it by absorption until finally there is equilibrium of temperature. It may be shown (see RADIATION) that the radiating and absorptive powers of any body are the same at any one temperature; and in general a body which is a good absorber is a good radiator, e.g. a body painted black; while, if a body is a poor absorber, and therefore a good reflector, it is a poor radiator, e.g. a piece of polished metal. Some bodies are transparent to ether-radiations of certain wave-lengths and opaque to others; they are called diathermanous if the waves which are transmitted by them carry a large amount of energy, which may be transformed into heat-energy if absorbed. See DIATHERMANCY.

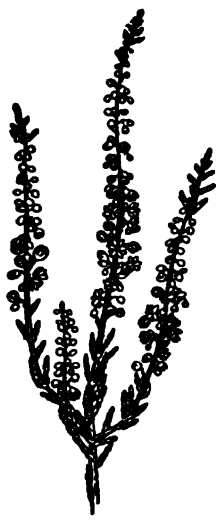
Consult: Preston, *Theory of Heat* (London, 1896); Tyndall, *Heat as a Mode of Motion* (6th ed. London, 1880); Maxwell, *Theory of Heat* (London, 1875). For heat considered as a factor of organic evolution, see EVOLUTION.

HEATH (AS. *hæþ*, Icel. *heiðr*, Goth. *haiþi*, OHG. *heida*, Ger. *Heide*, heath, OWelsh, Bret. *coit*, Corn. *cuit*, forest, Gall. *cēto-* in *Cēto-briga*, *eto-cētum*, Lat. *cetum* in *bu-cetum*, cow-pasture, *quer-cetum*, oak-forest). A term of varied significance, applied originally to various members of the Ericacæ (see below), and long used to designate areas covered by such plants. It has been still further extended to include most sterile uncultivated tracts, covered with low shrubs. In its more proper ecological sense, however, a heath may be defined as a plant society on sterile and commonly dry soil in which the dominant plant types are evergreen shrubs, chiefly ericads or ericad-like plants. The heath, defined in this way, is much less common in America than in Europe, although in the Northern United States and Canada small areas of low evergreen shrubs are often found in which the bearberry (Arctostaphylos) and junipers dominate. Small heath areas are also found in mountain (even alpine) districts. In the far northern regions and sometimes locally in the Northern States, habitats like the above are often covered with coarse mosses like Polytrichum or lichens of the genus Cladonia (including the reindeer lichen); these areas may be called moss or lichen heaths, since the soil conditions are those of the true heath, though the exposure is perhaps too great for the shrubs.

The origin of the heath is twofold: it may arise from a moor or undrained swamp (q.v.), or from a dry sandy area, as a beach or dune. This fact is of great ecological interest, since so far as water content is concerned, a dune is xerophytic, while a swamp is hydrophytic. That dune, heath, and moor are closely related as to their ecological conditions, however, is shown not only by the twofold origin of the heath, but also by the fact that all typical dune, heath, and moor plants have identical and xerophytic structures (see XEROPHYTES); not only this, but the dominant plant families, conifers and ericads, are the same throughout. On the dune transpiration is great, perhaps because of the excessive exposure; on the heath and in the swamp, transpiration is great in relation to absorption, probably because of the soil acids and the relative absence of bacteria. Hence in all three cases only those plants can thrive which are able to reduce transpiration by protective structures, and those structures are peculiarly prominent in conifers and ericads.

The heaths are small shrubs, distinguished by a calyx of four leaves and a bell-shaped or ovate corolla. The leaves are small, linear, and evergreen. The genus has been separated by some botanists into a number of genera, but the old name, Erica, is still commonly retained. The name heath, however, is in popular language extended to many plants of genera nearly allied to Erica. The little shrub which chiefly covers the large tracts named moors or heaths (Ger. *Haide*) in Great Britain and on the Continent of Europe, is the common ling or

heather (*Calluna vulgaris*), the only known species of the genus Calluna. It is also found in a few places in the Eastern United States, where it was probably introduced. It is found on arid places, and also in bogs. The flowers, which have much the appearance of being in spikes, are of a lilac rose color, rarely white. They afford abundance of honey, and the beehives are therefore transported to the moors when the heather is in bloom. In bogs it contributes much to the formation of peat. In some of the Hebrides a decoction of heath is used for tanning leather. The plant is applied to various other uses in the Highlands of Scotland. About 500 species of Erica are known, and these, with few exceptions, are natives of the south of Africa. None are found in America. The British Isles produce seven species, of which some have been found only in Ireland and some in the southwest of England; cross-leaved heath (*Erica tetralix*) and fine-leaved heath (*Erica cinerea*) are common plants in most parts of Great Britain, and, like most of the genus, are very beautiful when in flower. The heather-bells of Scottish song are the flowers of one or both of these species. *Erica Mediterranea* and *Erica carnea*, common in the southern parts of Europe, are very frequent ornaments of British flower borders, hardy plants, producing their flowers in great profusion in April. Many of the African species, remarkable for the size and beauty of their flowers, are much cultivated in greenhouses. Some of the South African or Cape heaths attain in their native region a much greater size than any European heath. The roots of *Erica scoparia* are known as bruyere, and furnish the true brier pipes of France.



HEATHER.

HEATH, James (1629-64). An English historian, born in London, and educated at Westminster School, and for two years at Christ Church, Oxford, from which he was expelled by the visitors from Parliament in 1648. He was an ardent Royalist, and lived in exile with Charles II. 'Carrion Heath,' a 'dreadfully dull individual,' according to Carlyle, wrote: *A Brief Chronicle on the Late Intestine War* (1661); *The Glories and Magnificent Triumphs of the Blessed Restitution of King Charles II.* (1662); *Flagellum: or, the Life and Death, Birth and Burial of Oliver Cromwell* (4th ed. 1669).

HEATH, Nicholas (c.1501-79). An English prelate and jurist, born in London, and educated at Saint Anthony's, in London, possibly at Corpus Christi, Oxford, and certainly at Christ's College, Cambridge. In 1539 he was made Bishop of Rochester. He 'oversaw and perused' the Great Bible of 1541, and was made Bishop of Worcester after Hugh Latimer's resignation. In 1550 he refused to accept Cranmer's form for the Prayer-Book, and was imprisoned and deprived of his see, but was restored at the accession of Mary, and in 1555 became Archbishop of York. When Mary died, Heath did all in his power to bring about the immediate and peaceful accession of Elizabeth; but when the question of Elizabeth's supremacy came before Parliament, Heath opposed her claim to the headship of the English Church, and later refused to take the oath required by the Act of Supremacy. For this contumacy he was again deprived of his see (1659), imprisoned for a short time in the Tower, and then permitted to retire, on the understanding that he was not to meddle with politics, profane or ecclesiastical.

HEATH, Sir Robert (1575-1649). An English jurist, born at Brasted, in Kent, and educated at Tunbridge and at Saint John's, Cambridge. He studied law, rose rapidly, became Solicitor-General in 1621, was knighted in the same year, and in Parliament (1624-25) showed himself a thorough Royalist, and was appointed Attorney-General as a reward for his services. In this office he was active and severe; he arrested in 1629 Holles, Eliot, Selden, and other members of the Commons, arguing that privilege did not protect after the close of a session, and carried their prosecution through successfully, and was equally strenuous and successful in his prosecutions before the Star Chamber. But there was a rumor that he was Puritan in secret, and he was removed without cause. But his loyalty did not waver; he accompanied the King to York in 1642, and later to France, where he died at Calais. Consult the autobiography in vol. i. of the *Philobiblon Society Miscellany* (New York, 1861).

HEATH, William (1737-1814). An American soldier. He was born at Roxbury, Mass., and was brought up on a farm, upon which he lived up to the outbreak of the Revolutionary War. He was a member of General Court of Massachusetts in 1761, entered enthusiastically into the political movement that culminated in the Revolution, and from 1771 to 1774 was a member of the committees of Safety and Correspondence. In the latter year he was elected to the Provincial Congress. His interest in the organization of the militia, of which he had made a special study, obtained for him in December, 1774, an appointment as a brigadier-general of militia, and as such he was present at the British retreat from Concord after the battle of April 19, 1775. Thereafter he was made major-general of militia, and on June 22, 1775, was commissioned by Congress a brigadier-general of the Continental troops. In March, 1776, he was ordered to New York; on August 9th was promoted major-general, and after the battle of White Plains, in the following October, was placed by Washington in command of the troops in the Highlands. In 1777 he became commander of the Eastern Department, with headquarters at Boston, and in June, 1779, was transferred to the command of Hudson River posts, where, with the exception of his coöperation with the French in Rhode Island in 1780, he remained until the close of the war. After the war he was a member of the Massachusetts Convention that ratified the Federal Constitution, was a State Senator in 1791-92, and was probate judge of Norfolk County in 1793. In 1806 he was elected Lieutenant-Governor of Massachusetts, but declined to serve. His *Memoirs*, which contain

much valuable material on the Revolutionary period, were published in 1798 by authority of Congress, and were last republished under the editorship of William Abbatt in New York in 1901.

HEATH'COAT, JOHN (1783-1861). An English inventor, born at Duffield, near Derby. He worked with a hosier, and later with a stocking-maker and frame-smith at Nottingham. In 1808 and 1809 he patented his complicated machinery for the manufacture of lace. His factory at Loughborough was attacked by the Luddites, and most of his machinery and lace destroyed. Rather than continue at Loughborough, Heathcoat refused an award of £10,000 for damages. He built a new plant at Tiverton, and for twenty-six years (1832-59) represented that constituency in Parliament. He built schools at Tiverton, and planned many charities, which were carried out by his daughters.

HEATH-COCK, HEATH-HEN. See BLACKCOCK; GROUSE.

HEATH'COTE, CALEB (1665-1721). An American merchant, born in England, where his father was Mayor of Chester. He established himself with his uncle, Capt. George Heathcote, a large ship-owner, in New York, and upon Heathcote's death inherited his fortune. He was a zealous churchman, and was one of the petitioners for a license to build the first Trinity Church. He held many offices, among them those of Mayor of New York (1711-14); judge of Westchester County; commander-in-chief of the forces of the Colony; surveyor-general of the province; and receiver-general of the customs for all North America. His large estates near Mamaroneck were erected into the manor and lordship of Scarsdale in 1701, and on his death passed with his title to his son.

HEATHEN CHINEE, THE. A celebrated satiric poem by Bret Harte (1869), in the metre of the threnody in Swinburne's *Atalanta in Calydon*, selected, as Harte says, because "it was just the kind of thing which Truthful James would be the last man in the world to adopt in expressing his views." The poem is based on the imitative faculty of the Chinese, especially in cheating at cards, and its points appealed at once to the East as well as the West, although it was originally intended only as a local satire on Western political conditions. It is probably the best-known and most-quoted of the author's writings.

HEATHER, hĕTH'ẽr. See HEATH.

HEATHER-BLEATER. A provincial name in England for the common snipe (q.v.), in allusion to the love-cry of the cock bird in the breeding season.

HEATH'FIELD, GEORGE AUGUSTUS ELIOT (or ELIOTT), first Baron (1717-90). A British soldier, born at Stobs, Roxburghshire, Scotland. He was educated at the University of Leyden, afterwards attended the French military college of La Fère, and served in the War of the Austrian Succession, being present at the battles of Dettingen and Fontenoy. As colonel of a regiment of light horse, he took part in the Seven Years' War in the years 1759-61. In 1762 he was second in command in the English expedition to Cuba, and for his services there was raised to the rank of lieutenant-general. In 1775, when, because of the *pacte de famille* between France and Spain, it was thought very probable that one or both of these countries, taking advantage of the rebellion in America, would attack England, an experienced soldier was deemed necessary for the command of Gibraltar, and Eliot received the appointment. Ample time was given him to repair the defenses, as it was not until 1779 that the Spanish undertook a regular siege. In the attacking force of French and Spaniards were the greatest engineers of the age, but their efforts to reduce the stronghold, including the terrific cannonade with the floating batteries of the Chevalier d'Arcon in 1782, were futile. Eliot and his little garrison, though at the verge of starvation, because of the blockade, held out until relief came from a force in command of Lord Howe, who succeeded in breaking through the Spanish lines with supplies. At the conclusion of peace, in 1783, Eliott returned to England, where he was richly rewarded for his bravery. He was made Knight of the Bath, and in 1787 advanced to the peerage as Lord Heathfield, Baron of Gibraltar. Consult Drinkwater, *History of the Siege of Gibraltar* (new ed., London, 1844).

HEATING AND VENTILATION. These topics are so closely related in sanitary and engineering discussions, as well as in the actual planning and erection of buildings, that they are generally considered together. Where artificial heat is seldom if ever required little attention need be given to ventilation, since the people spend most of their time either out of doors or in loosely constructed buildings, with plenty of exposure to the outer air. In cold climates ventilation becomes as essential for complete healthfulness as heating is for comfort, a fact that is not generally recognized; moreover, where much artificial heat is required, the fresh air provided as a part of ventilation must also be heated, which may add greatly to the expense of fuel. In general it may be said that the object of heating is to provide a uniform moderate temperature, and the aim of ventilation is to displace foul air with pure. Both heating and ventilation have an important relation to the moisture of the air, hot-air furnaces, for instance, giving an over-dry air, while the atmosphere of a poorly ventilated, over-crowded room gradually becomes saturated with watery vapor.

Heating has for its standard in the colder parts of the United States and in Canada a temperature of about 70° Fahrenheit, against some 60° in England. The difference is largely due to the more uniform and humid climate of England. Heat for warming is produced by the combustion of fuel (q.v.), except in those few rare cases where electricity generated by water-power or the stored heat from underground waters (as at Boise, Idaho) is utilized. Coal and wood are most commonly employed as fuel, but oil and gas are also used. Open fireplaces, stoves, or furnaces may be employed for burning any of the fuels named, except that oil is rarely if ever burned in open fireplaces.

The methods of heating are classified as direct and indirect radiation. Direct radiation takes place when the heat is generated either in the room, as with open fireplaces, stoves, and furnaces, or when hot water or steam is produced by means of central furnaces and then conveyed through pipes to radiators located in the various compartments to be heated. Indirect radiation

involves the bringing in of air warmed by passing it over some central heated surface, generally a furnace, but sometimes a coil of steam or hot-water pipes. It will be noted that direct radiation heats the air already in the room, while indirect radiation brings in heated air. Thus, indirect radiation may be a means of ventilation, also, by seeing that pure air is secured for heating and distribution. The same end may be effected by locating the heating surface in the room and passing the fresh air over it, which is known as direct-indirect radiation. Strictly speaking, fireplaces only heat solely by direct radiation, or by sending the heat out in straight lines until it is deflected or absorbed by something other than air. With stoves and radiators most of the heat is made available by convection, or the heating of the air that impinges upon or passes over the heated surface.

History. The first application of artificial heat consisted, most likely, in lighting a fire of dried sticks and leaves in a grove, a cave, or other natural shelter. Where tents or wigwams came to be erected, the fire would be lighted on the middle of the floor, with perhaps a hole in the roof for smoke to escape. The Romans warmed their apartments chiefly by portable stoves, without any regular exit for the smoke and fumes. A brazier of charcoal is still the chief means of heating sitting-rooms in houses in Spain and Italy, which are in general without chimneys, which are comparatively a modern invention. The early fireplaces were without chimneys and the flues extended only a few feet up in the thickness of the wall. They were then turned out through the wall, to the back of the fireplace, the openings into the outer air being small oblong holes. There is no evidence of chimneys earlier than the twelfth century, and brick was not used for their construction till late in the fifteenth century. Of the modern methods of heating dwellings by fireplaces, stoves, furnaces, steam and hot-air apparatus, the fireplace is the oldest, having been employed during the Middle Ages, and becoming, in Northern Europe, an important feature of its architectural development. The fireplace, at first wholly of masonry, was afterwards framed in elaborately carved oak, and the settle, which soon became an essential part of mediæval furniture, was built into the angle of the chimney. Stoves are said to have been used for the first time in Alsace, in 1490, but they did not come into general use as a means of heating until three centuries later. In 1744 Benjamin Franklin invented a cast-iron open heater, which projected out from the chimney, and so radiated heat into the room from the back and sides as well as from the front. The cast-iron box stove was invented in 1752. Early in the nineteenth century cylindrical sheet-iron stoves were made. About 1830 the first base-burner was put upon the market in America, and since that time the different types of stoves have been developed, by successive patents, to their present state of perfection.

The first attempt to construct a hot-air furnace for supplying pure heated air to rooms was probably made by Franklin. In 1744 he built a box-shaped stove for burning wood. "The smoke escaped over the top of a flat chamber behind its fire, passing downward between it and the real back of the stove, and thence into the chimney. This flat, hollow chamber communicated underneath the stove with a tube opening into the external atmosphere, and a quantity of air was thus passed through the flat chamber into the room through small holes left in the sides." Early in the nineteenth century the method of warming by hot air was developed. The first hot-air furnace in New England is said to have been built in Worcester, Mass., in 1835. Heating by hot water was an invention of great antiquity. According to Seneca, the baths of Rome were warmed by water running through brass pipes, which at one point were heated in a fire. With the fall of Rome this method of warming the air seems to have been forgotten, for we next hear of it as a fresh discovery made in 1777 by M. Bounemain for warming the hot-houses of the Jardin des Plants in Paris. Heating by hot water was introduced into England in 1816 by the Marquis de Chabonne. It was used in Canada for many years before it became popular in the United States, where it was not generally adopted till the last quarter of the nineteenth century. Heating by steam was proposed, in the middle of the eighteenth century, by William Cook, of Manchester, England. In the United States it was not introduced till nearly a century later. The first building in America warmed in this way was the Eastern Hotel of Boston, and the first factory the Burlington Woolen Mill, Vermont.

Fireplaces. The open fire glowing in a grate, which is still the prevalent mode of warming dwelling-houses in Great Britain, and the more common wood fire in America, have an air of cheerfulness and comfort that make them almost objects of worship. Unfortunately, only 10 to 25 per cent. of the value of the fuel burned in fireplaces is utilized as heat; such fires give a partial kind of warmth, heating the side of the body next to it, but leaving the rest cold, and producing draughts into the rooms which are anything but safe or agreeable. Nevertheless, the fireplace holds its own, for besides its cheerfulness and sentimental features it is, or may be, ornamental, while as an efficient aid to ventilation it is most useful. The substitution of brick-lined for non-lined fireplaces conserves some of the heat. Much also depends upon the shape of the fire-box, or grate itself, where coal, rather than wood, is burned. The chief object is to present as large a surface as possible of glowing fire to the front in order to secure as much radiant heat as possible. With this view, the grate is made long and deep, in proportion to its width from front to back. This principle, however, is carried too far in many grates. The stratum of fuel is too thin to burn perfectly, especially in the narrow angles at the sides, where the coal seldom gets to a red heat, and is only warm enough to distill away in smoke. Such fires are constantly going out, and are further from being economical than a square box.

Placing grates almost on a level with the floor is a mistake. The floor and the lower part of the person receive no share of the radiant heat. The chimney throat, instead of a gulf drawing in a constant wide current of the warm air of the room, and causing draughts from windows and doors toward the fireplace, should just be sufficient to admit the burned gases and smoke. Fireplaces are sometimes so arranged in connection with an air-inlet as to introduce a current of

warmed air into the room. In cold climates fireplaces must be supplemented by more effective means of heating.

A STOVE is simply an inclosure of metal, brick, or earthenware, heated by burning a fire within it, and then giving out its heat to the air by contact, and to surrounding objects by radiation. The simplest, and, so far as mere temperature is concerned, the most effective and economical of all warming arrangements is simply a hollow cylinder or other form of iron standing on the floor, closed at top, and having bars near the bottom on which the fire rests. The door by which the coals are put in being kept shut, the air for combustion enters below the grate, and a pipe issuing from near the top carries the smoke into a flue in a wall. If this pipe is made long enough by giving it, if necessary, one or more bends, the heated gases from the fire may be made to give out nearly all their heat into the metal before they enter the wall; and thus the whole heat of the combustion remains in the room. The great objection to this form of stove is that the metal is apt to become overheated, which not only gives rise to accidents, but deprives the air of or increases its capacity for moisture, thus parching the skin and lungs, unless means be taken to supply the necessary moisture. An evaporating-pan or other contrivance is an essential part of stoves and furnaces. Improvements on this simple and rude form of stove aim at avoiding a high heat in the warming surface, by inclosing it in several casings, so as to enlarge the heated surface.

FURNACES. In ordinary hot-air furnaces the fire is burned in a small compartment within the inner case, and the air is warmed by circulating between the inner and outer cases. When placed in the apartment or hall to be warmed, the outer casing has perforations about the top for the issue of the warm air. For heating churches and large buildings generally the furnace is placed in a separate room or cellar, and the warm air is conveyed to the different parts of the building in pipes or flues, while fresh air is drawn to the furnace through a fresh-air inlet and duct from outside the building to the openings in the outer casing of the furnace. The heat-pipes are generally of tin, suspended from the ceiling of the cellar, or from the beams supporting the floor above, in their horizontal course, and carried upward in the partitions to the higher floors to be heated.

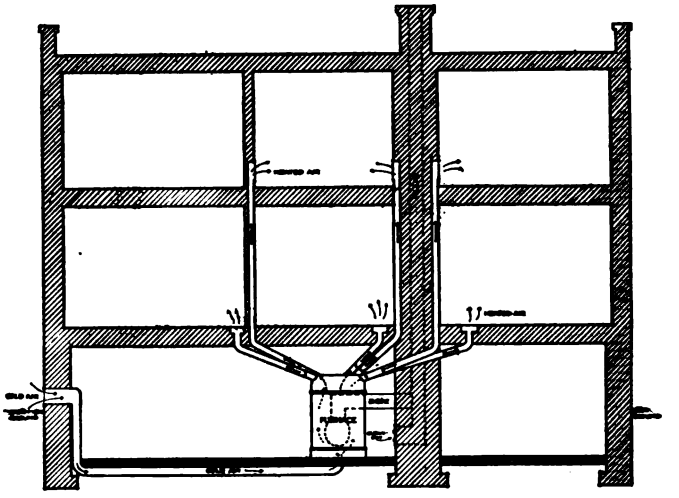


FIG. 2. HOT-AIR SYSTEM.

The heat is admitted to the several rooms through registers. Each room to be heated should have a separate line of heat-pipes, provided with a damper at the furnace. Each register should be supplied with a damper, so the heat may be regulated in the room. The several small openings in the registers should have an aggregate area at least as great as the cross sectional area of the heat-pipe. The supply of fresh outdoor air to be heated and distributed should be ample, for otherwise air will be drawn in from the cellar or some room in the house. The fresh-air box should be as nearly air-tight as possible, and both it and the inlet should be kept well away from any source of contamination. Economy and health alike demand that furnaces be large enough to serve their purpose without being forced, since forcing is wasteful of fuel and overheats the room air-supply. The latter is not only bad in itself, but increases the danger of contamination by the gases of combustion. Some means of mixing cold air with hot is desirable, in order to prevent the shutting off of the fresh-air supply when the room becomes too warm.

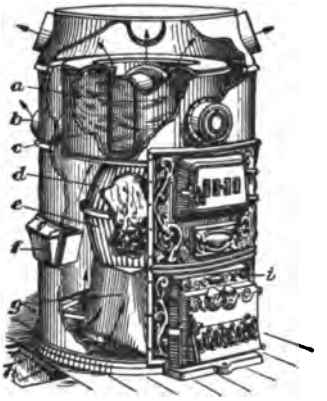


FIG. 1. FURNACE.

a, division-plate; *b*, smoke-pipe; *c*, steel plate radiator; *d*, body; *e*, fire-pot; *f*, water-pan; *g*, ash-pit; *h*, cold-air duct; *i*, dust-flue.

STEAM AND HOT-WATER HEATING. Either steam or hot water is the most common medium for heating the better class of residences and large buildings and groups of buildings. Either may be conveyed long distances with ease, and both are practically unaffected by the direction or the strength of the wind, freedom from a limitation which is one of the greatest drawbacks to the use of hot-air furnaces. Another advantage of steam and hot water is that they may be produced in connection with a steam plant for power purposes, but this is of less account

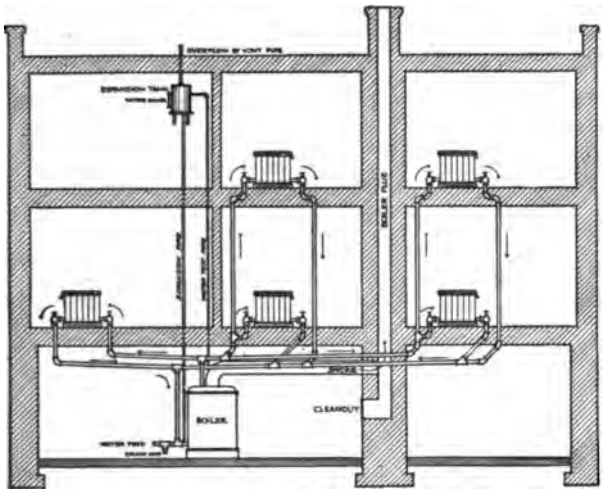


FIG. 3. HOT-WATER HEATING—USUAL METHOD OF PIPING.

now than before electric power became so common. The great disadvantage of either steam or hot water, when employed in direct radiation systems, is that they merely warm the air already in the room, instead of bringing in a constant supply of fresh warm air. This matters little where an independent system of ventilation has been provided and is intelligently used; but in small buildings, particularly houses, there rarely is a system of ventilation. It is to meet this objection that either the indirect system or the direct-indirect is often employed in place of direct radiation. Both steam and hot-water systems require a boiler or heater, a pipe system, and radiators. As the hot water is circulated at 140° F., against 212° F. for low-pressure steam, the radiating surface for hot water must be larger than for steam. Hot-water fitting requires greater care in design and construction than steam, which, coupled with the fact that steam-fitting has been practiced extensively for many years, has rendered the adoption of hot water less common than steam. Of late, however, hot water has been coming to the front. It has this great advantage over steam, namely, that it begins to yield heat very soon after the fire is started and continues to do so until the water cools, while there can be no heat from steam plants until a water temperature of 212° F. has been attained, and none after it falls below that point. On the other hand, steam heat may be shut off more quickly than water, since the latter continues to give off its heat for a much longer period.

Steam boilers and hot-water heaters alike require a furnace, with a grate surface for burning the fuel and a heating surface for imparting the heat thus derived to the water in the boiler or heater. Where steam for both power and heat is to be generated, the boiler will be chosen principally for its suitability for power; or wholly so if the exhaust steam from the engine is to be used for heating. Where the boiler is employed for heating only, low-pressure steam is likely to be used, and the boiler need not differ very much from a water heater, except that the former has a reservoir for steam mounted above the heating surface, while the latter has not. Low-pressure steam systems, it may be explained, show some 5 to 10 pounds pressure at the boiler, and lower through the pipes and radiators. The choice of a boiler, from the many types and styles available, will depend upon a variety of local and even individual conditions. Thus a vertical boiler may be chosen where horizontal space is scarce and vertical space is ample; or a water-tube boiler may be selected where a high pressure is to be carried for power purposes. Where fuel is cheap or the service is likely to

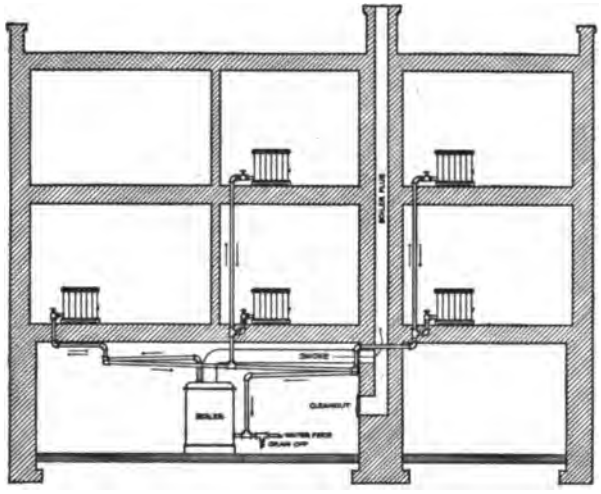


FIG. 5. STEAM-HEATING—PARTIAL-CIRCUIT SYSTEM.

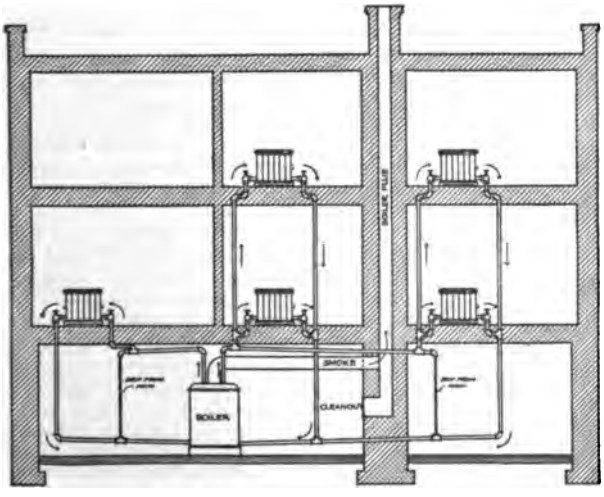


FIG. 4. STEAM-HEATING—TWO-PIPE SYSTEM.

be temporary, a boiler of low efficiency may be permissible, to save a relatively large capital outlay. The character of labor readily available as boiler attendants may have a very important bearing upon the choice of a boiler. Thus for

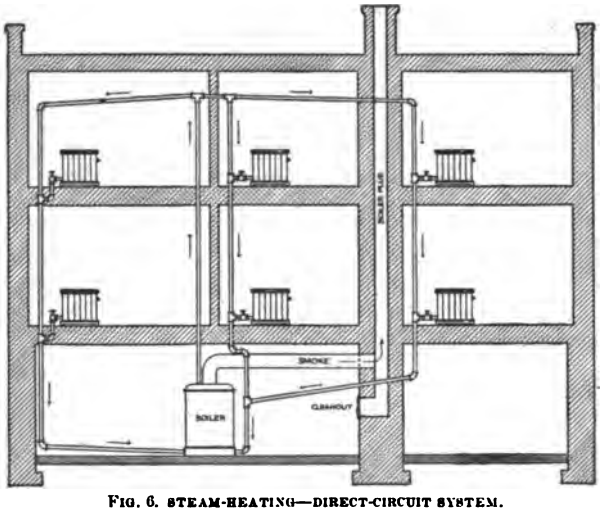


FIG. 6. STEAM-HEATING—DIRECT-CIRCUIT SYSTEM.

heating most residences and many school buildings simplicity, coupled with a maximum of safety, even under neglect, may be of more importance than economy of fuel. Sectional boilers are advantageous here, since a small portion, instead of the whole boiler, may give way in case of accident. Under other conditions fuel economy may be put first, with the understanding that the continuous service of a skilled fireman will be insisted on. In large heating plants, particularly central heating stations (see below), automatic stokers may be used to feed coal to the furnaces and also mechanical means for removing the ashes. See BOILER.

PIPING AND RADIATORS. Pipes for distributing both steam and hot water and for returning the condensed steam and the partially cooled water to the boiler and heater, respectively, are

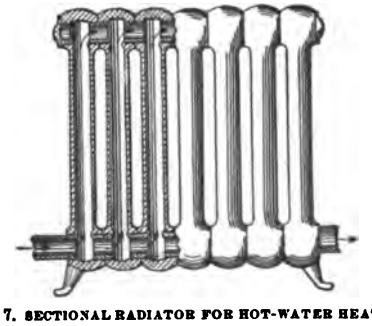


FIG. 7. SECTIONAL RADIATOR FOR HOT-WATER HEATING.

generally of wrought iron, with screw joints formed by means of couplings. The pipe-lines and radiators are controlled by various steam, water, and air valves, some of which are automatic. In most isolated plants the circulation is maintained wholly by gravity. Originally the radiating surfaces were mostly of cast-iron pipe, in horizontal lines, but this was superseded by coils of wrought-iron pipe, and these, in turn, have been largely replaced by vertical radiators, of either cast or wrought iron. For direct heating, cast-iron radiators are most commonly used.

For steam, the connections enter and leave the vertical radiators at the base, but hot-water

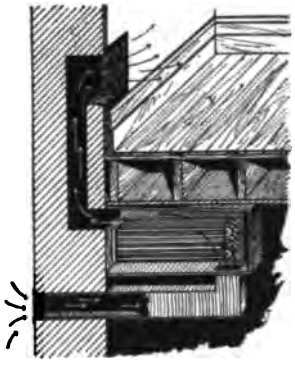


FIG. 8. RADIATOR FOR INDIRECT SYSTEM.

radiators have connections at the top, as well as at the bottom. This allows the air, which collects at the highest point in all water-pipes, to be drawn off. The indirect radiators are of either cast or wrought iron, placed in a chamber, so the fresh-air supply to be warmed may be passed over or through them. Some of the essentials of radiator designs are ample radiating surface, free passages to minimize friction, and good drainage in the case of steam radiators. To prevent the escape of heat where not needed for warming, steam and hot-water pipes are covered with asbestos, felt, or other insulating materials. Where high-pressure steam is used for heating it is generally reduced before entering the distributing system, since steam at much over 212° F. would be unpleasant if not dangerous to those coming near or in contact with the radiators. Recent improvements in heating include the securing of a partial vacuum in the pipes and radiators before admitting the steam, thus lessening the trouble with air. It may also be mentioned that fans are employed to aid the circulation of air in the indirect systems of steam and hot-water heating.

ELECTRIC HEATING. Heat is developed by the passage of an electric current through any conductor; the greater the resistance of the conductor the higher will be the temperature to which it is raised by the passage of the current. This is the principle upon which all electric heaters are constructed. These heaters have come into considerable use since 1895 for heating street cars. Their general construction is as follows: Wire of high resistance is imbedded in asbestos, fire-clay, or other refractory material and built up into plates of large radiating surface, these being generally inclosed between iron plates. The current is passed through the resistance wire, which at once becomes very hot and in turn heats up the refractory material and the inclosing iron. When the heater has been brought up to the required temperature the current may be turned all or partly off, and, owing to the nature of materials used, the heater will retain its heat for a long time. To heat water

or other liquids the resistance coils or the cases which contain them may be placed in the liquid to be heated. Electric heating is used but slightly, except in electric street-railway cars, where current is more readily available than any other means of heating. The heaters are placed beneath the seats, running throughout the length of the car; thus a good distribution of the heat is possible, making a pleasant contrast with the heat derived from the small red-hot coal-stove formerly used. In special cases, where economy is of relatively small importance in comparison with, say, advertising effects or convenience, electric heating is used for apartments in buildings. In a few restaurants and clubs it is also used for cooking. Its cost is so much greater than the more direct utilization of fuel that the general use of electric heating is a luxury in which even the very rich do not indulge. This may be the better appreciated when it is remembered that there is a loss at every step in the process of developing heat by electricity, and that the steps are many. Thus, there is a loss in the combustion of fuel, in the transformation of the heat so obtained into steam, in the utilization of steam in the engine, in the conversion of the power thus obtained to electric energy, in the transmission of that energy through wires to the electric heater, and finally in the reconversion of the electric energy to heat.

One of the great advantages of the electric current for cooking is that though there is great loss during the power of transmission, there is very little loss of heat at the point where it is applied, while only a small proportion of the fuel burned in ordinary cook-stoves is utilized for cooking. See ELECTRIC HEATER.

HEATING WITH ARTIFICIAL GAS is far less expensive than electric heating, but with illuminating gas at $1 per 1000 feet it costs some four to ten times as much as heating with coal. Where cheap fuel gas is available the case for artificial gas heating is not so bad. Gas may be used in fireplaces, stoves, hot-air furnaces, and steam and hot-water systems. For occasional use in fireplaces or other heating apparatus placed in living-rooms gas is often advantageous. It makes no dust, and thus possesses a great advantage over coal or wood. But without good ventilation it vitiates the atmosphere; or at least it consumes much of the available oxygen and may give off objectionable gases. Gas for cooking is rapidly growing in favor, particularly for summer use.

THE CHOICE AND DESIGN OF HEATING PLANTS. The factors entering into both the choice and design of heating plants are many and various, including range of temperature through which the air is to be raised, the size and character of the building to be heated, the sort of fuel to be used, the heating system to be employed, and the amount of ventilation, if any, to be provided.

As to temperature, the usual basis for all American calculations is the attainment of 70° Fahr., the original temperature varying with the locality and season, sometimes falling to —20° Fahr., or even lower. In the matter of the individual buildings there must be considered the area of the ground plan, the number of stories, the number and cubical contents of the several rooms, the areas of exposed or outer wall and window surfaces, and the material of which the outer walls are built, whether of wood, brick, or stone. A large ground plan, for instance, precludes heating with hot air, unless a fan or blower is used, or many furnaces are employed. The character and area of the outer walls of the buildings have an important bearing upon the amount of heat lost by passage through them. The choice of fuel depends largely upon local prices, but there are other important considerations, such as the smoke nuisance from soft coal, which may be (but often is not) avoided with large plants, but cannot be avoided in most plants for heating private residences. In the design of a specific heating plant the relation of grate to heating surface of the hot-air furnace, steam boiler, or hot-water heater must first be considered, having in mind the fuel and the type of furnace or boiler to be employed. Next comes the relation of the heating surface to the radiating surface, when steam or hot water is used, and finally the proportion of the radiating surface to the cubical space to be warmed. Any skimping on the various proportions named means either insufficient warmth in very cold weather, or overworking the heating apparatus, a practice which is wasteful of fuel, may injure the heating plant, and, worst of all, be a menace to health. The foregoing factors in the choice or design of heating apparatus are by no means the only ones, but are sufficient to show the technical nature of many of the problems involved, and the desirability of intrusting the solution of the latter to persons of skill and experience. In fact, the possible savings in fuel and doctor's bills are so great, to say nothing of matters of comfort and convenience, that a thoroughly competent engineer or architect may well be consulted in the selection, or design, and installation of heating plants for all buildings, from moderate-sized residences up. For all but very small heating plants, and for all systems of ventilation, this will be essential to the securing of the best possible result.

CENTRAL HEATING PLANTS are employed to heat a number of buildings from a common source. Steam or hot water is conveyed from the central station to the several buildings through underground pipes. Within the buildings the heat is distributed in the same manner as when generated on the premises. Hot water must be returned to the central station, but the condensed steam is drawn out of the system in each building and discharged into the sewer. By first passing the exhaust through an economizer indirect heating and ventilation may be afforded. The central station equipment consists of boilers for steam and heaters for hot water, or else utilizes the exhaust steam from electric light and power stations, as explained below. The large size and greater efficiency of the central, as compared with isolated for private heating plants, results in economy in both construction and operation, in addition to which there are the savings due to the use of cheaper fuel and automatic devices for feeding the coal to and removing the ashes from the furnaces. The consumer reduces his fire risk, avoids the dirt and dust incident to isolated heating, the bother of getting coal into and ashes out of his cellar, and all possible vitiation of the air of his house by furnace gases. The community at large may be benefited by a marked reduction in both the ashes and the smoke nuisance, the latter being of great possible importance where soft coal is used for domestic fuel. Finally, the consumer may be assured of an

equable temperature, night and day. As an offset to the economy of central heating there is the cost of installing and maintaining the distribution system, and of making good the losses of heat in transmission. Then it must be remembered that the care of isolated heating plants involves, oftentimes, no extra expense for labor, since they are tended by some member of the family, or some employee whose time is not fully occupied. Few central heating plants, except for colleges and other institutions having groups of buildings, were constructed until there came into vogue the utilization, for this purpose, of the exhaust steam from electric lighting and power plants. The occasional early installations were most frequent where a number of large customers could be secured near the station, particularly if steam could also be sold for power purposes. The latter was quite possible, since live steam was supplied to the mains, and reduced in pressure at the premises to be heated. From 1895 to 1900 many heating installations were added to central electric lighting plants. Although still largely an experiment, at least in many details, this departure seems sure to extend rapidly. The combination adds stability to both the electric and the heating industry: (1) By enabling the former to utilize a large percentage of the heat value of the fuel, which would otherwise go to waste; (2) saving the entire fuel bill of the latter, so long as the exhaust steam is sufficient for the heating demand; (3) by making it easier to secure customers for both current (light and power) and heat, since many possible consumers either went without electric light and power, or maintained isolated plants, because they required a steam plant for heating purposes. On the other hand, where the exhaust steam is used for heating, non-condensing engines, with lower efficiency than condensing, are generally employed. At present the majority of electric stations use non-condensing engines, so they are at liberty to choose between the more efficient condensing engine as a means of utilizing a portion of their exhaust steam and central heating installation to utilize the whole of it. The basis for choice rests upon a variety of local circumstances, including the cost of fuel, and the number and character of the population near the electric station.

Station Equipment for central plants is much the same as for isolated ones, only on a larger scale. When combined with electric plants, live steam must be made available when the demand for heat is greater than can be supplied by the exhaust steam. In such cases the pressure of the live steam is reduced before admitting it to the mains. Back pressure on the engine must be eliminated as far as possible. This may be effected, at times of low demand for exhaust steam, by wasting a part of the exhaust. If hot water is the heating medium, the exhaust steam is passed through a heater, then condensed and the warmed water distributed by pumping.

Distribution Systems consist of supply pipes for the steam or hot water and return pipes for the latter, and corresponding branches, or services, for the several consumers, all of which must be carefully installed to prevent loss of heat in transmission. The pipe is generally of wrought iron. Special provision must be made for expansion and contraction. The expansion joints are known as *variators*. They are made without packing, both to save the trouble and expense of its renewal and to diminish the number of manholes. Insulation is secured in a variety of ways. One of the most effective and cheapest means of insulation is bored pine logs. The large pipe is inclosed in regular compartments, often formed of brick side walls and plank tops. The space between the walls and the pipe is packed with some non-conductor of heat, in addition to which the pipes may be wrapped with asbestos felt. More expansion joints, better insulation, and more thorough protection against ground water are required for steam than for hot-water pipes, on account of the higher temperature and consequent greater heat losses of steam, and also to prevent condensation. Inside the building line there is a shut-off valve, and beyond that there may be a reducing or a regulating valve, to maintain the pressure at the desired point, regardless of its amount or variation in the street pipes. Next in order comes the meter, where the steam is sold by direct measurement, or the condensed steam may be passed through a hot-water meter on the main waste pipe leading to the sewer.

A hot-water supply may be metered, provided its temperature is kept fairly constant at the station. In some plants, however, the temperature, rather than the volume, of the water is increased when more heat is required. Steam may be supplied to either steam or hot-water radiators, but the lower temperature of hot water renders a previous installation of steam radiators inadequate for hot-water service, besides which a change in the piping system may be required. The temperature in hot-water systems is sometimes regulated at the central station and sometimes it is left to the customer. In either case the regulation may be effected by a thermostat. In fact, thermostats may be employed to a greater or less extent on nearly all systems of heating, isolated as well as central. The charges for central heating are most frequently based on the service for a whole season, modified by either the radiating surface supplied or the cubical space which that surface is designed to heat. Seasons, of course, vary both in length and in range of temperature, and the amounts of heat desired by different consumers also vary. On these and other accounts it is a convenient basis, and it is more attractive to new consumers than any system of metering, with its indefinite promise as to the cost of service.

The introduction of central heating plants for general municipal service was largely due to Birdsill Holly, of Lockport, N. Y. The first trial of his idea was made at Lockport, about 1880, when he organized a company for that purpose. Soon after, a plant with five miles of mains was installed in New York City. These, and a number of other Holly plants, supply steam for power, as well as for heat. At present a large number of both steam and hot-water plants are in use. They are operating under a great variety of conditions and their location ranges from Atlanta, Ga., to Seattle, Wash. Some of the plants are serving customers in towns with only a few thousand inhabitants.

VENTILATION.

History of Ventilation. Although special openings were left in the roofs of Roman buildings for the escape of air, their object was to

regulate the temperature rather than the air-supply of the building. Later the necessity of securing a supply of fresh air in mines served to call attention to the necessity of ventilation independent of heating. In the sixteenth century George Agricola (q.v.) wrote a treatise, *De Re Metallica*, in which he describes the methods employed to ventilate the mines of Saxony and Bohemia.

In France ventilation was formerly studied chiefly from the standpoint of securing a fresh-air supply for hospitals. In 1843, according to Pecht, there was but one hospital in France having a regular ventilating apparatus. In 1853 two systems were tried in the construction of the Hospital Lariboisière, one of aspiration, the other of inflation. Both were unsatisfactory because neither of them supplied a sufficient quantity of fresh air. In Germany, as in France, the early history of ventilation is connected with hospital construction. In England attempts at securing a fresh-air supply began much earlier, and consisted in repeated attempts to secure ventilation for the English Houses of Parliament. In 1660 Sir Christopher Wren made the first attempt, and the history of the subsequent efforts made would be an epitome of the advance of the science of ventilation. In 1856 the General Board of Health of England appointed a commission to inquire into the best methods of warming and ventilating dwellings. About the same time, owing to the heavy losses by sickness in the Crimean War, the question of barracks-room ventilation was under discussion.

In the United States, as in England, the early attempts at ventilation were directed toward securing fresh air for the meeting-places of legislative assemblies, the first report on the subject having been made on April 2, 1849.

Ventilation has for its object the maintenance of a pure-air supply indoors. This can be effected only by the removal of foul air and the introduction of an equal amount of pure air. Unfortunately, the fact that these two processes go together is often overlooked. Considered from the standpoint of the air in the room, ventilation removes or dilutes such impurities as have been introduced by man, regulates the moisture, cools the air, and may be instrumental in warming it, although the latter, properly speaking, pertains to heating. Ventilation has no effect on the quality of the air introduced. Therefore, it alone can give no better air than that surrounding the building to be ventilated. It is sometimes practicable to remove dust from the fresh-air supply, in case dust cannot be avoided, by filtering the air through cotton cloth or fibre, or through fine meshes of wire. The moisture of the air-supply may be lessened by drying, and air which is too dry may be moistened by spraying with water. The chief impurities in the air of houses and public assembly rooms are those thrown off by the lungs and skin. Next in importance are the gaseous products of the combustion of oil and gas for lighting, and of these two substances and coal when used for heating. Dust, also, is found everywhere, some being due to the processes already mentioned, some being brought in on the feet and clothes, or blown in through doors and windows, while large quantities of it are due to the wear and tear of clothing, carpets, and the like. In shops and factories the air is contaminated in most of the ways already mentioned, some of which, like dust, may be intensified many fold. In addition, the air of manufactories is liable to be made impure by the gases given off by the chemicals employed or produced, or by the decomposition of organic matter. The number of hours in a day during which a room is occupied, as well as the number of occupants in proportion to the cubical contents of the room, has a most direct bearing upon the vitiation of the air and the means to be employed to rectify it. Thus, dwellings of the better class have some of their rooms continuously occupied for one-half the day, and still other rooms for the remaining half, the air-space to each person being large. Churches may be crowded, but generally only for one to two hours at a time. School buildings, legislative assemblies, and factories may be crowded for hours together, then as completely emptied as churches. Hospital wards are liable to be fully and continuously occupied, in addition to which there are various well-known special ways of contaminating the air of hospitals. Wherever rooms are used intermittently, it is generally possible to give them a thorough airing by throwing the windows wide open; but, beneficial as this may be, its effect is not permanent, and, with the best of intentions, it is quite sure to be neglected, particularly in cold weather. Even in the summer time the ventilation of crowded assembly halls and hospitals cannot be left with safety to the interchange of air due to open windows, since the air may be stagnant outdoors as well as in. In capacious dwelling-houses, with walls, doors, and windows not too tight, the natural interchange between the inner and outer air may suffice during a large part of cold weather, while open doors and windows will give as much fresh air in summer as it is practicable to provide; but there will be times in cool weather when even these favorable conditions will be lacking.

It is pretty clearly shown by the foregoing that ventilation should be made an essential feature in the design and use of practically all classes of buildings in which people live, work, are instructed, or amused. The quantity of air to be supplied and removed, and the proper means of doing both, can be best understood after considering in more detail the nature and amount of the chief impurities which it is desired to avoid. The vital principle of air is oxygen. Normal air contains about 20.9 per cent., in volume, of oxygen, 79 per cent. of nitrogen and argon, and 0.1 per cent. of other substances, including some 0.03 or 0.04 per cent. of carbonic acid (carbon dioxide). After having been passed through the lungs the oxygen has been diminished to 16 per cent., and carbonic acid has been increased to 4.4 per cent. of the total volume, the nitrogen rising slightly to some 79.5 per cent. This exhaled air is rapidly diffused throughout the room, so unless the room is crowded the percentage of total oxygen is not greatly diminished for some time. With the reduction in the oxygen comes a change in the gaseous pressure in the lungs, as well as a lowering of the amount of the vital principle of the air-supply, both of which cause serious disturbances when carried far. Associated with the diminished oxygen there is also an increase in watery vapor, in the effete and putrescible organic contents of the air, and possibly in the number of harmful bacteria

which it contains. Another cause of diminished oxygen is the burning of oil and gas for illumination. As an index of the impurities present, and of the diminution of oxygen, carbonic acid has been chosen. For convenience it is generally expressed in parts per 10,000, thus giving 4 parts per 10,000, instead of 0.04 per cent., as the normal average amount in the air. In the purest air the carbonic acid may fall to 2.2 parts; in cities it may be normal at 4.5 parts; in occupied rooms it may go to 33 parts per 10,000, or even higher. Without going into the calculation involved, or considering the other impurities, it may be said that when the air of a locality shows an excess of carbonic acid above the normal for the locality as great as 2 parts per 10,000 it is considered to be polluted; also that it has been found desirable to supply each person in a room with at least 30 cubic feet of fresh air per minute, or 1800 cubic feet per hour. Obviously, the actual amount of air required will vary with the character of the rooms and their occupants, two very important considerations being whether or not the occupants are engaged in physical exercise, and the number of hours of continuous occupancy. After a careful consideration of the subject, including a weighing of authorities, Dr. John S. Billings, in his work on ventilation, gives the following table:

	Cubic feet of air per hour
Hospitals	3,600 per bed
Legislative assembly halls	3,600 per seat
Barracks, bedrooms, and workshops	3,000 per person
Schools and churches	2,400 per person
Theatres and ordinary halls of audience	2,000 per seat
Office rooms	1,800 per person
Water-closets and bathrooms	2,400 each
Dining-rooms	1,800 per person

These figures are for use in planning new buildings, where no allowance is placed "on leakage through crevices or on bad construction of the building as a source of air-supply," and where it is "assumed that the walls will be rendered more or less impermeable by paper and paint." In the case of old buildings, where for any reason it is difficult to supply so much air as recommended above, Dr. Billings says one-half the amount may be made to do, but it will be unsatisfactory. He also emphasizes the fact that the whole ventilating and heating system must be proportioned in accordance with the figures given, or any modification of them which may be adopted, including all air-ducts, inlets and outlets, blowers, and heat-generating apparatus.

Ventilation may be divided into two classes, gravity and mechanical. *Gravity ventilation* is based on the fact that warm air is lighter than cold, and hence is overbalanced and replaced by the latter. In cold weather the inner is warmer than the outer air, so, if sufficiently capacious inlets and outlets are provided, the warm, foul air will be displaced by cool, fresh air. But in warmer weather the differences in temperature, and consequently in pressure, are less and the interchange lags. The currents in the ventilating ducts may then be aided by a slight heating, which may be effected in a variety of ways, such as a light fire, or even a gas jet or jets in the base of the ventilating shaft; or a coil of steam or hot-water pipes, where feasible. Even if there be no ventilating flues, there will be a more or less constant interchange of air through the walls and the cracks around chimneys and doors; but in well-constructed houses this may be very small in fairly cold weather, and practically nothing in mild weather, while for schools, churches, and the like it is of little consequence except on very cold or windy days. This interchange may well be called *natural ventilation*, a term which may also be extended to include all ventilation depending solely on the difference between the inner and outer air. It may be added that natural ventilation has been used quite extensively in contradistinction to *forced ventilation*, and in place of the term gravity ventilation employed in this article; but when gravity ventilation is assisted by fires at the base of the stocks it, also, seems to belong properly under forced ventilation. The more recent nomenclature adopts gravity in place of natural, and mechanical in place of forced ventilation. *Mechanical ventilation*, as the name implies, depends upon machinery for the movement of the air. It may be used to introduce fresh air, to remove foul air, or both. Where indirect heating is employed the warm-air and the fresh-air supplies may be identical, but in mild weather the combined supply does not move readily by gravity alone, so mechanical aid may be advantageous. With direct heating an independent air-supply is required, and in cold weather it, also, must be heated. When not heated, such a supply may need to be urged along by mechanical power. With either indirect or direct heating an air-blast has the great advantage of perfect control of the fresh-air supply. If a hot-air blast is employed, both heating and ventilation are under equally good control, and it is claimed that the heating is more economically done. For the removal of foul air mechanical means are also advantageous, as being more reliable than gravity. The most common mechanical aids employed are blowers or fans, placed in the air-ducts, and either forcing the air ahead of them or creating a vacuum into which it rushes. Screw propellers and pumps may also be used to force the air. The terms *plenum*, or inflating, and *vacuum*, or aspirating, are applied, respectively, to blowing in and to sucking out air. The great danger in either system is that the fans, blowers, or other air-movers will be too small, in which case the friction losses will render them expensive to operate, and the air current will be so rapid as to cause draughts, or else an insufficient amount of air will be moved. There is also danger that a desire to economize in first cost will lead to air-ducts deficient in size, with the same general results. The proper elevations for introducing fresh and removing foul air are still mooted questions. It is certain, however, that the relation of the inlets and outlets should be so placed as to give the most perfect diffusion of the fresh air and to leave no stagnant foul air in the rooms, which will also tend to avoid heavy draughts. Many authorities favor the location of the inlets and outlets on the same side of a room, the inlets to be above the heads of the occupants. The theory is that the fresh air will ascend to and pass along the ceiling, and that the foul air will pass along the lower part of the room and then out. One of the chief objections to locating inlets, for either heating or ventilation, in the floor is that the ascending air carries up floor-dust with it; and another is that unless the

inlets are very numerous the inrush of air will be unpleasant to those near by.

BIBLIOGRAPHY. Consult Billings, *Ventilation and Heating* (New York, 1893), which is particularly full in its discussion of ventilation, and includes descriptions of the ventilation of a number of hospitals and other public buildings; Carpenter, *Heating and Ventilating Buildings* (New York, 1895), which goes more fully into heating and develops the mechanical phases of both subjects; Baldwin, *Hot Water Heating and Fitting* (New York, 1890); Richards and Woodman, *Air, Water, and Food* (New York, 1900), which sets forth the physiological side of ventilation briefly and clearly, and has a valuable chapter on methods of air analysis, and the determination of carbonic acid; Putnam, *The Open Fireplace in All Ages* (Boston, 1881); Dwyer, on "Stoves and Heating Apparatus," in *One Hundred Years of American Commerce* (New York, 1895); *Proceedings American Society of Heating and Ventilating Engineers* (New York, 1894-1900).

HEATON, AUGUSTUS GEORGE (1844—). An American painter, born in Philadelphia, Pa. He was the first United States student admitted to the Ecole des Beaux-Arts in Paris (1863). He studied under Cabanel there, and afterwards became a pupil of Bonnat, and exhibited several times at the Salon. Among his works are: "Washington at Fort Duquesne;" "The Recall of Columbus," which was bought by the United States Government and engraved for the 50-cent stamp of 1893; "Hardships of Emigration," engraved on the 10-cent stamp, celebrating the Trans-Mississippi and International Fair; and "The Promoters of the New Congressional Library" (1888). He also painted portraits of Mrs. Jefferson Davis and Amélie Rives.

HEATON, MARY MARGARET (1836-83). An English art critic, the daughter of a silk-printer, James Keymer, who was a friend of Douglas Jerrold. She wrote: *Masterpieces of Flemish Art* (1869); *Life of Albrecht Dürer* (1870); and a valuable *Concise History of Painting* (1873; and in Bohn's *Artist's Library*, 1888); as well as contributions to Bryan's *Dictionary of Painters and Engravers*.

HEAT-STROKE, SUNSTROKE, or THERMIC FEVER, also called INSOLATION, HEAT APOPLEXY, SUN FEVER, and SIRIASIS. The effect produced upon the body by exposure to intense heat, whether from the sun, from furnaces, or from the atmosphere. Another form of affection resulting from exposure to heat is HEAT EXHAUSTION, or HEAT PROSTRATION, in which there is a very different set of symptoms. In the commoner, mild form of heat prostration, the patient exhibits exhaustion, weakness, faintness, and occasionally nausea; in the severe form, pallor, great depression, collapse, and loss of consciousness, with a subnormal temperature dropping sometimes as low as 95° F. All cases recover in a few hours. Heat-stroke, on the contrary, usually comes on abruptly, or is preceded by some weakness and anxiety. Unconsciousness supervenes early, with flushing of the whole body and profuse sweating, delirium or even mania, vomiting and diarrhœa, and a temperature of 108° to 115° F. Death may ensue speedily, from cessation of respiration or from cerebral anæmia; the sweating ceasing, the full rapid pulse becoming imperceptible, and asphyxia, coma, or convulsions following. Laborers in the open, laundresses in an overheated kitchen, bakers, and firemen in engine-rooms, present most of the cases. Many cases occur at night among those exposed to indoor heat who have not been in the sun at all; others who have been in the sun during the day are stricken at night in the vitiated atmosphere of crowded tenement-house rooms, after drinking alcoholic beverages and eating hearty meals.

Two and six-tenths per cent. of the heat produced by the chemical metabolism within the body is lost from the body in warming substances taken in as food and drink, 2.6 per cent. in warming the inspired air, 14.7 by evaporation, and 80.1 per cent. by radiation and conduction from the skin. With the inspired air hotter than the body, radiation and conduction abolished, and evaporation rendered impossible in an atmosphere nearly saturated with vapor, the constant production of heat by muscular action must result in a great strain upon the inhibitory cerebral centres that preside over heat regulation. Any previous ill health, alcoholic indulgences, or other excess is followed by a failure of these centres under such strain, and heat-stroke is the result. The combined influence of heat and auto-intoxication constitute the combined cause of heat-stroke, with the possibility of a germ poison. Sambon, of Rome, in a paper on heat-stroke published in 1898, asserted the infectious character of the disease as produced by a specific germ. He classes it with yellow fever, dengué, and other tropical affections, all germ diseases requiring high atmospheric temperature for their development. This view has yet to be substantiated. Van Gieson, of New York, however, during an extensive examination of brains of victims of heat-stroke, found changes in the chromophilic plaques of the ganglion-cells. These plaques were changed in shape, fewer in number, replaced by fine dust, or entirely absent. The nucleus of the brain-cell stained very deeply, and within the nucleus membrane were found minute spherical granules not normally present. Van Gieson says: "There seems to be no other interpretation open as to the significance of this degeneration than the operation of a toxic substance upon the ganglion-cells. . . . There is in insolation a toxic cytolysis or cell resolution of the neurons." He considers the morphologic changes in the ganglion-cells similar to those produced by alcohol, lead, and the microbe poisons; and that heat-stroke is "a species of auto-intoxication, the neural symptoms finding a clear and definite explanation in the acute parenchymatous degeneration induced by an autogenous poison."

The treatment of heat prostration, the mild form of thermic exhaustion, consists in securing elevation of the temperature of the body by the use of external heat and in supporting the heart by the use of alcoholic stimulants, strychnine, and similar drugs. In heat-stroke, on the other hand, rapid reduction of temperature must be secured at the earliest possible moment. Sprinkling ice-water over chest and body or rubbing with ice is imperative. It has been urged that ambulances carry ice and a sprinkler, that treatment may begin as soon as the patient is reached, and continued during his trip to the hospital. Here the patient is placed on a Kibbé cot or a Walton bed, and the cold affusion is continued till the temperature falls to 102.5° F. He is then rubbed dry, removed to a bed and wrapped

in warm blankets, with as little disturbance as possible during the operation. If the temperature rises, the ice-water treatment is to be repeated. Acetanilid and antipyrine have been used with success as antipyretics, adjuvant to the ice-water. Venesection has been practiced with great relief in some cases. Ether or chloroform has been used to control convulsions, anæsthesia being continued for several hours. Morphine is very valuable in many cases. Flagellation of the extremities, sinapisms to the legs, stimulating rectal injections, atropine, digitalis, and nitroglycerin all have been used, in addition to the drugs mentioned.

The sequelæ of heat-stroke possible are headache, tinnitis, deafness, insomnia, impaired memory, insanity, epilepsy, paralysis, meningitis, and many functional irregularities, especially of the heart. Heat-stroke is often preventable. Laborers should dress in thin, loose clothing in place of woolen; sleeping-rooms should be ventilated, stimulants should be avoided, shelter from the sun should be provided when possible, and plenty of water should be drunk by those exposed to the heat. Troops, as well as gangs of laborers, should be inspected, and when sweating ceases and the skin becomes hot and dry, relief from duty, rest, and a cold bath should be ordered.

Consult: Wood, *Thermic Fever or Sun-Stroke* (Philadelphia, 1872); Townsend, "Sun-Stroke at the New York Hospital," in *Medical Record* (New York, 1880); Horton, *Diseases of Tropical Climates: Sun-Stroke* (London, 1879); Borely, *Le Coup de chaleur* (Paris, 1884); Ellis, "Treatment of Insolation," in *Medical Record* (New York, 1888-89); Ellis, "Insolation: Immediate Treatment Necessary," in *New York Medical Journal* (New York, 1891); Stowell, "Sun-Stroke at the Massachusetts General Hospital," in *Boston Medical and Surgical Journal* (Boston, 1892); Lambert, "Sun-Stroke," in *Medical Record* (New York, 1897).

HEAU'TON TIM'ORU'MENOS (Lat., from Gk. *ἑαυτὸν τιμορούμενος*, *heauton timoroumenos*, the self-tormentor). A comedy by Terence, based on a play with the same title by Menander, and first performed in B.C. 163 at the Ludi Megalenses. In it Terence developed the intrigue of the original into an extravagant plot. The play is lacking in life and in delineation of character. It contains the famous line, "Homo sum; humani nihil a me alienum puto."

HEAVEN (AS. *heofon*, OS. *heban*, Icel. *hifinn;* connected with Goth. *himins*, Icel. *himenn*, OS. *himil*, OHG. *himel*, Ger. *Himmel*, heaven, ceiling). In theology, that portion of infinite space in which the Lord of all things, although present throughout all, is supposed to give more immediate manifestations of His glory. Of the belief in the existence of some such special scene of the presence of the Deity, most of the known religions of the world, ancient and modern, present abundant evidence. Aristotle declares that all men, whether Greeks or barbarians, have a conception of gods; and all agree in placing the habitation of the gods in the most elevated region of the universe. Plato is equally explicit. Even Epicurus teaches the same doctrine; and one of the treatises deciphered from the papyri of Herculaneum is a treatise by him, in which the position and the other characteristics of the habitation of the gods are minutely discussed. The same may be said of the Persian, the Egyptian, the German, the Scandinavian, and in general, of all the ancient religions in which the belief of the existence of a supreme being assumes any other form than the pantheistic; and even in the pantheistic religions, although the philosophers may have adhered to the strict pantheistic view, and may have denied that any special locality could be regarded as the peculiar seat of the Deity, yet we find the popular belief and the popular worship even of such religions plainly founded upon the contrary supposition. In addition, however, to the idea of its being the special scene of God's glory, the word heaven also designates the place, or the state or condition, of the blessed spirits, and of the souls of just men who are admitted into the participation or the contemplation of the divine beatitude. In the religious system of the Greeks and Romans, none were supposed to be admitted to the heaven of the gods except the deified heroes or demigods; but with them the elysian fields (q.v.) of the lower world held, morally speaking, the same place in relation to the great doctrine of the divine retribution for the good and evil actions of human life. The elysium of the classic mythology is in all essential respects the natural equivalent of the heaven of the just. The Pythagorean doctrine of metempsychosis approached nearer to it in form; for it supposed that the soul, after the purification of successive transmigrations, was elevated to a higher and incorporeal condition in the cosmos. The doctrine of Plato was still more explicit. It may be said in general that all the philosophical systems which included the belief of the immortality of the soul, also involved, at least in substance, the idea of a state of happiness as the reward of a virtuous life. The happiness, however, of the heaven of these various creeds differed widely from the spiritual delights of the heaven of Christianity, each nation and each class forming to itself its own ideal of enjoyment. The delights of the classical elysium were, at all events in part, delights of sense. The German warrior had his war-horse and his armor laid in his grave, that he might be able to pursue, after death, the fierce enjoyments in which he had delighted while in the world of the living. The paradise of the Indian hunter is but a richer and more extensive hunting-ground. The paradise of the Mohammedans is grossly sensual. Still, not only these, but even the more groveling conceptions of other races, must be regarded as a natural manifestation of the same instinct. *The Testament of the Twelve Patriarchs* (see APOCRYPHA) contains a very curious exposition of the same notion.

The Hebrews conceived of the sky as a solid firmament, upholding the celestial reservoirs of water. (See FIRMAMENT.) They invariably used a plural noun for heaven indicating a belief in a plurality of heavens, Gen. i. 1; Deut. x. 14; I. Kings viii. 27; Ps. cxlviii. 4. It is probable that the conception of seven heavens, based on a division of the celestial spaces between the seven planets, existed already in early times in Israel. In the beginning of the Christian Era this idea finds expression in the Slavonic Enoch (q.v.), and some parts of the Testaments of the Twelve Patriarchs, where the character of each of the seven heavens is described in detail. It is noticeable that in Enoch vii. the sinning angels are

imprisoned in the second heaven, and that in chapter x. the sinners among men are punished in the northern part of the third heaven. Substantially the same conception is found in the Ascension of Isaiah, the Apocalypses of Moses, Ezra, John, Isaac, Jacob, and the Acts of Callistratus. In view of these facts, it becomes probable that in the Pauline Epistles the heavens are also assumed to be seven in number. Thus paradise is in the third heaven in II. Cor. xii. 2, 3, as in Slavonic Enoch viii.; in Eph. vi. 12 there are spiritual hosts of wickedness in the heavens; in Col. i. 20 the kings in heaven as well as on earth have to be reconciled to God; in Heb. iv. 14 the great high priest passes through the heavens. The Jewish apocalyptic sketch in Rev. xii. describes a war in heaven, between Michael and his angels and Satan and his angels. While ultimately the old Semitic doctrine of seven heavens and of battles and places of punishment in one of these heavens was suppressed in Christian thought, it continued in the religious systems of the Mandæans (q.v.) and in the Koran. As the storm-cloud was the celestial abode of Yahweh, Israel's god, so the translation of such heroes as Enoch and Elijah originally implied only that they were carried alive from earth to be with Him among the clouds. But as the conception of the Deity expanded, His heavenly dwelling-place began to occupy more fully the imagination. In the Ethiopic Enoch (see ENOCH, BOOK OF) and the Slavonic Enoch this antediluvian patriarch describes minutely the heavens through which he is permitted to pass. The hope awakened through the Persian doctrine of resurrection, of a release from sheol, in the case of all Israelites or of the pious in the nation, offered the possibility either of a new life on earth or of a translation to heaven. In the recorded sayings of Jesus there is no description of heaven. His answer to the question of the Sadducees touching the resurrection seems, however, to imply that He considered those who had been accounted worthy of being raised from the dead as living in heaven, being like angels, neither marrying nor being given in marriage (Luke xx. 33 sqq.). The dominant view in the early Church seems to have been that until the return of the Lord upon the clouds of heaven to raise the dead, those who had died were asleep, and that they would be suddenly awakened to be given their new bodies, after which they would reign with Him on earth for a thousand years before their final translation to heaven. But, largely under the influence of Greek thought, other conceptions prevailed. The fate of the patriarchs, prophets, and pious men of the old dispensation naturally occupied much attention and led to the idea that they were detained in a preparatory abode which the fathers called *limbus patrum*, awaiting the advent of the Redeemer. The general belief of Christians has been that since the resurrection of Christ the just who are free from sin are admitted immediately after death into heaven, where their chief joy consists in the unclouded vision of God. But especially since the sixteenth century there have been many who have returned to the millennial views of a part of the early Church. (See MILLENNIUM.) While Christians generally have maintained that since the coming of Christ no human being can be admitted into heaven without some identification with Him or His Church, through personal faith, or the sacraments, it has been held by some that access to Heaven would not be denied to unbaptized infants, pagans, or others having had insufficient opportunities of embracing the gospel, while others have believed that all souls would ultimately reach heaven. Consult: Smend, *Alttestamentliche Religionsgeschichte* (Freiburg, 1899); Holtzmann, *Neutestamentliche Theologie* (Freiburg, 1897); Morfill and Charles, *Book of the Secrets of Enoch* (Oxford, 1896); Atzberger, *Christliche Eschatologie* (Freiburg, 1890); Charles, *Eschatology* (London, 1899). See ESCHATOLOGY; IMMORTALITY.

HEAVES (from AS. *hebban*, Goth. *hafjan*, OHG. *heffan*, Ger. *heben*, to lift), or BROKEN WIND. A disease or unsoundness of the respiratory organs of the horse, which, from the French *pousse*, was termed by some of the old English writers on farriery *pursiness*. The nature of the malady is not well understood, though difficult expiration by a spasmodiq or extraordinary effort is characteristic. The air is inspired with ease.

A broken-winded horse does not generally thrive, is lean, and has a dependent belly, the muscles of which are usually active as expiratory muscles. The characteristic symptoms are best observed when the horse is exercised. The breathing becomes very labored, the nostrils dilated, the eyes bloodshot, and even blue, an indication of imperfect blood purification. On watching the chest and flank, the ribs are observed very actively moved, and after collapsing, when the air is expelled from the lungs, are further depressed by a spasmodic jerk brought about by the abdominal muscles. A broken-winded horse has the hollow cough referred to by veterinarians as characteristic of unsoundness. When the animal is oppressed by fast work, or by dragging a load up a hill, the pulse is excessively rapid, a symptom regarded by some as indicating disease of the heart, and by others an affected diaphragm. In reality it is a dietetic disease, and is due to the irritation in the stomach caused by indigestible food, being reflected from the nerves of the stomach to those of the lungs. On post-mortem examination the stomach is found to be much distended with food of a dry nature, and to have thinner walls than is normal. The lungs are lighter in color, and float much more buoyantly than in health; little or no blood is seen in them, but they contain a large quantity of air, which makes them crackle when pressed.

The treatment of heaves is very unsatisfactory, and a palliation of the symptoms by keeping the alimentary canal in proper order, administering occasional purgatives, and feeding on a proper quantity of the best oats, which should always be bruised, is all that can be recommended as remedies; but turning out to pasture, or feeding on cornstalks or other laxative food, sometimes produces a cure in mild cases. Only the best quality of hay should be fed, and that in small quantities. Some veterinarians have vaunted their power to cure this disease, and recommend large doses of camphor, digitalis, and opium; but these potent narcotics only operate for a very short time, and as their effects pass off the symptoms return, often with increased severity. It is generally conceded that the disease is incurable. Horses very frequently drop down exhausted when at hard work, and die either from congestion of the lungs, hemorrhage, or simple suffocation.

HEAVY'SEGE, Charles (1816-76). A Canadian poet, born in Liverpool, England. For some time after his arrival in Canada (1853) he followed his trade, that of a cabinet-maker, but later branched off into wood-carving, and thence went into journalistic work for the Montreal *Witness*. After publishing anonymously *The Revolt of Tartarus* (1853), and a volume of sonnets, he produced his best work, a three-part tragedy entitled *Saul* (1857), followed by *Count Filippo, or the Unequal Marriage: A Drama in Five Acts* (1860); *The Dark Huntsman* and *The Owl* (1864); *Jephthah's Daughter* and a novel called *The Advocate*, in 1865.

HEB'BEL, Friedrich (1813-63). A German poet and dramatist of peasant birth and cosmopolitan education. He was born at Wesselburen. As a vestryman's clerk he printed poems in journals and found patrons who enabled him to study at Hamburg, Heidelberg and Munich. In 1841, having gone back to Hamburg, he published *Judith*, a tragedy. Then, going to Denmark, where he had closer acquaintance with Thorwaldsen and Oehlenschläger, he received a traveling scholarship from the King, visited Paris, stayed several years in Italy, and on his return (1846) married and settled in Vienna. Already he had written two noteworthy dramas, *Genoveva* (1843) and *Maria Magdalene* (1844). His best later works are *Julia* (1851), *Agnes Bernauer* (1855), and *Die Nibelungen* (1862), all of which show dramatic instinct, powerful character-drawing, and an intensity of passion that is sometimes extravagant and sometimes uncouth or gruesome. His smaller poems are most attractive. Hebbel's works include the dramas *Herodes und Mariamne* (1850); *Michel Angelo* (1855); and *Gyges und Sein Ring* (1856). Hebbel more or less followed Grabbe, with whom he shares a liking for the uncouth, but Hebbel is more poetic and more conversant with theatrical requirements. He is also distinguished for love of psychological enigmas. His *Tagebücher* are in 2 vols. (1885-87). Consult: Kuh, *Biographie Friedrich Hebbels* (Vienna, 1877); Kulke, *Erinnerungen an Friedrich Hebbel* (ib., 1878); Bartels, *Friedrich Hebbel* (Leipzig, 1899). His works were edited by Krumm (12 vols., Leipzig, 1900) and by Werner (12 vols., Berlin, 1900).

HEB'BURN. A town in Durham County, England, on the south shore of the Tyne estuary, four miles east of Newcastle. It is an important industrial centre, with ship-building and supplementary establishments, engineering and chemical works. The public buildings include a mechanics' institute, an armory, and isolation hospital; among modern municipal improvements are a new drainage system, a public park, and electric lighting. Population, in 1891, 16,645; in 1901, 20,901.

HEBE, hē'bē (Lat., from Gk. Ἥβη). The goddess of youth, the daughter of Zeus and Here, or, according to others, of Here alone, the wife of Heracles after he had been deified. She was the cup-bearer of Olympus before Zeus conferred that office upon Ganymede (q.v.), and she always retained the power of restoring the aged to the bloom of youth and beauty. In the cult she usually appears joined with Hera or with Heracles; but in Phlius she was worshiped as Ganymede, and at Sicyon as Dia, as one who frees from all bonds, apparently through the joys of life. Statues of Hebe are rare, but on vases and reliefs she often appears with Heracles or as cup-bearer of Zeus. The representations of Hebe and the eagle are probably all modern. Consult: Kekulé, *Hebe* (Leipzig, 1867); Preller-Robert, *Griechische Mythologie* (Berlin, 1894). See Juventas.

HEBEL, hā'bel, Johann Peter (1760-1826). A German dialect poet. He was born at Basel, studied at Erlangen, and in 1791 became professor in the gymnasium at Karlsruhe. In 1805 he was appointed Church councilor, and in 1819 prelate. He is chiefly known for his *Allemannische Gedichte* (poems in a Swabian dialect, 1803; last ed. 1894), which, reviewed by Goethe in the *Jenaische Allgemeine Litteraturzeitung*, made him famous. He also wrote for his periodical, *Der Rheinländische Hausfreund*, a number of short stories afterwards published as *Schatzkästlein des Rheinländischen Hausfreundes* (1811). Consult: Schultheiss, *Hebels Leben* (Heidelberg, 1831); Längin, *Johann Peter Hebel, ein Lebensbild* (Karlsruhe, 1874); and Giehne, *Studien über Hebel* (Würzburg, 1894).

HE'BER, Reginald (1783-1826). An English poet, second Bishop of Calcutta, born at Malpas, Cheshire. In 1800 he entered Brasenose College, Oxford, and three years afterwards produced his prize poem, "Palestine," one of the very few prize poems that have lived. In 1805 he became a fellow of All Souls. In 1807 he was inducted into the family living at Hodnet. In 1812 he was made prebendary of Saint Asaph, and published a volume of poems; in 1815 he was appointed Bampton lecturer at Oxford, and in 1822 preacher at Lincoln's Inn. The next year he was consecrated Bishop of Calcutta. During his three years in India he labored with great zeal, traveling through his vast diocese, healing dissensions, and encouraging his fellow-missionaries. His prose writings include the Bampton lectures on *The Personality and Office of the Christian Comforter* (1816); *A Life of Jeremy Taylor* (written in 1822); *Sermons* (1829, 1830); and *Journey Through India* (1828). His fame, however, rests chiefly on his beautiful hymns, as "From Greenland's Icy Mountains," and "Holy, Holy, Holy! Lord God Almighty!" Most touching is the poem addressed to his wife: "If thou wert by my side, love." Consult: *Life*, by his widow (London, 1830), and by G. Smith (ib., 1895). The poems, collected in 1841, were reprinted in 1881.

HEBER, Richard (1773-1833). An English bibliophile, son of Reginald Heber, and half-brother of Bishop Reginald Heber, born at Westminster. He was educated by George Henry Glass, and at Brasenose College, Oxford. Closely following his early devotion to Latin poetry, especially to Persius, Claudian, and Silius Italicus, whom he labored to edit, came an interest in Early English drama and poetry; and he became the intimate friend of Walter Scott, who frequently alludes to him in his notes and dedicated to him the sixth canto of *Marmion*. He was chosen member for the University of Oxford in 1821, and resigned from Parliament five years afterwards. His wonderful collections of books were not mentioned in his will, and were sold at auctions in London, Ghent, and Paris; they in-

cluded more than 145,000 volumes, and formed a matchless library of Early English literature.

HEBERDEN, WILLIAM (1710-1801). An English physician, born in London. He graduated at Saint John's College, Cambridge, in 1728; studied medicine in London, and practiced for ten years in Cambridge and for more than thirty years in London, where he was prominent in the College of Physicians. A remarkably original thinker, Heberden took minute notes on his more important cases, and published them under the title *Commentarii de Morborum Historia et Curatione* (1802), of which an English translation, possibly by his son William, appeared in 1803. His contributions to the *Medical Transactions* of the College of Physicians include a description of the first recorded case of angina pectoris, and other original matter.

HÉBERT, ā'bâr', ERNEST (1817—). A French painter, born at Grenoble. He was a pupil of David d'Angers and Paul Delaroche, and won the Prix de Rome in 1839. He was director of the French Art School in Rome from 1866 to 1873 and from 1885 to 1890; was elected a member of the Institute in 1874, and was chosen commander of the Legion of Honor in 1874. Although classic and elegant in style, and an excellent colorist, Hébert has often a cloying sentimentality. His best-known pictures are: "A Slave who has Freed Himself;" "La malaria" (1850); and "Le baiser de Judas" (The Kiss of Judas) (1853), in the Luxembourg, and a number of portraits, among which are those of Roberty and a young woman (in the Luxembourg). He received first medals at the Salon of 1851 and the Paris Exposition of 1855, and the medal of honor at the Paris Exposition of 1889.

HÉBERT, JACQUES RENÉ (1755-94). A journalist and politician of the French Revolution. He was born at Alençon, November 15, 1755, of respectable parents, and was educated at the local college; but disgracing his family by his wild conduct, he quitted Alençon, went to Rouen, and subsequently came to Paris. There he dragged out a miserable existence from 1780 to 1790. He finally emerged from obscurity in the latter year as a pamphleteer and editor of a rabid republican paper, *Le Journal du Soir*. He first became famous, however, as the editor of the journal *Le Père Duchesne*, started in opposition to a publication of the same name edited by Lemaire. Knowing the tastes of the class of people he addressed, he displayed such an exaggeration of principles and cynicism of language as not only ruined the enterprise of his honest rival, but caused Hébert to become a popular idol, and earned for him the name of 'Père Duchesne.' After the events of August 10, 1792, he became a member of the Revolutionary Commune, and as such approved of the September massacres. In December, 1792, he became a substitute procureur for the Commune, and in 1793 actively advocated the overthrow of the Girondist party. The Convention, alarmed at the violence of the Communists, ordered Hébert and three others to be arrested. His popularity was so great, however, that he had to be set at liberty a few days later, and he was presented with a civic crown by the Commune. With Chaumette he inaugurated the worship of Reason, and as a member of the commission appointed to examine Marie Antoinette, he added to her sufferings by accusing her falsely of scandalous offenses. His party were called *les enragés*, and advocated the most extreme measures; but the Committee of Public Safety, under the control of Robespierre and Saint-Just, caused the Hébertists to be arrested, March, 1794, and after a summary trial Hébert, together with many of his adherents, was guillotined, March 24, 1794. His wife perished on the scaffold a month later with Gabel and Chaumette. Consult: Duval, "Hébert chez lui, dans la révolution française," *Revue Historique*, vols. xii. and xiii. (Paris, 1880-81); Brunet, *Le Père Duchesne d'Hébert* (ib., 1859); Tridan, *Les Hébertists* (ib., 1864); Mater, *J. R. Hébert avant la journée du 10 Avril, 1792* (Bourges, 1888); Aulard, *Le culte de la raison et le culte de l'être suprême* (Paris, 1892).

HÉBERT, LOUIS PHILIPPE (1850—). A Canadian sculptor, born at Sainte Sophie d'Halifax, Quebec. He early manifested a taste for art, and studied several years in a studio before he went to Paris, where he afterwards settled. His works include several historical statues for public buildings in Ottawa, Montreal, and Quebec. He won the Confederation medal presented by the Canadian Government in 1894.

HÉBERT, PIERRE EUGÈNE EMILE (1828—). A French sculptor, born in Paris. He was the son of a sculptor, who taught him the art. He had a bust in the Salon by the time he was twenty-one, reappeared there with a bronze group (1863), and exhibited at the international exhibitions of 1855 and 1867, and at Vienna in 1873, besides doing special work—"Bacchus" for the Tuileries (1866); a bronze statue of Rabelais for the city of Chinon; a stone statue of Regnard for the Hôtel de Ville, Paris; a marble bust of Cabet for the Museum of Dijon; "La comédie et la drame" for the Vaudeville; bas-reliefs and busts of Davau, Balzac, and others.

HEBERT, THÉODORE MARTIN (1829—). A French sculptor, born in Paris. He was a pupil of Chevillon, and after 1848 exhibited such works as an equestrian statue of Napoleon; an African hunter fighting with an Arab on horseback; "Faust et Marguerite" (1861); "L'Innocence" (1864); "Renaud et Armide" (1866); besides busts, bas-reliefs, and groups in plaster and in marble. He received honorable mention in 1859.

HEBRA, hā'brà, FERDINAND, Ritter von (1816-80). An Austrian dermatologist, born at Brünn. He was educated at the University of Vienna; in 1842 became instructor in the medical faculty; was appointed consulting physician of the general hospital of the city in 1848, and professor of dermatology in 1849. He was the first great German dermatologist, and entirely reformed the therapeutics of the science. He strongly indorsed local treatment. He wrote: *Atlas der Hautkrankheiten*, with Elsinger and Heitzmann (1856); *Lehrbuch der Hautkrankheiten*, with Kaposi (1872-76); and a third and smaller work under the former title, with Bärensprung (1867-68).—His son, HANS VON HEBRA (1847-1902), was a specialist in the same branch, and wrote: *Lehrbuch der Hautkrankheiten* (1884), and *Die krankhaften Veränderungen der Haut mit Beziehung auf die Krankheiten des Gesamtorganismus* (1884).

HEBREW LANGUAGE AND LITERATURE. See JEWS; SEMITIC LANGUAGES.

HEBREW MELODIES. A collection of poems by Lord Byron which, with music by Braham and Nathan, was published in 1815 by Murray, who gave £500 for them. Among them are "The Destruction of Sennacherib," "Jephtha's Daughter," and "She Walks in Beauty."

HEBREW MUSIC. Our knowledge of ancient Hebrew music is perhaps more limited and unsatisfactory than what we know of any other civilized nation of antiquity. From the Egyptian frescoes and relics, from the Greek treatises and descriptions, and from the modern Chinese instruments and thoretical works, we gain a fairly complete idea of the music of those nations; but, with the exception of a few reliefs on coins, practically our sole source of knowledge about Hebrew music is the Bible, which must be supplemented by constant reference to the musical instruments of the Assyrians and Egyptians.

In view of the late redaction of those books (like Genesis) which relate to the earliest traditions, great care must be exercised in using the notices about the supposed antiquity of music among the Hebrews. Such a notice, e.g. as is found in Gen. iv. 21, where Jubal is said to be "the father of all those who handle the harp and organ" ('organ' being obviously a mistranslation), has of course no historical value; and similarly the description of Miriam dancing and singing after the deliverance of the Hebrews from Pharaoh and his army (Exod. xv. 20-21) is probably part of the later embellishment of the exodus of some of the Hebrew tribes from Egypt, although it is quite probable that something of the kind took place under the circumstances. On the other hand, an incidental reference to "songs, drum, and lyre," in connection with friendly leave-taking, such as is found in Gen. xxxi. 27, is of decided value as pointing to a popular custom associated with a comparatively primitive form of life. The instruments themselves must have been correspondingly primitive; and with this restriction clearly understood, there is no objection to the assumption that Hebrew tribes, even during the nomadic period, had some music, and, like the ancient Arabs, had their battle-songs, their songs of triumph, their songs celebrating the exploits of their favorite heroes, which they chanted or sang to the accompaniment of primitive forms of drums and of simple stringed instruments, while for the purpose of calling the people together for battle or assembly, some simple form of wind instrument perhaps existed in very early days. Through foreign influence—notably from Egypt and Babylonia, and later from Greece—the simple instruments gave way to more elaborate ones, and a large variety of percussion, wind, and string instruments was gradually introduced into Palestine. That the earliest use of music among the Hebrews was largely if not exclusively secular seems reasonably certain; but the religious bearings of events of a secular character, such as battle and victory songs, rejoicings at harvest-time and wedding festivities, lend to music even when thus employed also a certain religious significance. On all the occasions named, with the exception perhaps of wedding festivities, the tribal or national deity would come in for a share at least of recognition. His help was sought before proceeding to battle; to him thanks were offered for the victory, and it was his favor that had blessed the fields with plenty. From such considerations it did not require many steps for the introduction of music as part of the organized worship. To what extent, however, music was introduced in the pre-exilic temple at Jerusalem it is difficult to say. Certainly the elaborate description furnished by the chronicler (I. Chron. xv. 11-24; II. Chron. v. 12, etc.) of the temple service and organization in the days of David and Solomon applies to the second temple (and even here only in a measure), and not to the first. Similarly the melodies and musical directions connected with the Psalms belong to the later phases of post-exilic worship among the Jews, though all this does not preclude the possibility that in pre-exilic days music on occasions formed part of the temple service in Jerusalem, and perhaps also in connection with some of the sanctuaries outside Jerusalem.

Only a few of the musical instruments mentioned in the Old Testament are genuinely Hebraic in character. (1) Of stringed instruments the most common and probably the oldest was the lyre (Hebrew *kinnor*), the form of whose sounding-board, as also the number of its strings, varied considerably. Three to six strings appears to have been the ordinary number, but there are lyres depicted on Jewish coins with as many as twelve strings. Next to the lyre, the harp (Hebrew *nebel*) is most frequently referred to; but we must not suppose that the ordinary harp was a large affair, such as the Egyptians used. It was probably a small triangular instrument, consisting ordinarily of not more than ten strings. (2) The most common wind instrument among the Hebrews was the flute (Hebrew *khalil*), which, like the lyre, dates from very early times. It was the ordinary instrument at weddings and funerals, and in the second temple was played before the altar on festival occasions. It is probable that the Hebrews, like the Egyptians and the Assyrians, had both the long flute, held straight before the player, and the oblique flute, which was played by blowing into a hole at the side. The horn (Hebrew *shophar*) was a ram's horn, whose limited compass (never over an octave) made it unsuitable for other purposes than signals to assemble the people, to give the order to disperse, etc. In the Jewish ritual it was retained as a solemn rite, and to this day in orthodox synagogues the ram's horn is blown during the services on New Year's Day, at the close of the Day of Atonement, on the day of the Feast of Tabernacles, and during the entire month of Elul, after the recital of the supplications. The Hebrew trumpet (*khasoserah*), of which there is a representation on the Arch of Titus, was a very long instrument, and was used by the priests in the later temple service. (3) The chief percussion instruments were (a) the drum (*toph*), of which there were numerous forms, though ordinarily the hand drum is intended: (b) the cymbals (*mesiltayim*), which were made of metal; and (c) the sistrum (*menaanim*), which appears to have been introduced from Egypt. Besides the above list, there are quite a number of instruments mentioned in the Old Testament (cf. especially Dan. iii. 5-10), which have not yet been identified. For example, the *symphony* (Dan. iii. 5, margin) may have been a species of bagpipe, while the *shalishim* (I. Sam. xviii. 6) appears to have been a sort of triangle.

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gogen- und Volks-Melodien bei den Juden geschichtlich nachweisbar? (Leipzig, 1898); Saalschütz, *Geschichte und Würdigung der Musik bei den Hebräern* (Berlin, 1829), which gives a comparison of the Hebrew instruments with the Greek and the modern Arabian; Stainer, *The Music of the Bible* (New York and London, n. d.); Wellhausen's edition of the Psalms in the *Polychrome Bible* (New York, 1898), with appendix on the "Music of the Hebrews;" J. Weiss, *Die musikalischen Instrumente in den heiligen Schriften des alten Testaments* (Vienna, 1895); Bücheler, "Zur Geschichte der Tempelmusik und der Tempelsalmen," *Zeitschrift für Alttestamentliche Wissenschaft* (1899-1900); the Hebrew archæologies of Nowack and Benzinger; and for the musical instruments of the Book of Daniel, H. Derenbourg. See PSALMS; DAVID.

HEBREWS. The name given to a group of clans of Aramean stock, who trace their origin to Southern Babylonia. The ultimate home, however, of these groups, and of the Arameans and Arabs, is in general to be sought rather in the steppes of Arabia. Hence they passed to the north in two steady streams, one by a direct route into Palestine and Syria, the other by the Euphrates Valley, where some made more or less permanent settlements, attracted by the higher culture prevailing in that region, while others continued northward and passed into Syria and ultimately Palestine. The name Hebrew is first applied to Abraham (Gen. xiv. 13); but there is an earlier eponymous ancestor, Eber (Gen. x. 21), to whom it properly belongs. The designation of Abraham as 'the Hebrew' already reflects the later conditions when the Hebrew confederacy was organized. Where the name originated is, therefore, a problem for which no satisfactory solution has yet been proposed. Some have supposed that the name originally designated a nomadic people of invaders, and that the Habiri of the Amarna tablets are Hebrews in this sense. Inasmuch as the term is generally used by foreigners in designating the Hebrew confederacy (Gen. xl. 15; Ex. ii. 6; I. Sam. iv. 6), it has been interpreted as the name given to the people, and denoting those who had 'come from beyond.' The stem from which Hebrews is formed has this meaning; but the explanation is not acceptable, since in that case the name would hardly have acquired such importance as to give rise to an eponymous ancestor, Eber. The fact is that, since the literature of the Old Testament is for the great part written from a religious point of view, the distinctively religious designation of the confederacy as *Bene Israel* (or Israelites), or as Israel and Judah, receives the preference over *Ibrim* or Hebrews, and hence the latter is introduced only on special occasions and for some special reason. For the history, language, literature, and institutions of the Hebrews, see JEWS; SEMITIC LANGUAGES.

HEBREWS, EPISTLE TO THE (Gk. *ἡ πρὸς Ἑβραίους ἐπιστολή, hē pros Hebraious epistolē*, Lat. *epistola ad Hebræos*). An anonymous book of the New Testament. The questions concerning its author, the readers to whom it was addressed, and the place where, as well as the time when, it was written have all been points of critical debate, and it cannot be said that any one of them is yet positively settled.

I. The time of composition could not have been later than A.D. 95, since the book was used freely by Clement of Rome in his letter to the Corinthians, which is assigned to about this date. How much earlier than this it was written depends largely upon what is to be understood by the persecutions referred to in x. 32-34. If they are to be identified with the Claudian edict (see PERSECUTIONS OF THE CHRISTIANS), it cannot be dated earlier than 48; if they are to be identified with the Jewish War (see JEWS), it cannot be dated before 65. In fact, whichever event is intended, it is likely that the writing was long subsequent to it, since the persecutions are referred to as belonging to the 'former days' (x. 32). As between these two events, however, the statement in xii. 4 that the readers had 'not yet resisted unto blood' would seem to make it unlikely that they had passed through the horrors of the Jewish War. But the force of this argument is dependent largely on the assumption that the readers were resident in Jerusalem or some part of Palestine. If resident elsewhere, then a new viewpoint of the persecutions is possible, and the above limits may not be necessary. It would seem to be certain that the author belonged to a generation later than the Gospel times (ii. 3; cf. Luke i. 1-4), and that the readers were under rulers different from those who had founded and had originally been in charge of the Church (xiii. 7). It would further seem to be clear that the persecutions mentioned in x. 32-34 as belonging to the 'former days' are to be separated from those in the midst of which the readers were at the time of writing, and in which they had not yet come to the shedding of blood (xii. 4), though the crisis of their troubles was not far beyond them (x. 25; cf. xii. 25-29). Anything more definite than this, however, must depend upon the consideration of the remaining points.

II. The place of the Epistle's composition would seem largely to depend on the interpretation of xiii. 24*b*. If 'they of Italy' is to be understood as referring to those who had come from Italy, then the Epistle was written somewhere outside of that country; if it is to be understood as referring to those who belonged to Italy, then the place of writing was most naturally somewhere within that land. As to which of these two usages the author had in mind, it may, perhaps, be impossible definitely to say; although, from the grouped character of the salutations in the verse, it would seem that he was sending a greeting to all those who were associated with the readers—both officers and fellow Christians—from all those who were associated with himself. But this would seem to imply that these latter were the Christians generally of the land from which he was writing, since otherwise they must be merely Christian sojourners who were accidentally in the place where he was. In this case we should have a general greeting on the one side and a strangely partial greeting on the other—a greeting from a group of Christian travelers in a city, but none from the Christians of the city itself. There would, consequently, seem to be something in favor of the Epistle's having been written within the land of Italy. If so it was probably at some other place than Rome, since Timothy's release from prison and his expected arrival at the place where the author was (xiii. 23) would indicate a coming from Rome, as the most probable place of imprisonment, to some other place where the author was awaiting him.

III. The readers of the Epistle have generally been considered Jewish Christians—a conclusion which would appear to be clearly evidenced by the distinctively Hebrew character of the argument employed in the Epistle. Recently, however, critics have claimed a Gentile Christian readership, saying that a Hebrew argument might have been formulated for Christians who were not Jews. Theoretically this is true; but were it so in this particular case, the Epistle would become a purely academic essay, lacking all the significance which would otherwise come from its appeal to the Jewish race from the point of view of its peculiar institutions and its distinctive Scriptures. It amounts to nothing in support of such Gentile readership to contend that the Epistle contains no direct statement of the fact that the readers were in danger of an apostasy to Judaism, for the readers might not have come to the point of apostatizing and yet have been Jews. Jewish Christians as well as Gentile might have been simply weak in the faith and in need of exhortation to hold fast to their profession. In fact, if this weakness of faith and insecurity of profession was the condition of the readers, it is difficult to understand why such a Jewish background to the strengthening exhortation given them was selected, unless they were Jewish themselves. In view of this background, such passages as vi. 1, 2, and xiii. 4 are of no significance, since they are both specifically applicable to Jewish Christians, the latter especially, in view of Paul's arraignment of the race in Rom. ii. 17-29.

Admitting the probability, therefore, that the readers were Jewish, their habitation would seem to be most naturally in a place of Jewish surroundings such as Palestine and Jerusalem. Against this, however, is the strong Alexandrian mode of thought which quite plainly underlies the Epistle's argument. This would not be natural in the places mentioned above. On the contrary, it would suggest Alexandria itself and Egypt. Against this latter location the only argument would be our general ignorance of the condition of early Christianity in this region. Rome is urged by modern critics, and, as far as the Alexandrian mode of thought is concerned, there might not be much against the place. As a matter of fact, however, the critics base their contention largely on the specifically Jewish character of the Roman Church—an argument which is so clearly against the facts of the Roman Epistle as to be impossible of acceptance. There would, consequently, seem to remain only some such locality as the Phrygian region of Western Asia—a region largely inhabited by Jews and largely under the influence of Alexandrian thought. With such a locality Timothy's relationship (xiii. 23, 'our brother Timothy'), and the evident tendencies of the readers to angel-worship (chs. i. and ii.), an eclectic spirit and a false asceticism (ch. xiii.) would be significant.

In view, therefore, of the probable Jewish character of the readers and their most natural location in Western Asia Minor, the strong probability of an Italian place of composition is greatly strengthened; since to Jewish readers resident in Phrygia a salutation from mere Italian sojourners would have no meaning. And in view of all three points, a date some time after the Jewish War would seem most reasonable; for then the Jewish colonies in the Diaspora would be largely increased and such independent Hebrew congregations more possible. We could also thus understand by the persecutions of the 'former days' the Jewish War, whose horrors were not likely to have faded from the exiles' minds; while the newer persecutions, in the beginnings of which the readers were (xii. 4), could quite easily be the rise of the Domitian anti-Christian aggressiveness. This supposition is favored by two considerations—the distinctive Jewish rivalry to Christianity after the destruction of Jerusalem, and the general Christian disappointment at the non-return of Christ, which had been widely expected in connection with this catastrophe, in view of the common understanding of the words of Christ as promising it. These two facts would almost seem to account for the troublous situation of the readers, at least from its Jewish side; for it is clear they were suffering from oppression by their unbelieving countrymen—an oppression which gathered an irritating strength largely from the failure of the expected return of their Christ. This oppression might be more or less connected with the Government's hostility, and shows the situation to have been one of peculiar danger, because of the combination of evil which threatened them. We might place the writing of the Epistle, therefore, somewhere about A.D. 90.

IV. The question of author has been generally held to be the most important point connected with the criticism of the Epistle. It is, in fact, the least important, since the even approximate settling of the above questions gives us practically all the critical knowledge of the Epistle which we need for working purposes. The fact, therefore, that there is no certain answer to this question is of no significance. At the same time it can be safely said that, whoever the author may have been, he was not Paul. This is universally accepted by critics to-day. Outside of Paul, evidence would seem, in some respects, to point to Barnabas, whose name was apparently attached to the manuscripts of the Epistle with which Tertullian was acquainted, and was considered by him in his day as an accepted tradition. Any definite conclusion, however, is impossible. The attempt of Harnack to credit it to Prisca and Aquila, chiefly Prisca, is not supported by the facts.

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the Hebrews (Edinburgh, 1899); Harnack, *Chronologie* (Leipzig, 1897).

HEBREWS, GOSPEL OF. See APOCRYPHA, NEW TESTAMENT.

HEBRIDES, hĕb'rĭ-dēz. The name applied to all the islands of the western coast of Scotland, popularly known as the WESTERN ISLES (Map: Scotland, A 2). They are classified as the Outer and Inner Hebrides. To the Outer belong Lewis-with-Harris, North Uist, Benbecula, South Uist, Barra, and the remote Isle of Saint Kilda. The principal of the Inner islands are Skye, Coll, Tiree, Eigg, Mull, Iona, Staffa, Ulva, Lismore, Kerrera, Easdale, Colonsay, Jura, and Islay. Bute, Arran, and the Cumbraes, though lying in the Firth of Clyde, are usually classed with the Hebrides.

The total number of the Hebrides is about 521; of these not more than 120 are inhabited. The entire area is estimated at upward of 3000 square miles, and the population, in 1901, was 95,739. Only about 200,000 acres are arable; the rest is in pasture land, and in morasses, peat-mosses, lakes, and barren sands and rock. Geologically the Hebrides are divided into groups, of which the more important are the gneiss, trap, and slate. The scenery is grand and picturesque; Mull is noted for its lofty mountains, Jura for its peaks, and Arran for its high, rugged hills. Islay and Bute are comparatively level and arable. Staffa is remarkable for its basaltic columns and great cavern. Iona derives interest from its ruins and historical associations. Politically all the Hebridean isles are attached to Scotland. The counties among which they are distributed are those of Ross, Inverness, Argyll, and Bute. The principal Hebridean towns are Stornoway in Lewis, Portree in Skye, Tobermory in Mull, and Rothesay in Bute. Though situated on the mainland of Argyll, Oban (q.v.) is usually considered a town of the Hebrides, and, along with Rothesay, is best known to tourists. Sheep, cattle, and pony rearing, herring fisheries, and the manufacture of kelp are the chief industries. Live stock, fish, kelp, wool, and stone are the principal exports; iron and groceries the imports.

Enjoying the benefit of the Gulf Stream (q.v.), the climate, although humid, is mild, pleasant, and healthful, and is recommended for certain classes of invalids. The poorer class of natives for the most part speak Gaelic. The establishment of several distinct lines of steamer communication with Glasgow, and the opening up of remote tracts formerly reached with difficulty, have developed the resources of the islands and brought them, with the neighboring coast, within the sphere of trade and the reach of tourists. Under modern proprietorship real estate has improved, and large tracts of moorland are annually rented to sportsmen as shooting-grounds.

The Hebrides are the *Ebudæ* of Ptolemy, the *Hebudes* of Pliny, and the *Sudreyjar* of the Norwegians. The Hebrides were first colonized in the ninth century by emigrants from Norway. They settled in the greatest numbers on the Shetland and Orkney Islands and Outer Hebrides, but soon wandered as far south as the Isle of Man, colonizing as they went. This resulted in the absorption of the Celtic into the Norse element in the northern islands, while southward the Celtic element remained predominant. The colony extended to the north and west coasts of Scotland, Cumberland, and Westmoreland, and probably founded the Norse kingdoms of Dublin, Waterford, and Limerick; it also sent a colony to Iceland in 874. The settlers became sufficiently powerful to annoy the mother country, whereupon Harald Haarfagr (King of Norway, c.866-933) fitted out a great expedition and subdued the Hebrides and Man. They remained subject to Norway till 1266, three years after the battle of Largs, and were then transferred to Scotland. In 1346 one of the chiefs, named Macdonald, reduced the whole under his authority, and took the title of 'Lord of the Isles;' but in 1540 they were finally annexed to the Scottish Crown by James V. The Hebrides were ecclesiastically dependent on Norway as late as 1374. Scott's *Lord of the Isles* contributed materially to create popular interest in these islands, which has been added to by William Black's novels. Consult: Buchanan, *Hebrid Isles* (London, 1883); Gordon-Cumming, *In the Hebrides* (ib., 1883).

HE'BRON (Heb. *Khebrōn*). A very ancient sacred city of Southern Palestine, the modern El-Khalil, about 21 miles south-southwest of Jerusalem. Hebron figures in tradition as one of the oldest cities of Palestine (cf. Num. xiii. 22), and was originally called Kirjath Arba, 'four-city' (Gen. xxiii. 2; Joshua xiv. 15; cf. Josephus, *Bel. Jud.*, iv. 9, 7). As one of the famous sanctuaries of the south, it became associated in the traditions and legends of the Hebrews with the beginnings of their history. All three patriarchs, Abraham, Isaac, and Jacob, are represented as sojourning in Hebron (Gen. xiii. 18; xxxv. 27; xxxvii. 14), and tradition locates here the cave of Machpelah, where all three, as well as Sarah and Rebecca, were buried (Gen. xxiii.; xxv. 9; xxxv. 27-29; xlix. 29-32; l. 13). The spies sent out by Moses before entering the promised land came hither (Num. xiii. 21, 22). Joshua is said to have destroyed the city, given it to Caleb for an inheritance, and made it a city of refuge (Joshua x. 36-37; xiv. 13; xx. 7). Hebron figures prominently in the history of David (q.v.); it was here that he was anointed King, first over Judah, later over all Israel (II. Sam. ii. 1-4; v. 1-3). The popularity of the Davidic dynasty probably had much to do with the production of legends regarding Hebron and the reshaping of old traditions of the place to make them conform to the later scheme of Hebrew historiography. It was from Hebron that Absalom made his attempt to secure the throne (II. Sam. xv. 7 sqq.). After this time it is seldom mentioned in biblical history. Judas Maccabæus captured it from the Edomites, and the Romans stormed it. It was held for a time by the Crusaders, but fell into the hands of Saladin (1187), and since then has belonged to the Mohammedans, who have always respected its sanctity and regard it as one of the four sacred cities of the world, Mecca, Medina, and Jerusalem being the other three. Its association with Abraham, who is called by the Mohammedans *Khalil Allah*, 'friend of God,' has given it its modern name. The modern city has a population of about 18,000 Mohammedans and 1500 Jews. The alleged sepulchres of the patriarchs are still shown, and an ancient oak at the neighboring Mamre is pointed out as the oak of Abraham. In the neighborhood are the so-called tombs of Ruth, Jesse, and Abner.

HEBRON. A city and the county-seat of Thayer County, Neb., 65 miles southwest of Lincoln; on the Little Blue River, and on the Burlington and Missouri River and the Chicago, Rock Island and Pacific railroads (Map: Nebraska, G 3). It is the commercial centre for a farming and stock-raising district. Population, in 1890, 1502; in 1900, 1511.

HEBRUS, hē'brŭs. The ancient name of the river Maritza (q.v.).

HEC'ATÆ'US (Lat., from Gk. Ἑκαταῖος, *Hekataios*). The most important of the Greek logographers (q.v.), son of Hegesander of Miletus. He flourished about B.C. 500. At the time of the Ionian revolt (c.501-493 B.C.) he strove in vain to keep his countrymen from entering upon the war with Persia, and after their defeat he went as an ambassador to Artaphernes, the Persian satrap, and induced him to treat the Ionians kindly. Like most of the logographers, he was an extensive traveler; to judge from the fragments of his work, he must have visited Greece, Thrace, the countries bordering on the Euxine, a great part of Persia, Africa, and possibly Italy and Spain. He wrote a work called *Genealogies* (Γενεαλογίαι), which was little more than a prose version of the poetical legends of the Greeks. His *Tour of the World* (Περιοδος Γῆς), in two books, is interesting from the fact that it was accompanied by a map, probably based upon that of Anaximander (q.v.). The fragments of these two works are published by Müller, *Fragmenta Historicorum Græcorum*, i. and iv. (Paris, 1841-70). Consult, also: Atenstädt, *De Hecatæi Milesii Fragmentis quæ ad Hispaniam et Galliam Pertinent*, *Leipziger Studien*, xiv. (1891); Tropea, *Ecateo da Mileto ed i frammenti della periegesis (estratto degli Atti dell' Acad. Pelormitana*, 1896-97).

HECATE, hĕk'ā-tē (Lat., from Gk. Ἑκάτη, *Hekatē*, the far-working goddess, from ἑκάς, *hekas*, afar). An ancient moon goddess, as is clear, not only from her functions, but from the direct statements of the ancients. She is first mentioned by Hesiod, as the only daughter of the Titan Perses, and of Asteria, or night. The poet praises her as a mighty goddess ruling earth, heaven, and sea, the helper of hunters and fishermen, giver of victory in battle and council. Like other moon goddesses, she appears as helper of women in their confinement, guardian of children, and a goddess of marriage; she also possesses the power of purifying from sin, like Apollo. Mysteries were celebrated in her honor at Ægina, and in conjunction with the Corybantes in the Zerynthian cave of Samothrace. The special seats of her worship are found in Asia Minor and on the east coast of Greece, though in later times she was widely honored. Hecate in the general belief of antiquity was associated with the guardianship of doors and roads, and her sanctuaries seem in general to have been little more than wayside shrines. A statue of the triple Hecate by Alcamenes stood near the entrance to the Acropolis of Athens, and she was worshiped in private houses. The crossroads were under her special protection, and at them sacrifices, especially of dogs, were offered. At each new moon, also, the rich set out in her honor food, which was eaten by the poor. As a goddess of the night Hecate is also associated with the lower world, a companion of Persephone, and guardian of her door. She had control of the spirits of the dead, goblins, and spectres, her coming was greeted by the howling of dogs, and she was invoked by magicians and witches. From these varied functions, it is not strange that she became closely connected with Persephone, and especially with Artemis. In art she was at first represented as a maiden carrying torches, and this type persisted through the classical period. The common type, however, derived probably from her epithet Τριοδῖτις (Lat. *Trivia*, 'where three roads meet'), was that of three bodies, joined so as to face in three directions. In the frieze of the great altar at Pergamum, Hecate is shown as having three heads and six arms, but a single body, and this type appears occasionally in later works. Consult: Preller-Robert, *Griechische Mythologie* (Berlin, 1894), and especially Roscher, "Hekate," in *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1886-90).

HEC'ATOMB (Lat. *hecatombe*, from Gk. ἑκατόμβη, *hekatombē*, from ἑκατόν, *hekaton*, hundred + βοῦς, *bous*, ox). Strictly, a sacrifice of 100 oxen, but even in the Homeric poems a term for any sacrifice of a large number of animals; thus we hear of a hecatomb of 12 oxen or of 50 rams. The belief that the favor of the gods was dependent upon the size of the offering probably was one factor in inducing such large numbers of victims; but a powerful influence was also exerted by the desire to feed the populace, since only a small part of each victim was actually consumed upon the altar. See also SACRIFICE.

HECK, BARBARA (1734-1804). One of the founders of the Methodist Church in America. She was born, of German parentage, in Ballygarry County, Limerick, Ireland, a district which early felt the influence of Wesley's preaching. She and her husband, Paul, came to America in 1760, and in 1766, with Philip Embury, organized a Methodist society in New York City. The building of the famous old John Street Methodist Church was due, in great part, to her tireless energy. During the Revolution the Hecks retired to northern New York, and finally to Canada, to be among Loyalists. They founded the earliest Methodist society in Canada.

HECK'ER, FRIEDRICH KARL FRANZ (1811-81). A German revolutionist and American soldier. He was born at Eichtersheim, in Baden, September 28, 1811, and after studying law in Heidelberg became, in 1838, advocate of the Supreme Court in Mannheim. Elected, in 1842, a member of the second Chamber in Baden, he abandoned his profession for political life, and soon grew popular among the more advanced elements of the opposition. He sat and voted with the Extreme Left, and his influence helped to oust the Blittersdorf Ministry from office. In 1845, in conjunction with Itzstein, he conducted a democratic campaign in Germany, during which he was arrested at Berlin and expelled from Prussia. In 1848 he employed his eloquence in revolutionary agitation, and he and Struve became leaders of the advanced Revolutionary party. When the preliminary convention of the German nation (*Das Vorparlament*) met at Frankfort, Hecker endeavored, with the influence of his whole party, to constitute it into a permanent republican assembly. The frustration of this effort led him to attempt to surprise the smaller governments

of Southern Germany with the bands of artisans which had come from France. Defeated at Kandern, in Baden, April 20, 1848, he fled into the Canton of Basel, where he conducted a radical newspaper, and wrote his work, *Die Volkserhebung in Baden*. On being refused admission to the National Assembly at Frankfort, though twice elected to represent Thiengen, he emigrated to America, where he bought a farm at Belleville, Ill. The Baden Revolution (1849) brought him back to Europe; but finding the revolution over on his arrival, he returned to America. He was a colonel and brigadier-general in the Union Army during the Civil War. During his later years Hecker watched with interest the founding of the new German Empire, and was a stanch supporter of German interests in America. He died at Saint Louis, March 24, 1881. His *Reden und Vorlesungen* were published in Germany in 1872, and were followed two years later by *Betrachtungen über den Kirchenstreit in Deutschland und die Infallibilität*.

HECKER, Isaac Thomas (1819-88). An American priest of the Roman Catholic Church, founder of the Paulist Fathers. He was born in New York City, and early in life engaged in business. In 1843 he was a member of the socialistic community at Brook Farm, and later of that at Fruitlands, Mass. He also lived for some time with Henry D. Thoreau at the latter's 'Hermitage.' In 1845 he was converted to the Roman Catholic faith, and four years later was ordained to the priesthood by Cardinal Wiseman. He joined the Redemptorists, but with others was released from his vows, and in 1858 founded the Congregation of Saint Paul the Apostle, or Paulists (q.v.), in New York. Father Hecker was the founder and director of the Catholic Publication Society, and also founded and edited from 1865 until his death the *Catholic World*, the chief popular Roman Catholic magazine in America. His writings also included: *Questions of the Soul* (1855); *Aspirations of Nature* (1857); and *Catholicity in the United States* (1879). Consult Elliott, *Life of Father Hecker* (New York, 1891). The appearance of an abridged and incorrect anonymous French version (1897; 6th ed. 1898) of Father Elliott's volume evoked an attack by Abbé Maignan, of the Congregation of Saint Vincent de Paul, in *La Père Hecker, est-il un Saint?* (1898). This was succeeded by the so-called 'American' controversy, for the settlement of which Pope Leo XIII. in 1899 addressed an apostolical letter to Cardinal Gibbons. For an account of the matter, consult Sedgwick, *Father Hecker* (Boston, 1900).

HECKER, Johann Julius (1707-68). A German educator, born at Werden, Prussia. At the command of Frederick II. of Prussia, he drew up a system of regulations for the government of common schools, parts of which are still in force. Consult Fr. Ranke, *Johann Julius Hecker* (Berlin, 1861).

HECKER, Justus Friedrich Karl (1795-1850). A German physician and writer of medical history, born in Erfurt, Prussian Saxony. He was professor of medicine in the University of Berlin, and wrote: *Geschichte der Heilkunde* (1822-29); *Der schwarze Tod im 14. Jahrhundert* (1832); *Die Tanzwut, eine Volkskrankheit im Mittelalter* (1832), translated into English by B. G. Babington, under the title, "The Dancing Mania of the Middle Ages" (1875); *Der englische Schweiss. Ein ärztlicher Beitrag zur Geschichte des 15. und 16. Jahrhunderts* (1834); *Geschichte der neuern Heilkunde* (1839); *Kinderfahrten, eine historisch-pathologische Skizze* (1845).

HECK'EWEL'DER, John Gottlieb Ernestus (1743-1823). An American pioneer missionary and orator, born in Bedford, England. He settled in Pennsylvania in 1754, studied theology, and entered the Moravian ministry. In 1771 he became assistant to David Zeisberger (q.v.), who had charge of the missionary work of that Church among the Indians in the Ohio country, whither Heckewelder proceeded in that same year. In this service he remained for fifteen years. In 1792 and 1793 he assisted in drawing up treaties between the United States and the Indians, by whom he was greatly loved and trusted. He remained in Ohio until 1810, when he settled at Bethlehem, Pa., and engaged in writing the history of his labors and observations. He published: *An Account of the History, Manners, and Customs of the Indian Nations Who Once Inhabited Pennsylvania and the Neighboring States* (1818), a work of great value which was translated into both German and French; *Narrative of the Mission of the United Brethren Among the Delawares and Mohegan Indians* (1820); *Names Which the Lenni Lenape or Delaware Indians Give to Rivers, Streams, and Localities* (1822). Consult Rondthaler, *Life of Heckewelder* (Philadelphia, 1847).

HECKLE, HATCHEL, HETCHEL. A wooden frame studded with iron teeth used for separating the shine or boon of flax and hemp from the fibre; also the operation of cleaning the fibre with this tool.

HECKMONDWIKE, hĕk'mond-wĭk'. A manufacturing town in the West Riding of Yorkshire, England, 10 miles southwest of Leeds (Map: England, E 3). It has coal-mines, ironworks, machine-shops, and is an important centre of carpet, blanket, and heavy woolen manufactures. The town has improved in recent years; has good drainage, an ample water-supply, and electric lighting. Population, in 1891, 9700; in 1901, 9460.

HECKSCHER, hĕk'shĕr, Johann Gustav Wilhelm Moritz (1797-1865). A German politician, born in Hamburg. He served during the War of 1815 as a volunteer in the Hanseatic Corps, and then studied at the universities of Göttingen and Heidelberg. Upon completing his studies he settled in Hamburg, where he practiced law, and, after 1840, directed the politics of the *Hamburger Nachrichten*. In 1848 he was elected to the Vorparlament, in which he opposed the propositions of the Democratic Party. In the National Assembly at Frankfort (1848-49) he was at first a member of the Left Centre, but inclined more and more to identify himself with the Right. He advocated the election of Archduke John of Austria as Vicar of the Provisional Government, in which he himself was appointed Minister of Justice, and opposed the proposition to exclude Austria and erect a German empire with a Prussian King as hereditary Emperor. Later he helped to organize the Pan-German Party.

HEC'LA, or HEK'LA. A volcano in Iceland, situated in the southwestern part of the island,

about 20 miles from the coast. It has an irregular cone built of lava, scoriæ, and ashes, and bare of vegetation, which rises to a height of 5100 feet above the sea. There are several subsidiary craters, besides the principal crater on the summit, and the cone is dissected by deep ravines, through which torrents rush down from the snow-fields above. The volcano has an extremely wild and desolate appearance. Eruptions take place at irregular intervals, the total number on record since the discovery of Iceland being 28. The most violent outbursts occurred in 1157, 1300, 1597, 1636, and 1766. In the last-named year a large area was buried beneath the ejected lava and ashes. The volcano was again active from September, 1845, to April, 1846, and in March, 1878. See ICELAND.

HECTARE, HECTOGRAM, HECTOLITER, HECTOMETER. See METRIC SYSTEM.

HECTIC FEVER (from Gk. *ἑκτικός*, *hektikos*, consumptive, from *ἕξις*, *hexis*, condition, from *ἔχειν*, *echein*, to have). A type of fever, usually associated with tubercular disease, abscess, or septicæmia, distinguished by an afternoon or evening rise of temperature, during which the patient has bright eyes, flushed cheeks, and some nervous excitement, while afterwards the temperature falls and profuse perspiration occurs. The treatment must be directed toward the existing disease, of which it is generally a grave symptom.

HECTOGRAPH. See COPYING MACHINES.

HEC'TOR (Lat., from Gk. *Ἕκτωρ*). The leader and mightiest warrior in the Trojan army, son of Priam and Hecuba, husband of Andromache, and father of Astyanax or Scamandrius. In the *Iliad* he appears as brave in battle, but hasty, and often imprudent; he is also full of reverence for the gods, tender love for his family, and devoted patriotism. During the absence of Achilles from the fight he storms the Greek camp and penetrates even to the ships. Driven back by Patroclus, the friend of Achilles, he at length slays him, by the help of Apollo. Roused by his thirst for vengeance, Achilles is reconciled with Agamemnon, and in divine armor routs the Trojans with fearful slaughter, and finally, after chasing Hector three times round the walls of Troy, slays him by the help of Athena, and drags the body at his chariot-wheels to the Greek ships. Here the corpse is miraculously preserved by the gods, and finally ransomed by Priam. With the mourning and burial of Hector the *Iliad* closes. In the post-Homeric literature little is added to the picture of Hector. At Ilium he was worshiped as a hero, and similar offerings were made at Thebes, whither it was said an oracle had commanded the removal of his bones. In art the combats of Hector with various Greek heroes, his death, the maltreatment of his body, and his ransom, are favorite subjects.

HECTOR, ANNIE (FRENCH) (1825-1902). A British novelist, best known by her pseudonym of 'Mrs. Alexander,' born in Dublin, Ireland. She began writing at an early age, but with so little success that on her marriage she laid aside her pen and resumed it only when the death of her husband obliged her to seek some means of maintenance. Among her novels, some of which met with considerable success, are: *The Wooing O't* (1873); *Her Dearest Foe* (1876); *By Woman's Wit* (2 vols., 1886); *Mona's Choice* (1887); *A Life Interest* (3 vols., 1888); *A Winning Hazard* (1896); and *Barbara: Lady's Maid and Peeress* (1897).

HECTOR, or **ECTOR,** SIR. The name of two knights in Arthurian legend.

HEC'UBA (Lat., from Gk. *Ἑκάβη*, *Hekabē*). The second wife of Priam, King of Troy, to whom she was said to have borne nineteen children, including Hector, Paris, Helenus, Cassandra, Deïphobus, Polydorus, and Troïlus. In the *Iliad* Hecuba appears as bringing offerings to Athena, trying to restrain Hector from the battle, and lamenting his death. The tragedians, and especially Euripides, basing their work on the later epics, developed her story, and it served as a source for still later poets. Before the birth of Paris she dreamed that she bore a blazing torch which fired the whole city. From dread of the meaning of this omen, Paris was exposed. Another episode was her vengeance on Polymestor, King of Thrace, to whom Priam had sent his son Polydorus and much treasure for safe-keeping. Polymestor murdered his ward, and threw the body into the sea, which bore it to the shore of the Troad, where it was discovered by a servant of the now captive Hecuba. She then enticed Polymestor to her tent, and with her attendants slew his sons before his eyes and blinded him. The loss of Polydorus was only one of her sufferings after the capture of Troy, for she saw her husband and her sons slain, her grandson, Astyanax, son of Hector, thrown from the walls of Troy, and her daughter Polyxena sacrificed at the tomb of Achilles, while the lot assigned her as slave to her most hated enemy, Odysseus. The legends of her end varied, as in one version she was transformed into a dog, which sprang into the sea and was drowned, while in another her lamentations and curses so angered the Greeks that they stoned her. Her name became proverbial for a sorrowful fate.

HECUBA, or **HEC'ABE.** A tragedy by Euripides, produced about B.C. 424. It deals with the revenge of the Trojan matron on Polymestor, King of Thrace, who had murdered her youngest son, Polydorus, previously consigned by Priam to his guardianship. The tragic pathos of the play is also heightened by the introduction in the first part of the story of Polyxena, the daughter of Hecuba, who was sacrificed by the Greeks to the shade of Achilles. The play is somewhat lacking in unity.

HECYRA, hĕs'ĭ-rȧ (Lat., from Gk. *Ἑκυρά*, mother-in-law). A comedy by Terence, produced in B.C. 165. The play, which is based on an unknown Greek comedy, lacks plot, and was at first unsuccessful.

HEDA, hā'dȧ, WILLEM CLAESZ (1594-c.1678). A Dutch painter, born probably at Haarlem. He was one of the most famous of the still-life painters, and also attempted historical subjects, but with little success. He was dean of the Haarlem Guild in 1631 and in 1651, but aside from this nothing is known of the events of his life. There is a "Dessert" by him in the Louvre, dated 1637. His other pictures are in the German galleries, notably some breakfast subjects in Munich, Dresden, and Nuremberg.

HEDBERG, hĕd'bĕr-y', FRANS TEODOR (1828—). A Swedish dramatist, born at Stockholm. He had tried various professions, including that of actor and wig-maker, before he set seriously to

work as a dramatist (1854). Afterwards he was appointed reader, and then teacher, at the Royal Theatre in Stockholm (1861), and later director of the New Theatre, Gothenburg (1881). In 1883 he gave up this position to devote himself entirely to writing. His works include comedies, tragedies, adaptations, translations, vaudevilles, and poems. The best known of his plays is *Bröllopet på Ulfåsa* (1865). He also wrote: *Karaktäristiker och Porträter af Svenska Skådespelare* (1884), and *Karaktäristiker och Porträter af Svenska Operasönngare* (1885), besides other works dealing with theatrical subjects.

HEDDA GABLER, hĕd'dȧ gȧ'blĕr. A play by Hendrik Ibsen (1890), and the name of its heroine, an eccentric woman who, disappointed in her marriage with a young savant, attempts to regain her influence over a former lover, Eilert, now under the good influence of a former school friend of Hedda. He loses the manuscript of a new work which is to make him famous, and Hedda's husband finds it, but she destroys the work. When Eilert, in despair, thinks of suicide, she gives him a pistol with which he ends his life in a low resort, and Hedda kills herself.

HED'DING, Elijah (1780-1852). An American clergyman, bishop of the Methodist Episcopal Church. He was born in Pine Plains, Dutchess County, N. Y., and began to preach in Vermont when nineteen years old. During most of the time between 1807 and 1824 he was presiding elder in New Hampshire, in Portland, Maine, and in Boston. In 1824 he was elected bishop, and during the formative period of the Church's growth he exercised a powerful influence. He was one of the founders of *Zion's Herald*, the first Methodist paper in the country, and author of a *Manual of Discipline*.

HEDDLE, or **HEALD** (of Scandinavian origin; cf. Icel. *hafald*, thrum for holding the weft). In weaving, the threads of the warp are so arranged that at each passage of the shuttle backward and forward, a certain number of the warp threads are raised up, and the remainder drawn down; this is done with vertical threads, cords, or wires, with a small loop in the middle through which the warp thread is passed, there being one of the vertical threads for each horizontal or warp thread. These threads or wires are known as heddles or healds. See Loom.

HEDENSTIERNA, hā'den-styĕr-nȧ, Karl Joseph Alfred (1852—). A Swedish author, born at Wedåsa (Småland province). In 1879 he became connected with the staff of the *Smålands Posten* at Wexiö, and in 1890 was made editor-in-chief of that journal. In addition to several volumes descriptive of Swedish peasant life, he wrote a series of humorous articles, published weekly in the *Posten* over the name 'Segurd,' and in part collected in a translation into German by Krusenstierna and Langfeldt, entitled *Allerlei Leute* (Leipzig, 1892-97).

HEDGE (AS. *hecg*, *hege*, OHG. *hecga*, *hegga*, Ger. *Hecke*, hedge; connected with AS. *hege*, Eng. *hay*, and AS. *hēawan*, Eng. *hew*). A fence formed generally of growing shrubs or trees and cultivated either for defense or ornament. Hedges are much used in England, Italy, and in other countries where wood for fences is scarce. For many situations, they are particularly adapted; owing to the protection which they afford from high winds. The height to which they are permitted to grow should be accommodated to the requirements of the locality. Hedges in Great Britain are generally formed of hawthorn (q.v.). Beech hedges are very common around gardens and pleasure grounds, and a hedge of beech and hawthorn mixed is common in many places. Holly makes an excellent ornamental hedge, much in use for gardens and pleasure grounds. Ornamental hedges are sometimes formed of yew, hornbeam, lime, and other trees. In the United States, osage orange (*Maclura aurantiaca*) and honey-locust (*Gleditschia triacanthos*) are considered the best hedges for fence purposes. For ornamental hedges California privet (*Ligustrum ovalifolium*), Norway spruce (*Picea excelsa*), American arbor-vitæ (*Thuja occidentalis*), common hemlock (*Tsuga Canadensis*), Japan quince (*Cydonia japonica*), *Deutzia scabra*, and some spireas and viburnums are used.

HEDGE, Frederic Henry (1805-90). An American clergyman, critic, and philosopher, born at Cambridge, Mass. He was a son of Levi Hedge, professor of logic and metaphysics in Harvard College. He studied in Germany under the care of George Bancroft from 1818 to 1823, and graduated at Harvard (1825), and from the Divinity School at Cambridge in 1828. He was a Unitarian pastor successively at West Cambridge (1829), Bangor, Maine (1835), Providence, R. I. (1850), Brookline, Mass. (1856), and in 1857 was made professor of ecclesiastical history in the Harvard Divinity School, and editor of the *Christian Examiner* (1857-60). From 1872 to 1881 he was professor of German at Harvard. To literary criticism he contributed *Prose Writers of Germany* (1848), and *Hours with German Classics* (1886); to religious and philosophical criticism: *Reason in Religion* (1865); *The Primeval World of Hebrew Tradition* (1870); *Martin Luther and Other Essays* (1888). He wrote also several hymns and translations from the German poets, and prepared a liturgy for the Unitarian Church (1856). His chief significance to American thought was his introduction of German scholarship and literature.

HEDGEBOTE. See Haybote.

HEDGEHOG. One of a genus (Erinaceus) of insectivorous quadrupeds, the type of the family Erinaceidæ. The muzzle is rather elongated, the neck short, the limbs short, the feet five-toed, the claws strong, the tail short, the body covered with short spines on the upper part, and with hair below, and capable of being rolled up into a ball. The teeth are 36 in number, 20 in the upper jaw and 16 in the lower; the middle incisors are very long, and stand forward. Like many other insectivora, hedgehogs are by no means limited to insect food, but prey on larger animals, as reptiles, small quadrupeds, and birds; they are fond of eggs and of milk, and in confinement will readily eat soaked bread, cooked vegetables, or porridge. Their power of rolling themselves into a ball, from which the spines project on every side, is their means of protection from enemies. The spines are curiously bent near the root, and so set, that on the contraction of the muscles by which the animal rolls itself up they are held firmly in their position, their points toward the adversary. They are very strong and sharp, and their elasticity is so great that the animal

can sustain falls from considerable heights without apparent injury.

The common hedgehog (*Erinaceus Europæus*) is a native of all Europe and of Western Asia. Its short ears are one of its distinctive specific characters. It is seldom more than nine and a half inches in length. Its spines are about an inch long. It readily kills snakes, and even vipers, which it eats, beginning always at the tail. It brings forth from two to four young at a birth, and provides for the occasion a curiously constructed nest, mostly of dry leaves, of which the roof is capable of throwing off the rain. The young are blind at first, their ears are closed, and their bodies are covered with soft, incipient spines. In winter the hedgehog becomes torpid, retiring to a hole at the base of a tree, beneath roots, or in some such situation. It provides no winter store, and few animals hibernate so completely. The hedgehog is easily tamed, becomes very familiar, and is very useful in houses where cockroaches are troublesome. Night is its period of activity. Its flesh is eaten in some parts of Europe, but in Great Britain only by gypsies, who roll the animal up in a ball of clay, and so roast it. About eighteen other species of hedgehogs are found in different parts of Asia and Africa, but no closely related animal is included in the American fauna. See Plate of PORCUPINES AND HEDGEHOGS.

HEDGEHOG PLANT (so called from the shape). A name given to those species of medic (Medicago) in which the pods are spirally twisted and rolled up into a ball, beset with spines. The peculiar appearance of the pods makes them objects of interest, on which account they sometimes find a place on flower borders. Like other medics, they are useful as sheep and cattle food in countries where they abound. They are particularly plentiful on sandy grounds near the sea in some parts of South America, and their bur-like pods are often abundant in South American wool. See MEDIC.

HEDGE-HYSSOP. See GRATIOLA.

HEDGE-MUSTARD, *Sisymbrium.* A genus of plants of the natural order Cruciferæ, mostly annual or perennial herbs, with various foliage, yellow or white flowers, and long, roundish or six-angled pods. Several species are natives of Europe, of which one, the common hedge-mustard (*Sisymbrium officinale*), was once employed in medicine for catarrh and other ailments, and still is sometimes cultivated as a pot-herb on account of its mild pungency. It is abundantly introduced into the United States, where it is considered a troublesome weed. Broad-leaved hedge, or London rocket (*Sisymbrium irio*), is said to have sprung up in great abundance on the ground desolated by the fire of London in 1666. There are a number of other species, nearly all of which are weedy in habit. *Sisymbrium Alliaria* is noted for its strong garlic-like odor.

HEDGE-NETTLE. See STACHYS.

HEDGE-SPARROW, HEDGE-WARBLER, or DUNNOCK. A familiar European warbler (*Accentor modularis*). It is not quite as large as the house-sparrow, which it somewhat resembles in dull brownish plumage, but in little else. It feeds principally on insects. It is one of the earliest spring songsters, having a sweet plaintive song. The nest, of green moss, roots, and wool, lined with hair, is usually placed rather low in a bush or hedge. The eggs are four or five in number, of a delicate and spotless bluish green.

HEDIN, hĕ-dēn′, SVEN ANDERS (1865—). A Swedish explorer, born at Stockholm, and educated there and at Upsala (1885), at Berlin and at Halle, where, in 1892, he received the doctorate. He traveled in Southwestern Asia in 1885-86, and gave an account of his journey in *Genom Persien, Mesopotamien och Kaukasien* (1887); was a member of the Swedish commission to Teheran, which he described in *Konung Oscar's beskickning till Schahen af Persien* (1891); and in *Genom Khorasan och Turkistan* (1892) told of his experiences in Central Asia in 1890-91. In the years 1894 to 1897 he traveled through East Turkestan, the Pamir, the Takla-Makan Desert, northern Tibet, and the Desert of Ordos, reaching Peking and returning west through Mongolia and Siberia, and in the latter year won the Karl Ritter medal from the Berlin Geographical Society. These remarkable journeys, performed at times amid extraordinary hardships, were described in the book, *Through Asia* (1899), which made the author's reputation in England and America; and, less popularly, in *Petermanns Mitteilungen* (1900); "Die geographisch-wissenschaftlichen Ergebnisse meiner Reisen in Central Asien, 1894-97." Hedin's expedition of 1899 to 1902 explored the lower course of the Tarim, the country between it and the Tchertchen-Darya, the region of Lob-Nor, the Desert of Gobi, and the greater part of Tibet. He made two unsuccessful attempts to enter the sacred city of Lhasa. Hedin accepted invitations to visit America for a course of university lectures for the early part of 1903.

HEDJAZ, hĕ-jäz′ (Turk., land of pilgrimage). A Turkish vilayet of Arabia (q.v.), extending along the northeast shore of the Red Sea from the Gulf of Akabah to about the parallel of 20° N. (Map: Turkey in Asia, P 10). It reaches to the Nefud Desert on the east. Its area is estimated at 96,500 square miles. The district is barren, being covered with sand and eruptive material. In parts of the interior there are mountains reaching an altitude of about 6000 feet. The country is traversed by numerous wadis. The climate is hot and dry, and vegetation is found only in a few oases. The population is estimated at about 300,000, consisting of Bedouins, many of whom are engaged in the plundering of caravans. Hedjaz is important in the Mohammedan world, for within its confines are the two sacred cities of Mecca and Medina. The chief port is Jeddah.

HEDLINGER, hĕd′lĭng-ẽr, JOHANN KARL (1691-1771). A Swiss stamp-cutter, born at Schwyz. He completed his studies in Paris, and then went to Sweden, where he was appointed royal medalist in 1718. His pupil, Fehrman, succeeded him as a medalist to the King, and finished from his designs a series of portraits of Swedish sovereigns. His works were published with a French text by C. de Michel (1778, forty plates), and with a German text by J. C. Füszli and J. E. Haid (1781-82, eighty plates).

HEDONISM (from Gk. *ἡδονή, hēdonē*, pleasure; connected with *ἡδύς, hēdys*, Lat. *suavis*, Goth. *suts*, OHG. *suozi*, Ger. *süss*, Eng. *sweet*, Skt. *svādu*, sweet, from *svad*, to make pleasant, to taste). The theory that pleasure is the high-

est good in human life. (See ETHICS.) In Occidental speculation this view appeared very early, and was vigorously asserted by many sophists (q.v.). Aristippus (q.v.) and his school (see CYRENAIC SCHOOL) made hedonism their central doctrine. Aristippus seems, at least at times, to have insisted upon the supreme value of the pleasure of the moment, and to have lost sight of the necessity, even according to hedonism, of taking account of the future. But while many of the sayings attributed to him have this irrational character, the value he set upon insight would seem to indicate that it was not his intention to hold up as ideal the man who completely ignored all the hedonic consequences of his action. Epicurus (q.v.) laid more emphasis on the desirability of choosing 'productive' pleasures, to use Bentham's nomenclature; i.e. pleasures whose consequences are not painful. But however they differed in other points, all the ancient hedonists were agreed that the pleasure of the agent was, for the agent himself, the supreme end. A disinterested desire for some one else's good was not recognized as possible; or, if possible, it was regarded as perverse. Early modern hedonists (see HOBBES and LOCKE) were almost or quite as individualistic as the ancients. But with Cumberland, Hutcheson (q.v.), and Hume (q.v.), a new phase of hedonism was introduced, viz. the theory that not the agent's greatest pleasure, but "joy in widest commonalty spread," is the supreme end of mortal action (Universalistic hedonism, or Utilitarianism, q.v.). There is also another distinction between ancient and modern hedonism. It was characteristic of Greek and Roman pleasure theories that they rested on the principle that every man, or at least every normal man, always seeks his own pleasure. In other words, the ancient theory rested on an alleged psychological fact, and has therefore been called *psychological* hedonism. Some modern authors take the same position; but the prevailing tendency in modern hedonism is to assert, not that every man always *actually* seeks his own pleasure, but that he *ought* to seek the greatest pleasure, whether of himself or of humanity, or of all sentient creatures. This is *ethical* hedonism.

Psychological hedonism is controverted by well-known facts. So far is man from always seeking pleasure, that in most of his actions he has no thought of pleasure. He acts from automatic impulse, from instinct, from habit, from desire for certain objective ends, as well as occasionally from desire for pleasure. It has even been denied that there can be any desire for pleasure, although this is, without doubt, an extreme position. The tendency among many writers at the present day is to maintain that the affections, i.e. pleasantness and unpleasantness, are the motives or mainsprings of *voluntary* action, and not that pleasure and the avoidance of pain is the *end* of action. The difference between a motive and an end is that between an efficient and a final cause (see CAUSALITY), although it should be remarked that motive is often used as synonymous with end. This view that the affections are the motives of actions, so far as these actions are voluntary, is not to be confused with hedonism, which is a theory of ends, not of cause.

Ethical hedonism is beset at the outset with one great difficulty. It is often argued that hedonism is not practicable unless all pleasures can compare in some way with each other. Who shall say whether the pleasures of the table are greater or less than those of the opera? The question can be only approximately answered by each individual according to his own tastes. And even such an answer can claim no uniform applicability. At one time, e.g. when extremely hungry, even the most enthusiastic lover of music might prefer beefsteak to Wagner, while just after an epicurean banquet the gourmand might temporarily prefer music. The greatest sum of pleasures either for the agent or for the race would be a very difficult ideal to set before one, except in the abstract—too difficult, perhaps, to make it the criterion of morality for the ordinary man. But the difficulty of it must not be a bar, if, on sufficient ground, it can be proved that man *ought* to seek the greatest pleasure either of himself or of others. What obligation means and how it relates itself to pleasures and desires is discussed elsewhere. (See ETHICS.) After that discussion it may be said that hedonism has no scientific basis. Consult the authorities referred to under UTILITARIANISM; ETHICS.

HÉDOUIN, ā'dwăN', EDMOND (1820-89). A French painter, born at Boulogne-sur-Mer. He studied under Delaroche and Nanteuil, and first attracted attention by his "Woodcutters of the Pyrenees," exhibited in 1844. His best works are scenes of Spanish peasant life. He also produced some decorative paintings for the foyer of the Théâtre Français in Paris. One of his landscapes is "Gleaners Overtaken by Storm" (1857), in the Luxembourg. In engraving, Hédouin's work for an edition of Molière (1881-89) may be noted.

HÉDOUVILLE, ā'dōō'vēl', GABRIEL MARIE JOSEPH THÉODORE, Count d' (1755-1825). A French general and diplomat, born at Laon, and educated at La Flèche and at the Military School. In 1797 he was made Governor of Santo Domingo, but was unable to cope with Toussaint L'Ouverture, and returned to France two years afterwards. In 1801 he was made Minister to Russia, in 1805 went on diplomatic missions in Italy, and, with Josephine, to Strassburg and Munich. After the peace with Austria he was Plenipotentiary at Frankfort, but in 1814 voted for the overthrow of the Empire. He was made count in 1818, and was appointed to the commission on the disputes between France and the Grand Duchy of Warsaw.

HEDWIG, hĕd'vĭK (1174-1243). The patron saint of Silesia, a daughter of Berthold IV. of Meran. In her twelfth year she was married to Duke Henry I. of Silesia, who died in 1238. She entered a Cistercian cloister which she had founded near Breslau, and died there.

HEDWIG, or **JADWIGA**, yăd-vē'gȧ (1371-99). A Queen of Poland, daughter of Louis the Great of Poland and Hungary. After his death (1382) the Poles put her on the throne. In 1386 she married Jagellon of Lithuania, who embraced Roman Christianity and became known as Wladislaw (Ladislas).

HEEL-FLY. A local name in the Southern and Western States for the ox bot-fly (*Hypoderma lineata*), derived from the fact that the

adults hover around the heels of cattle for the purpose of laying their eggs on the hairs, whence they will be licked off. See BOT.

HEEL-FLY.

HEEM, hām, JAN DAVIDSZ DE (1606-84). The most celebrated painter of 'still life' that the Dutch School has produced. He was born at Utrecht, and studied under his father, a painter of still life. We know but little of his life. In 1620, and during the years following, he was active at Leyden, and in 1635 he became a member of the Painters' Guild of Antwerp. In 1667 he returned to Utrecht, but during the French invasion of 1672 he fled to Antwerp, remaining there until his death in 1684. Heem's pictures represent for the most part splendid vases of fruits and flowers, musical instruments, and ornaments of various kinds. His work was popular and commanded high prices. His works are to be found in nearly all the principal galleries of Europe, especially in those of Holland, Belgium, and Germany. They show exquisite coloring, unsurpassable chiaroscuro, faultless arrangement, and a fine observation of nature, which he imitates with microscopic fidelity.

HEEMSKERK, hāms'kĕrk, or **HEMSKIRK**, MARTIN VAN (1498-1574). A Dutch painter, whose name was Martin van Veen, but who was called Heemskerk from the place of his birth. He studied under Scorel, from whom he got a liking for Italian art which he displayed, particularly in his imitation of Michelangelo, whose works influenced him strongly when he saw them on his visit to Rome in 1532. Many of his pictures were destroyed by the Spaniards during the sack of Haarlem (1572). Among those still existing are: "Saint Luke Painting the Virgin" (1532), "Adoration of the Shepherds," "The Brazen Serpent," "Last Judgment," and "Triumph of Silenus."

HEEP, URIAH. A very "umble' person and a most egregious hypocrite in Dickens's *David Copperfield*. He is a clerk in Mr. Wickfield's law office, gains absolute ascendency over that benevolent but singularly weak character, and is prevented from ruining him only by being exposed by Micawber.

HEER, hār, OSWALD (1809-83). A Swiss naturalist, born at Nieder-Utzwyl. He was director of the botanical gardens at Zurich (1835-83), and also professor of botany at the university and at the Polytechnicum. His earliest publications were on entomology, but his most important contributions to science were his works on the fossil plants and insects of the Tertiary period, notably *Flora Tertiaria Helvetiæ* (1854-56); *Die Urwelt der Schweiz* (1865-79); *Flora Fossilis Helvetica* (1877); *Flora Fossilis Arctica* (1865-83). Consult: J. J. Heer and Schröter, *Oswald Heer, Lebensbild eines schweizerischen Naturforschers* (Zurich, 1885-87); and Malloizel, *Oswald Heer. Bibliographie et table iconographique* (Berlin, 1888).

HEEREN, hā'ren, ARNOLD HERMANN LUDWIG (1760-1842). An eminent German scholar, born at Arbergen, near Bremen, where his father was at that time pastor, and educated at the cathedral school of Bremen, and at the University of Göttingen. His first published work was an edition of Menander's *De Encomiis* (1785), and somewhat later appeared the *Eclogæ Physicæ et Ethicæ* of Stobæus (1792-1801). In collecting materials for the latter he visited Italy, the Netherlands, and France. In 1794 he was appointed professor of philosophy, and in 1801 professor of history at Göttingen. In 1793-96 appeared at Göttingen his *Ideen über Politik, den Verkehr und den Handel der vornehmsten Völker der alten Welt* (4th ed. 1824-26). This work has secured him a place among the most eminent modern historians, and is still of much value. If his *Geschichte des Studiums der Klassischen Litteratur seit dem Wiederaufleben der Wissenschaften* (1797-1802) proved less satisfactory to scholars, his *Geschichte der Staaten des Altertums* (5th ed. 1826) and his *Geschichte des europäischen Staatensystems und seiner Colonien* (4th ed. 1822) abounded in new views and acute expositions. For his *Versuch einer Entwickelung der Folgen der Kreuzzüge* (1808) he received the prize from the Institute of France. His *Vermischte historische Schriften* (1803-08) contain some very interesting treatises. In 1821-26 he published an edition of all his historical works (*Historische Werke*) in fifteen volumes.

HEEREN, FRIEDRICH (1803-85). A German chemist, nephew of the historian Arnold Herman Ludwig Heeren, and born at Hamburg. Educated at Göttingen and Paris, he was for two years engaged with his brother in the manufacture of stearin and whale-oil candles in Hamburg, and in 1831 became professor of chemistry in the institute of technology at Hanover. He patented a machine for testing milk, wrote on chemical dyes, and published a *Technisches Wörterbuch* (with Karmarsch, 1841-44; revised by Kick and Gintl, 1874-92), a free translation of Ure's *Dictionary of Arts, Manufactures, and Mines*, and a standard work of reference.

HEFELE, hā'fe-le, KARL JOSEPH VON (1809-93). A Roman Catholic bishop and scholar. He was born at Unterkochen, not far from Stuttgart, Württemberg, March 15, 1809; graduated at Tübingen, and in 1840 received a professorship in the Catholic theological faculty, where he lectured on Church history, Christian archæology, and patrology. From 1842 to 1845 he was a member of the Württemberg Chamber of Deputies. He was consecrated Bishop of Rottenburg in 1869, and took a prominent part in the Vatican Council, where he was foremost among those who spoke and voted against the dogma of Papal infallibility. At first he refused to proclaim it in his diocese, but on April 21, 1871, did so, and in 1872 gave his public assent to it. In 1874 he declined the Archbishopric of Freiburg offered to him by the Baden Government, on the ground that he could not take the oath which was demanded from the bishops in Prussia and Baden. His most important work, based on the study of original materials, is the *Conciliengeschichte*, a history of the councils of all grades, in nine volumes. Hefele's part of the work extends to the Council of Florence, but with Hergenröther's appendix, the work goes to Trent. The English translation (Edinburgh, 1871-96, 5 vols.), goes as far as 738. Hefele's *Life of Ximenes*

(1844) has been translated (London, 1860). He died in Rottenburg June 5, 1893.

HEFFERNAN, Mr. Michael. The nom-de-plume which Samuel Ferguson signed to *Father Tom and the Pope, or a Night at the Vatican.*

HEFFTER, hĕf'tĕr, August Wilhelm (1796-1880). A German jurist, educated at Berlin and Leipzig. He was made professor at Bonn (1823), at Halle (1830), and at Berlin (1832). From 1849 he was a member of the First Chamber; in 1861 was appointed Crown Syndic and became as such life member of the Prussian Upper House. He wrote: *Institutionen des römischen und deutschen Civilprozesses* (1825); *Das europäische Völkerrecht der Gegenwart* (8th ed. by Geffken, 1888); *Lehrbuch des gemeinen deutschen Strafrechts* (6th ed. 1857); and *Die Sonderrechte der souveränen und mediatisierten Häuser Deutschlands* (1871); and, on current history, *Der gegenwärtige Grenzstreit zwischen Staats- und Kirchengewalt* (1839).

HEFNER-ALTENECK, hĕf'nĕr äl'te-nĕk, Jakob Heinrich von (1811—). A German historian and art critic. He was born in Aschaffenburg, and while still a child he lost the use of his right arm, but nevertheless became an excellent draughtsman. He made a specialty of the history of art, especially of the Middle Ages. He was made successively professor of designing (1835), conservator of the art collection of Munich (1853), of the Royal Museum of Engravings (1863), and conservator-general of the art collections of Bavaria and director of the National Museum (1868). His retirement in 1886 did not put a stop to his literary activity. The more important of his works are: *Trachten, Kunstwerke und Gerätschaften vom frühen Mittelalter bis Ende des 18. Jahrunderts* (2d ed. 1879-90); *Hans Burgkmaiers Turnierbuch* (1854-56); *Eisenwerke oder Ornamentik der Schmiedekunst des Mittelalters und der Renaissance* (1861-87); *Originalentwürfe deutscher Meister für Prachtrüstungen französischer Könige* (1865); *Originalzeichnungen deutscher Meister des 16. Jahrhunderts zu ausgeführten Kunstwerken für Könige von Frankreich und Spanien* (1889); *Deutsche Goldschmiedewerke des 16. Jahrhunderts* (1890); and *Lebenserinnerungen* (1899).

HEGAR, hā'gär, Friedrich (1841—). A German composer, born at Basel. He studied at the Leipzig Conservatory under several famous teachers, and in 1860 became leader of the Bilse Orchestra at Warsaw. In 1863 he settled in Zurich, where he became a well-known conductor, and in 1876 founded a school of music. He composed some piano and violin music, but became best known for his male choruses and songs. His oratorio, "Manasse," was highly successful, and is a striking work.

HEGEL, hā'gel, Georg Wilhelm Friedrich (1770-1831). One of the greatest German philosophers. He was born August 27, 1770, at Stuttgart, and became in 1788 a student in the University of Tübingen, where his speculative abilities, however, were outshone by his younger companion, Schelling, who, together with Hölderlin, exercised a great intellectual influence on him. In the university he studied theology, philosophy, and natural science, and was interested in political events and theories. His diploma described him as having good parts, but did not mention him as distinguished for his knowledge, philosophical or otherwise. After leaving the university in 1793, he was a private tutor at Bern and Frankfort-on-the-Main for seven years, during which period he continued his studies in philosophy and theology, and wrote a *Life of Jesus*, which, however, was never published. In the beginning of 1801 he left Frankfort for Jena, where he published his first work, *Ueber die Differenz des Fichteschen und Schellingschen Systems der Philosophie* (1801), and entered the university as privat-docent. Next year he joined Schelling, to whose philosophy he seems at this time to have adhered, in the editorship of the *Kritisches Journal der Philosophie.* This alliance did not last long, and soon turned into philosophical antagonism. His lectures in Jena did not attract much notice, but it was at this place, while the din of the battle in 1806 was sounding through the town, that he completed his first important work, *Phänomenologie des Geistes* (1807), which he used afterwards to call his voyage of discovery. Shortly before the battle he had been made professor extraordinarius of philosophy; but the disaster which the war brought upon Jena compelled him to seek means of subsistence elsewhere, and he went, accordingly, at Niethammer's request, to Bamberg, where he edited a political paper for a year or two. In 1808 he was appointed rector of the gymnasium at Nuremberg, and there he had just completed the first edition of his *Wissenschaft der Logik* (1812-16), when he was called in 1816 to a professorship of philosophy in Heidelberg. There he published his *Encyklopädie der philosophischen Wissenschaften* (1817), in which he first developed his complete system. In 1818, however, he was called to Fichte's place in Berlin, and it was here that he first began to gather around him a new philosophical school. His lectures, which were delivered without rhetorical ornament, yet with an impressiveness due to the expression of laborious thought, attracted hearers from all ranks and professions. He rose to great political influence by reason of his defense of existing political institutions. This defense subsequently led his critics to charge him with time-service; the charge, however, does him a great injustice. In 1821 he published his *Grundlinien der Philosophie des Rechts*, in which he gave expression to his ethical and political views. He demands in that work, among other things, representation of the people, freedom of the press, publicity of judicial proceedings, trial by jury, the administrative independence of corporations, and, above all, a monarch who shall "put the dot over the *i*," i.e. complete the constitution of the State. In the midst of an active life he was suddenly cut off by cholera, November 14, 1831. He was buried beside Fichte. A complete collection of his works was published in eighteen volumes (Berlin, 1832-41), some of them compiled from notes taken by his students. Of his works translated into English may be mentioned: *Philosophy of Mind* (Oxford, 1894), and *Logic* (ib., 2d ed. 1892), translated by Wallace, both of which are portions of the *Encyklopädie; Philosophy of Right*, translated by Dyde (London, 1896); *Philosophy of Religion*, translated by Spiers and Sanderson (ib., 1895); *Philosophy of History*, translated by Sibreener (ib., 1857); *History of Philosophy*, translated by Haldane and Simpson (ib., 1892); *Hegel's Doctrine of Reflection*, translated by W. T. Har-

ris, book ii. of *Greater Logic* (New York, 1881); and portions of book i. of the *Greater Logic* by J. H. Stirling in his *Secret of Hegel* (2d ed., Edinburgh, 1897).

It is impossible in this article to give any detailed account of Hegel's system of philosophy. He called it the system of the Absolute Idea. The idea is, for him, the indissoluble unity of the universe, existing in the two polar distinctions of subject and object. This idea is absolute because all-inclusive. The method by which Hegel arrived at this result he called dialectic (Dialektik), and by this he meant the process of exhibiting the incomplete character of any conception except the all-inclusive conception of the Absolute Idea. Thus in his *Logik*, which expounds the method, Hegel begins with the conception of Being (Sein), and shows that it is not a complete conception; i.e. that it cannot be thought by itself. It is always only a part conception and has no independence. The other part conception is Naught (Nichts). These two parts are not put together in any external way, but each is originally connected with the other. The organic unity of the two part conceptions he calls Becoming (Werden). In the same way Becoming is not a complete thought; it is only part of a larger thought, which in its turn is part of a still larger, till at last we reach the thought of the Absolute Idea. But the *thought* of the Absolute Idea is itself only a partial fact if it is conceived as a mere conception, i.e. as something that has existed only "in the abstract medium of pure thought." Thought must have its objects. These objects we may try to conceive as existing apart from thought, but this conception is in its turn shown to be as incomplete as that of thought without object. The Absolute Idea then is not a conception in the ordinary sense of the word, but it is a fact, the fact of the inevitable union of thought and object of thought. Again, the inseparability is not spatial, but temporal. That is to say, Hegel does not mean that the act of thinking and the object thought must be in the same place or at the same time. All that he means is that whatever may be the temporal relation between the act of thinking and the object thought, the latter cannot be conceived as existing except either as an actual object of thought or as standing in intelligible relation to some actual object of thought, just as the act of thinking cannot exist except in thinking some object. Though an interval of time may separate subject and object, an object which stands out of all relation to a subject or a subject which stands out of all relation to an object is inconceivable. In other words, all reality is one, in the sense that all real things, physical or psychical, are interconnected in such ways that their several reality is not something they have in isolation from the system of real things of which each is an integral part. Hegel's theology and the other parts of his system, such as the philosophy of law, of nature, of art, and of mind, are too subtle to admit of treatment here. Indeed, even the short sketch of the system as a whole, given above, would be rejected by many students of Hegel as inaccurate, so difficult is the task of interpreting Hegel. Hegelianism is a term commonly employed to denote some supposed agreement with his views, but most thinkers who stand close to Hegel fight shy of the term because of the indefiniteness of its connotation. A thinker of the present day, therefore, hardly ever calls himself an Hegelian. Four years after Hegel's death, a controversy was raised among his followers by Strauss's *Leben Jesu* (see STRAUSS), and was further imbittered by Strauss's *Christliche Glaubenslehre*. The Hegelians then split into three sections, called severally, the right, the left, and the centre, accordingly as they represented supernaturalism, naturalism, or a mediating tendency. The first section was represented, among others, by G. A. Gabler, H. T. W. Hinrichs, and K. T. Göschel; the leftists, by Bruno Bauer, Feuerbach, Strauss, and K. L. Michelet; the centrists, represented by J. K. Rosenkranz, J. E. Erdmann, and W. Vatke, Weisse, I. H. von Fichte, the younger Ulrici, Fischer, and Carrière, were named pseudo-Hegelians, because, though retaining a large element of Hegel's doctrine, they did not follow closely the Hegelian tradition as represented by the three schools. Hegel's philosophy has had great influence in other countries than Germany, notably on British and American thought. T. H. Green (q.v.), J. Caird, E. Caird, W. Wallace, J. H. Stirling, B. Bosanquet, F. H. Bradley, H. Jones, J. Watson, D. G. Ritchie, A. S. Pringle-Pattison, in Great Britain, and G. S. Morris, W. T. Harris, and J. Dewey, in the United States, have been more or less influenced by Hegel, although many of these thinkers have attacked Hegelianism. In Germany the encouraging patronage extended by the Prussian Government created in the later years of his life a great professorial constituency of Hegelians. But the metaphysical excesses of these Hegelians led to a violent reaction, the effects of which have lasted to the present day. For various views of his system, consult: Trendelenburg, *Logische Untersuchungen* (Berlin, 1840. 3d ed. 1870); Ulrici, *Ueber Princip und Methode der Hegelschen Philosophie* (Halle, 1841); A. Schmid, *Entwickelungsgeschichte der Hegelschen Logik* (Regensburg, 1858); Janet, *Etudes sur la dialectique dans Platon et dans Hegel* (Paris, 1865); Stirling, *The Secret of Hegel* (Edinburgh, 2d ed. 1897); Harris, *Hegel's Logic* (Chicago, 1890); Caird, *Hegel* (London, 1883); Bosanquet, *Introduction to Hegel's Philosophy of Fine Art* (London, 1886), containing also translations of selected portions of Hegel's writings on æsthetics; Morris, *Hegel's Philosophy of the State and of History* (Chicago, 1888); Seth (Pringle-Pattison), *Hegelianism and Personality* (Edinburgh, 2d ed. 1893); McTaggart, *Studies in the Hegelian Dialectic* (Cambridge, 1896); Noel, *La logique de Hegel* (Paris, 1895); Schmitt, *Das Geheimniss der Hegelschen Dialektik* (Halle, 1888); Baillie, *Hegel's Logic* (London, 1901); Stibben, *Hegel's Logic* (New York, 1902); the philosophical works of Rosenkranz and of K. L. Michelet; and the histories of modern philosophy by Ueberweg and Heinze, Windelband, Höffding, and Erdmann. For his life, consult Rosenkranz, *Hegel's Leben* (Berlin, 1844); Haym, *Hegel und seine Zeit* (Berlin, 1857).

HEGEL, KARL VON (1813-1901). A German historian, elder son of the philosopher. He was born at Nuremberg; studied philosophy, theology, philology, and history at Berlin and Heidelberg; was assistant at the Köllnische Gymnasium in Berlin, became professor of history at Rostock (1841) and at Erlangen (1856). He was chief editor of *Chroniken der deutschen*

Städte vom 14. bis ins 16. Jahrhundert (1862-99). His principal work is *Geschichte der Städteverfassung von Italien* (1847); and among his other works the more important are: *Die Chronik des Dino Compagni* (1875); *Ueber den historischen Wert der ältern Dante-Kommentare* (1878); *Briefe von und an G. W. F. Hegel* (1887); *Städte und Gilden der germanischen Völker im Mittelalter* (1891); *Die Entstehung des deutschen Städtewesens* (1898); and *Leben und Erinnerungen* (1900).

HEGELUND, hā'ge-lụn, PEDER JENSEN (1542-1614). A Danish dramatist, born at Ribe. He studied at Copenhagen, Leipzig, and Wittenberg, was made rector of the school at Ribe (1569), dean of the cathedral, and Bishop of Ribe (1595). A number of his plays and an historical work are lost, but several of his poems, and a play, *Susanna*, translated from Xystus Bitulejus, which he arranged for pupils, and which was acted at Ribe (1576), have been edited by S. Birkit Smith (1890-91).

HEGE'SIAS (Lat., from Gk. *Ἡγησίας, Hēgēsias*). A Cyrenaic philosopher, who flourished about 300 B.C. He was a Hedonist and a follower of Aristippus, but taught that a life of pure pleasure was unattainable, and therefore not to be sought. The chief aim of life was freedom from pain. Therefore, it was the part of true wisdom to cultivate a state of absolute indifference to all pleasure. In his doctrine he set forth the desirability of suicide as a means of escaping the sorrows of this life so eloquently that Cicero tells us Ptolemy forbade his teaching as pernicious. From this advocacy of suicide he was given the nickname *πεισι-θάνατος*, or 'Death's advocate.'

HEGE'SIPPUS (Lat., from Gk. *Ἡγήσιππος*). A Christian writer of the second century. He was probably of Jewish descent and born in the East, whence he went to Rome, stopping at Corinth on the way. He is supposed to have died about 189. While at Rome he composed a work, *Hypomnemata*, in five books, which was probably directed against the Gnostics, and may have been in some sense a history of the early Church. It is known only from fragments, mainly in Eusebius. Another work on the wars of the Jews (also in five books), ascribed to Hegesippus, is confessedly spurious. The most complete collection of the fragments of his writings is that of Galland, *Bibliotheca*, vol. ii. (Venice, 1765-81); they are also in Migne, *Patrol. Græca*, v., and are translated in the *Ante-Nicene Fathers*, viii.

HEGESIPPUS. An Athenian orator of the fourth century B.C., an ally of Demosthenes against Philip of Macedon. The oration *De Haloneso*, ascribed to Demosthenes, probably is the work of Hegesippus.

HEGESO, hē-jē'sō, MONUMENT OF. One of the most beautiful of the monuments in the Street of Tombs, at Athens. It belongs to the fourth century B.C., and is decorated with a relief representing a lady at her toilet with a female slave in attendance.

HEGIRA, hĕj'ĭ-rā. See HEJIRA.

HE'GIUS, ALEXANDER (c.1433-98). A humanist, teacher of Erasmus. He was born at Heek (whence his name), in Westphalia, and was taught by Thomas à Kempis at Zwolle. In 1469 he taught at Wesel; in 1474 at Emmerich and at Deventer, where Erasmus, the future Pope Adrian VI., Conrad Goclenius, afterwards professor at Louvain, and Hermann von dem Busch were among his pupils. His methods were novel; he did not use the mediæval text-books, but made classic Latin his standard, and tried to introduce Greek. His works, comprising treatises on pedagogy, morals, and psychology, together with hymns, elegies, and letters, and an essay, *De Utilitate Græcæ Linguæ*, now very rare, were originally published by Jakob Fabri in 1503.

HEGNENBERG-DUX, hĕg'nen-bĕrk-dụx', FRIEDRICH ADAM JUSTUS, Count (1810-72). A Bavarian statesman, descended from Georg Dux, a natural son of William IV. of Bavaria. He was educated at Würzburg, and in 1845 was elected to the Bavarian Lower House. He was a member of the National Assembly at Frankfort, and from 1848 to 1865 was president of the Bavarian House of Deputies. Always independent in politics, he was a leader of the opposition up to 1848, then for a short time was allied with the Government, only to oppose it again. In 1871 he was made Prime Minister; but he died less than a year after.

HEGNER, hāg'nĕr, ULRICH (1759-1840). A Swiss author, born at Winterthur. He wrote: *Auch ich war in Paris* (1803-4); *Berg-, Land- und Seereisen* (1818); *Die Molkenkur* (3d ed. 1827), a descriptive novel; its sequel, *Suschens Hochzeit* (1819); and *Salys Revolutionstage* (1814), an historical novel; also the biographical and critical works: *Hans Holbein, der jüngere* (1827), and *Beiträge zur nähern Kenntnis und wahren Darstellung J. K. Lavaters* (1836). His collected edition of his works was published at Berlin (1828-30). Consult: Schellenberg-Biedermann, *Erinnerungen an Ulrich Hegner* (Zurich, 1843), and Waser, *Ulrich Hegner* (Halle, 1901).

HEGO'LEH, or MADOQUA. See DUIKER.

HEHN, hān, VIKTOR (1813-90). A German-Russian writer and teacher, born at Dorpat. He studied there (1830-33) and at Berlin (1838-40). After extended travels, especially in Italy, he became teacher of German at Pernau (1841), and afterwards at Dorpat. Here he fell under suspicion politically, and, after a long consideration of his case, was by Czar Nicholas ordered to serve in an inferior position in the Province of Tula in the interior of Russia. But Alexander II. summoned him to Saint Petersburg and made him chief librarian of the Imperial library (1855). In 1860 and 1863 he traveled again in Italy, and from 1874 on lived at Berlin as Russian Imperial Councilor. His works are: *Zur Charakteristik der Römer* (1843); *Zur Physiognomie der italienischen Landschaft* (1844); *Italien: Ansichten und Streiflichter* (6th ed. 1900); *Kulturpflanzen und Haustiere in ihrem Uebergang von Asien nach Griechenland und Italien sowie in das übrige Europa* (7th ed. by O. Schrader, 1902), the most important of his works and the most important work on the subject; *Gedanken über Goethe* (4th ed. 1900); and, posthumously, *Hehns Briefe an seinen Freund Wichmann* (1890); *De Moribus Ruthenorum Zur Charakteristik der russischen Volksseele. Tagebuchblätter, 1857-73* (1892, edited by Schiemann); *Ueber Goethes Hermann und Dorothea* (1898, edited by Leitzmann and Schiemann); and *Reisebilder aus Italien und Frankreich* (1894, edited by Schiemann). For his *Life*, consult Schrader

(Berlin, 1891), and Schiemann (Stuttgart, 1894).

HEI, hā, or **HEISHI**, hā'shê. See TAIRA.

HEIBERG, hī'bĕrk, HERMANN (1840—). A German novelist, born in Schleswig, and educated there. He succeeded his father in his publishing house, sold it in 1870, and went to Berlin, where he was editor of the *Norddeutsche Allgemeine Zeitung* and of the *Spenerschen Zeitung*, and, after a few years as a banker, devoted himself to literature. His novels are modern and realistic, dealing mostly with family life; among the nearly threescore titles the following may be mentioned: *Acht Novellen* (2d ed. 1895); *Apotheker Heinrich* (2d ed. 1890); *Eine vornehme Frau* (2d ed. 1889); *Esthers Ehe* (2d ed. 1890); *Menschen untereinander* (2d ed. 1896); *Höchste Liebe schweight!* (2d ed. 1894); *Zwischen drei Feuern* (1895); *Merkur und Amor* (1898); *Vieles um Eine* (1900); *Dreissig Geschichten* (1901). Consult Merian, *Hermann Heiberg* (Leipzig, 1891).

HEIBERG, JOHAN LUDVIG (1791-1860). A Danish poet and critic, born in Copenhagen. He was the son of Peter Andreas Heiberg, and of a famous novelist who later became Baroness Gyllembourg-Ehrensvärd (q.v.). The father was exiled in 1800, and the mother cared for the son till he entered the University of Copenhagen in 1809. He spent four years in study and travel, and in 1813 wrote at Stockholm "Hjemkomsten" (The Return Home), a poem of much strength. This was followed by a drama, *The Theatre for Marionettes* (1813), and other work that brought Heiberg after his graduation (1817) a grant from the Government for travel. He passed 1819-22 at Paris with his exiled father. For three years he was professor of Danish at Kiel, and lectured on the comparative merits of the Eddas and Oehlenschläger (German trans., 1827). In 1825 he returned to Copenhagen, endeavored vainly to propagate Hegel's metaphysics, and produced in rapid succession national dramas, comedies, vaudevilles, and farces, while editing the *Copenhagen Flying Post*, and writing also poems collected in 1841, two of which, "A Soul After Death," and "The Newly Wedded," are masterpieces. Much of all this work was satirical, and Heiberg grew increasingly unpopular, especially for a malicious dramatic skit, *The Nut-Cracker* (1845). Yet in spite of this he was made director of the National Theatre in 1849, a post from which he was forced by intrigue in 1856, after which he was made theatre censor. He died in Paris. Heiberg's *Works* are in twenty-two volumes (Copenhagen, 1861-62).

HEIBERG, PETER ANDREAS (1758-1841). A Danish writer, born at Vordingborg, on the island of Seeland. From 1788 he was active at Copenhagen as a translator, and, with Malte-Brun (q.v.), as an exponent of liberal ideas and a scathing critic of the Danish Government. In 1799 he was accused of a series of offenses against a newly enacted press law, and was banished the kingdom. He went to France, was there appointed by Napoleon to a post in the Ministry of Foreign Affairs, and obtained a pension from Louis XVIII. In his *Rigdalersedlens Hændelser* ("Adventures of a Bank-Note"), and more particularly in his operettas and comedies, he unsparingly satirized the existing régime for its obscurantist tendencies and its unfairness. As a dramatist he was perhaps second to Holberg (q.v.) in influence, but was greatly inferior to him in merit. One of his comedies appeared in an English rendering, by C. H. Wilson, as *Poverty and Wealth* (London, 1799). He further wrote political treatises in Danish and French. Consult the study by Schwanenflügel (Copenhagen, 1891); also Heiberg's own *Erindringer af min politiske og literaire Vandel i Frankrige* (Christiania, 1830), and Longfellow, *The Poets and Poetry of Europe* (New York and London, 1855).

HEIDEGGER, hī'dĕg-ĕr, JOHANN HEINRICH (1633-98). A Swiss theologian, born at Bärentschweil, in the Canton of Zürich. He was a student at Marburg and Heidelberg, and afterwards returned to the latter town as professor of Hebrew and then of philosophy. In 1665 he was made professor of moral philosophy at Zürich. An ardent reformer and expert controvertist, he was the author, with Turretin, of the *Formula Consensus Helvetica* (1675), the object of which was to effect a league of the Reformed churches. This plan, however, failed. He was the author of a number of other works of little interest now, mostly directed against the Romish Church, and including *Anatome Concilii Tridentini* (2 vols., 1672), and a *Historia Papatus* (1684), published under the pseudonym Nicander von Hohenegg.

HEIDELBERG, hī'dĕl-bĕrk. A city of Germany, formerly capital of the Palatinate, situated in the northern part of Baden, on the left bank of the Neckar, 12 miles southeast of Mannheim, and 55 miles south of Frankfort (Map: Germany, C 4). It is renowned for its romantic picturesqueness and historic environs. The old town lies on a beautiful slope between the castle hill and the river. It consists mainly of one street (Hauptstrasse) about one and a half miles long, and is architecturally very interesting. The newer portion of Heidelberg extends westward. The interesting Rathaus was built in 1704. Among the ecclesiastical edifices, the most prominent are the late-Gothic Heilig-Geistkirche, of the fifteenth century, erected under the Emperor Rupert, whose tomb it holds, and the Protestant Church of Saint Peter, restored in the ornate Gothic style in 1867.

In addition to the famous university (q.v.), Heidelberg is celebrated for its castle, one of the most interesting in Europe, now to a great extent a ruin. It overlooks the town on the east and is surrounded by a splendid park. It was probably founded by Conrad of Hohenstaufen in the twelfth century, and was enlarged at various times by the rulers of the Palatinate, the palatial portions dating from the sixteenth century and the earlier part of the seventeenth. The castle was well-nigh destroyed in the desolating wars waxed by Louis XIV. toward the close of the seventeenth century. It was largely rebuilt, then ruined by lightning in 1764 and left in its present condition. This ivy-clad, moated castle, reached by a bridge, and rising with careless grandeur in the midst of beautiful trees and foliage, consists of a number of buildings constructed at different periods. The yard is faced by the highly decorated façades of the castle's two finest buildings—the Friedrichs-Bau and the Otto-Heinrichs-Bau. The former is a grandiose, late-Renaissance building, dating from 1601. The latter, dating from 1556, with a striking portal,

is a rare example of German Renaissance, its front being lavishly covered with medallions, and with symbolical statues, both biblical and pagan. There are vast princely halls, the great watch tower, a beautiful balcony, dungeons, cellars, one containing the well-known Heidelberg tun (q.v.), the museum with pictures and historic relics, and a magnificent terrace which commands a splendid view. On the terrace is a statue of Victor von Scheffel, unveiled in 1891.

The environs of Heidelberg abound in ancient, often prehistoric ruins, foundations, ring-walls, and cisterns, and are rich in legendary and literary associations, and romantic haunts of the feudal nobility. Among the conspicuous objects of interest are the Molkencur, a lovely hill whose top commands a view of the castle from above; the Heiligenberg, the Mons Piri of the Romans; the old and new bridges over the Neckar; the Philosophenweg, a long, charming walk through vine-clad slopes, with views reaching to the distant Speyer Cathedral and the Hardt Mountains; and the famous student's inn and dueling-grounds in the vale of the Hirschgasse.

The educational institutions of Heidelberg comprise, besides the university, one gymnasium, an 'oberreal,' and an industrial school, and several private schools. There are also a museum and a number of scientific and art societies. The manufactured products include cement, artificial wood, scientific instruments, fire-department apparatus, etc. There is considerable trade in the hops, tobacco, fruits, and nuts grown in the vicinity. The town is equipped with electric railways. The population was 31,739 in 1890, and 40,121 in 1900, including 14,194 Protestants. The number of foreign residents, many of whom are English and American students in the university, is about 1000.

Heidelberg stands on the site of a Roman colony, but the town dates only from the latter part of the Middle Ages. From the thirteenth century, when it was an insignificant place, down to 1720 it was the capital of the Palatinate. After the Reformation Heidelberg was long the headquarters of German Calvinism, and gave its name to a famous Calvinistic catechism. The town suffered much during the Thirty Years' War. Tilly captured and plundered it in 1622. It was severely treated by the French in 1688, and was in 1693 almost totally destroyed by them. It passed to Baden in 1803. Consult: Hautz, *Geschichte der Universität Heidelberg* (Mannheim, 1862-64); Oncken, *Stadt, Schloss und Hochschule Heidelberg* (Heidelberg, 1885).

HEIDELBERG, University of. The oldest of the German universities within the present German Empire, founded in 1386 by Rupert I., Elector Palatine. The first rector and the real organizer was Marsilius von Inghen, who modeled the university after that in Paris, where he had been a lecturer. The organization was ecclesiastical, the mode of teaching scholastic. From the beginning the university was well attended and successful. In the middle of the sixteenth century Melanchthon gave his aid to a complete reorganization; scholasticism gave way to humanism, and from being Catholic the university became Protestant and a stronghold of Calvinism. At this time the staff included Ursinus and Olevianus, the authors of the Heidelberg Catechism, published in 1563. A period of great prosperity followed, lasting till 1622, when Tilly captured the town and sent to Rome the famous collection of manuscripts known as the Bibliotheca Palatina. The university was much crippled, and in 1626 suspended altogether. In 1652 it was restored, with freedom of confession for all teachers. In the French wars at the end of the century, however, the town again suffered, and the university was again broken up. Some of the professors, it is true, set up instruction at Frankfort-on-the-Main in 1694, removed to Weinheim in 1698, and two years later returned to Heidelberg once more; yet for a century the university led a dead-and-alive existence under the influence of Catholic reactionaries, and after the Peace of Lunéville (1801) nearly all its possessions and endowments were lost. When Heidelberg became a part of Baden in 1803, its new sovereign restored the foundation, and it has since in a measure recovered its former fame. In 1886 the five-hundredth anniversary was celebrated. There were 1600 students in 1901, the largest number in any one faculty being in jurisprudence. The library has about 400,000 volumes, including incunabula, and 3500 manuscripts. Consult Hautz, *Geschichte der Universität Heidelberg* (Mannheim, 1862-64).

HEIDELBERG CATECHISM. See Catechism.

HEIDELBERG TUN. An enormous copper cask in the cellar beneath Heidelberg Castle, set up in 1751 by the Elector Charles Philip. It has a capacity of 49,000 gallons, and measures 36 × 24 feet. Until 1769 it was constantly kept full of Rhine wine, but the custom was abandoned in that year.

HEIDELBURG UNIVERSITY. An educational institution situated at Tiffin, Ohio. It was incorporated as a college in 1851 and reorganized as Heidelburg University in 1890. Its endowment in 1902 was $125,000, its income $15,000, and the approximate value of its buildings and grounds $150,000. In the same year its faculty numbered 30, and its student body 350, of whom 100 were enrolled in the collegiate department. Its departments include summer and preparatory schools, and schools of music, art, oratory, commerce, and theology. The library contains about 25,000 volumes.

HEIDELOFF, hī'de-lōf, Karl Alexander von (1788-1865). A German architect and painter, born at Stuttgart. He studied in Stuttgart and was called to Nuremberg as municipal architect (1818). His knowledge of the early Gothic made him particularly successful in restorations; examples of this are the churches of Saint Sebald and Saint Laurent, and Albert Dürer's fountain. He was made professor in the polytechnic school, and conservator of the monuments of art in Nuremberg. He was an historical painter of some note, and the author of several important works on architecture, among which are: *Die Lehre von den Säulenordnungen* (1827); *Der Kleine Vignola* (1832); *Nürnbergs Baudenkmale der Vorzeit* (1838-54); *Die Ornamentik des Mittelalters* (1838-42); *Die Kunst des Mittelalters in Schwaben;* and *Baudenkmale aus Schwaben* (1854-61).

HEIDEN, hī'den, Eduard (1835-88). A German agricultural chemist, born and educated at Greifswald. He went to Eldena in 1855 and became assistant in the chemical laboratory there

(1857). He was professor of agricultural chemistry at Waldau (1862-67) and at Berlin; and, in 1868, was appointed to the superintendency of the experimental station at Pommritz. He wrote: *Die Phosphorsäure* (1864); *Lehrbuch der Düngerlehre* (2d ed. 1879-87); *Die landwirtschaftlichen Versuchsstationen* (2d ed. 1874); *Leitfaden der gesamten Düngerlehre und Statik des Landbaues* (3d ed. 1892); *Ueber die zweckmässigste Ernährung des Schweins* (1879); and, with Müller and Langsdorff, *Die Verwertung der städtischen Fäkalien* (1885).

HEIDENHAIN, hī'den-hīn, Rudolf Peter Heinrich (1834-97). A German physiologist, born at Marienwerder, and educated at Königsberg, Halle, and Berlin. He spent several years in experimental research with Du Bois-Reymond, and became docent at Halle (1857) and professor at Breslau (1859). Besides many contributions to the foremost German technical journals of histology, anatomy, and physiology, he published: *Physiologische Studien* (1856); *Mechanische Leistung, Wärmeentwicklung und Stoffumsatz bei der Muskelthätigkeit* (1864); *Der sogennante tierische Magnetismus* (1880); *Die Vivisektion im Dienste der Heilkunde* (1879); *Die Vivisektion* (1884); and *Beiträge zur Histologie und Physiologie der Dünndarmschleimhaut* (1888). Consult Grützner, *Zum Andenken an Rudolf Heidenhain* (Bonn, 1899).

HEIDENHEIM, hī'den-hīm. A town of Württemberg, Germany, situated on the Brenz, a short distance from the Bavarian frontier (Map: Germany, D 4). It has a number of large manufacturing establishments, including cotton-mills, machine-shops, cigar-factories, chemical-works, etc. Population, in 1900, 10,510.

HEIDENMAUER, hī'den-mou'ĕr (Ger., heathen wall). (1) A name given in Germany to the remains of various prehistoric fortifications of German and Roman origin. Such ramparts are found on the Ottilienberg, a hill of the Vosges in Lower Alsace, and on the Kastanienberg near Dürkheim, in the Palatinate. (2) A novel by James Fenimore Cooper (1832). The scene is laid in the Vosges during the Middle Ages.

HEIDENSTAM, hī'den-stâm, Werner von (1859—). A Swedish littérateur, born at Olshammar (Nerike Province). He studied painting at the Stockholm Academy, but later turned to literature; took prominent rank among contemporary Swedish verse-writers by his collections, *Vallfahrt och Vandringsår* (1888) and *Dikter* (1895), and wrote further, among various works, the volumes of prose sketches, *Från Col di Tenda till Bloxberg* (1888) and *Saint Göran och draken* (1900; in a German rendering, 1902). His poetical work is original in content, but unequal and often crude in technical structure.

HEIGEL, hī'gel, Karl August von (1835—). A German poet, born in Munich, and educated at the university there. In 1863 he went to Berlin, and from 1865 to 1875 was editor of the *Bazar*. From 1875 on he lived a wandering life in Munich, the Tyrol, and Italy, occupying himself with literary work under the patronage of Louis II. of Bavaria. After the death of the King, Heigel lived at Riva, on Lake Garda. His principal works are: The dramas, *Marfa; Vor hundert Jahren; Freunde; Die Zarin; Die Heimkehr;* the novels, *Die schöne Zarin; Josephine Bonaparte;* the epic, *Bar Cochba, der letzte Judenkönig* (1857); the stories, *Ohne Gewissen* (1871); *Die Dame ohne Herz* (1873); *Benedictus* (1875); *Das ewige Licht* (1877); *Es regnet* (1878); *Der Karneval in Venedig* (1878); *Mosaik* (1886); *Das Geheimnis des Königs* (1891); *Der reine Thor* (1891); *Der Roman einer Stadt* (1893); *Gluck-Gluck* (1894); *Der Herr Stationschef* (1897); *Am blauen Gardasee* (1898); *Der Mahradscha* (1900); *Die neuen Heiligen* (1900); and the biographies, *Karl Stieler* (1890) and *König Ludwig II. von Bayern* (1892).

HEIGEL, Karl Theodor von (1842—). A German historian, brother of Karl August von Heigel. He was educated at Munich, his native city; became docent of history (1873), member of the Academy (1876), professor extraordinary in the university (1879), full professor (1883) in the polytechnic institute, and in 1885 professor and director of the historical seminary in the university. His works include: *Das Herzogtum Bayern, zur Zeit Heinrichs des Löwen und Ottos von Wittelbach* (with Riezler, 1867); *Ludwig I. König von Bayern* (1872); *Der österreichische Erbfolgestreit* (1877); *Quellen und Abhandlungen zur neuern Geschichte Bayerns* (1890); *Nymphenburg* (1891); and *Deutsche Geschichte vom Tode Friedrichs des Grossen bis zur Auflösung des alten Reichs* (1892—). With H. Granert he became editor of *Historische Abhandlungen* (Munich, 1891 et seq.).

HEIGHTS, Measurement of. See Leveling; Hypsometry.

HEIJN, hīn, or **HEYN**, Piet (1578-1629). A Dutch admiral. He was born at Delftshaven near Rotterdam. In 1626 he engaged and utterly defeated the Portuguese in All Saints Bay, Brazil, and returned to Holland with an immense booty. Only two years after this he captured, in the Bay of Matanzas, almost without a blow, the grand Spanish silver flotilla, the value of which was estimated at 12,000,000 Dutch guilders. As a reward he was named admiral of Holland, in 1629. Shortly after, he met his death in a naval encounter off Dunkirk.

HEILBRONN, hīl-brŏn'. A manufacturing town of Württemberg, Germany, situated on the Neckar (here navigable), 33 miles by rail northeast of Stuttgart (Map: Germany, C 4). The old section of Heilbronn is surrounded by a fine avenue laid out on the site of the ancient fortifications. In this part are the interesting Gothic Church of Saint Kilian, begun in the eleventh century, and recently restored, with a rich carved altar; the late Gothic Rathaus of the sixteenth century, with a remarkable clock, and associated intimately with the history of Götz von Berlichingen, as is also the Götzenturm where he was imprisoned, a remnant of the old fortifications; the administration building, originally an Imperial palace and afterwards occupied by the Teutonic Order; and the Schönthaler Hof where Charles V. once sojourned for the sake of the Heilbronn waters. Schiller lived in Heilbronn for a time, and his house is shown. There are an historical museum, a theatre, interesting archives (among which are letters from Gustavus Adolphus, Charles XII., Schiller, and others), a gymnasium founded at the beginning of the seventeenth century, a splendid post-office, schools of music and of agriculture, and a meteorological observatory. The

town is lighted by gas, supplied by a municipal plant, and by electricity.

Industrially it is of great importance. It produces chemicals, silver articles, machinery, sugar, cigars, soda, chicory, coffee, etc. In the vicinity are situated extensive salt works and numerous vineyards. The town has four harbors and a large trade in groceries, agricultural products, wood and coal. The magnificent views in the vicinity embrace the mountains of Middle Germany, the Black Forest, and the Vosges. Heilbronn is of considerable antiquity. After an existence of some 500 years it became a town in 1225 and a free city in 1360. It suffered greatly from war through the Middle Ages. Here, in 1633, in the course of the Thirty Years' War, a treaty of alliance was concluded between the German Protestant States and Sweden. Heilbronn came into the possession of Württemberg in 1802. Population, in 1890, 29,939; in 1900, 37,891, mostly Protestants.

HEILBUTH, hīl'bōōt, FERDINAND (1826-89). A genre painter born at Hamburg, but naturalized as a Frenchman. He traveled and studied in Italy, and finally settled in Paris. His pictures are charming in color and full of humor and grace. Among them may be mentioned the following: "Palestrina's Rehearsal" (1857); "Luca Signorelli by the Body of His Slain Son" (1859), in the Hamburg Gallery; "Mont de Piété" (1861), in the Luxembourg; and "On Monte Pincio," in the Corcoran Gallery, Washington, D. C. He also painted some excellent portraits. He received second-class medals at the Salons of 1857, 1859, and 1861, and the Legion of Honor in 1881.

HEIL DIR IM SIEGERKRANZ, hīl dēr ĭm zē'gēr-krănts (Ger., Hail to thee with victor's crown). The Prussian national hymn, the original words for which were written by Heinrich Harries. They were published in the *Flensburger Wochenblatt* of January 27, 1790, as "A Song for the Danish Subject to sing on his King's Birthday" to the melody of the English national hymn, "God Save Great George, the King." In 1793 B. G. Schumacher published a revised version in five stanzas which soon became the national hymn.

HEILPRIN, hīl'prĭn, ANGELO (1853—). An American naturalist and traveler, son of Michael Heilprin. He was born in Hungary, and came to the United States in 1856. In 1876-78 he prosecuted his studies at the Royal School of Mines, London, at Geneva, and at the Imperial Geological Institution of Vienna. He was professor of invertebrate palæontology and geology at the Academy of Natural Sciences, Philadelphia (1884-1900), executive curator of that institution from 1883 to 1892, and the first president of the Geographical Society of Philadelphia. In 1886 he made a journey to Florida and determined the geological structure of the peninsula. In 1888 he investigated the structure of the Bermuda Islands, and in 1890 made a journey to Mexico which yielded valuable results in connection with the geology of the great central plateau, and in the course of which he ascended Orizaba, Popocatepetl, and Iztaccihuatl, making new barometric measurements of their altitude. In 1892 Professor Heilprin led the Peary Relief Expedition to Greenland. After the destruction of Saint-Pierre, Martinique, by the eruption of Mont Pelée, in 1902, he made two journeys to the island, and repeatedly climbed to the crater while the volcano was in eruption. Among his publications are: *Contributions to the Tertiary Geology and Palæontology of the United States* (1884); *The Geographical and Geological Distribution of Animals* (1887); *The Geological Evidences of Evolution* (1888); *The Bermuda Islands* (1889); *Principles of Geology* (1890); *The Arctic Problem* (1893); *The Earth and Its Story* (1896); *Alaska and the Klondike* (1899); *Mont Pelée and the Tragedy of Martinique* (1902).

HEILPRIN, LOUIS (1851—). An American scholar and encyclopædist, brother of Angelo Heilprin. He was born in Hungary. He became connected with various American encyclopædic publications, including the *New International Encyclopædia*, and is the author of the *Historical Reference Book* (1884; 6th ed. 1899).

HEILPRIN, MICHAEL (1823-88). A biblical scholar, critic, and writer. He was born at Piotrkow, Russian Poland, of Jewish parents. He belonged to a family whose members were distinguished in the field of Hebrew lore as far back as the sixteenth century. His father, Phineas Mendel Heilprin, a Hebrew scholar of note, left Poland with his family in 1842, in consequence of the oppressive measures of the Russian Government, and settled in Hungary. On the outbreak of the Hungarian Revolution of 1848, Michael Heilprin threw himself ardently into the movement for national independence headed by Kossuth, whose friend he became. He published stirring war songs in the Magyar language, of which he had made himself master, and was appointed secretary of the literary bureau attached to the Ministry of the Interior under Szemere. After the collapse of the Revolution, Heilprin lived for a short time in exile, and in 1856 he settled in the United States. He was connected with the *New American Cyclopædia* from 1858, and was one of the associate editors of the new edition of that publication (1873-76). On the establishment of the New York *Nation* in 1865, he became one of the regular contributors, his articles embracing a wide range in current European history and literary criticism. In 1879 he published the first volume of *The Historical Poetry of the Ancient Hebrews, Translated and Critically Examined*, a work of profound original research, which at once took a position both in America and Europe as a most valuable contribution to advanced biblical criticism. The second volume appeared in 1880, the work being left incomplete at the author's death. Heilprin devoted the last years of his life in great measure to furthering Russian-Jewish agricultural colonization in the United States. He was a scholar of encyclopædic knowledge, and was familiar with more than a dozen languages.

HEILSBRONN, hīls'brŏn. A small town in the Bavarian circle of Middle Franconia, situated 20 miles from Nuremberg. The Cistercian Abbey of Heilsbronn, the burial place of the Hohenzollern burgraves of Nuremberg, of the first Hohenzollern Electors of Brandenburg, and of a number of Franconian princes of the house, owed its origin in 1132 to Bishop Otho of Bamberg. The church contains monuments commemorative of ancient German history, and illustrative of the progress of art in Germany during the Middle Ages. Population, in 1900, 1208.

HEIM, hīm, ALBERT (1849—). A Swiss geologist, born at Zurich, where he was educated, and after further study at Berlin, was made docent, and, in 1873, professor in the Polytechnic Institute. In 1875 he became also professor in the university. In 1881 he was appointed director of the department of natural sciences in the Polytechnic and head of the geological museum. He traveled to New Zealand in 1901. Heim wrote: *Untersuchungen über den Mechanismus der Gebirgsbildung* (1878); *Handbuch der Gletscherkunde* (1885); *Beiträge zur geologischen Karte der Schweiz* (1890); *Geologische Excursion -q-uer durch die östlichen Schweizer Alpen* (1894). He also published a *Geologische Karte der Schweiz* (1894, with Schmidt), as well as several panoramic views and reliefs of Switzerland.

HEIM, ăN, FRANÇOIS JOSEPH (1787-1865). A French historical painter, born at Belfort. He studied under Vincent and won the Prix de Rome in 1807. His classic style was unsympathetic to the art world, newly converted to romanticism, and it was not until the end of his career that he gained the recognition he deserved. In the Louvre there are several large historical subjects by him, such as "Charles X. distribuant les récompenses aux artistes à la fin de l'Exposition de 1824" ("Charles X. Distributing Prizes at the Salon of 1824"), and "La brise du temple de Jérusalem" ("Taking the Temple of Jerusalem"). He also painted a number of portraits and executed some decorative works for the Hall of Conference in the Chamber of Deputies, and two ceilings in the Louvre. He received a first-class medal at the Salon of 1812, and the medal of honor at the Paris Exposition of 1855, and became a member of the Institute in 1829, and an officer of the Legion of Honor in 1855.

HEIM, hīm, or **HEIMR**, hīmr (Icel. *home*). In Norse mythology nine worlds are named: Muspelheim, Asaheim, Ljosalfaheim, Vanaheim, Mannaheim, Jötunheim, Svartalfaheim, Helheim, and Niflheim. The highest is Muspelheim (world of fire) the home of Surt, in the highest region of which was Gime (heaven). The lowest is Niflheim (mist-world), the home of cold and darkness, having in its midst the fountain Hvergelmer, where the dragon Nidhogg dwells. Midway between Muspelheim and Niflheim is Mannaheim (man's world), the round plane of the earth surrounded by the ocean. Above Mannaheim is Asaheim (world of the gods), forming an immense vault above the earth. In the midst of this is Idavold, the place where the gods assemble. Beyond the ocean is Jötunheim (home of giants), separated from Asaheim by the river Ifing, which never freezes over. Next above the earth is Ljosalfaheim (home of the elves of light), and between it and Asaheim is Vanaheim (home of the vans). Farther down is Svartalfaheim (world of dark elves); further still Mannaheim, and lastly Helheim (world of the dead, or *hel*).

HEIMBURG, hīm'bŏŏrk, GREGOR VON (c.1400-72). A German jurist and diplomat, born at Würzburg. About 1430 he became secretary to Æneas Silvius, afterwards Pope Pius II., and accompanied him to the Council of Basel; but they soon quarreled because of Heimburg's opposition to the Papal policy of interference in German affairs, and the young man became syndic of Nuremberg, and took a great part in the declaration of the neutrality of the German Church in the quarrel between the Council and Pope Eugene IV. (1438). He was a member of the commission demanding from the Pope the reinstatement of the electors of Cologne, Mainz, and Treves (1446); and as minister of Duke Sigismund of Austria opposed the Pope and was put under the ban. Eventually Sigismund made his peace with the Pope and Heimburg left his service for that of the Hussite King, George Podiebrad, of Bohemia. The latter died in 1471 and his Minister went to the court of the Duke of Saxony, where he died in the following year, only a few months after Pope Sixtus IV. had removed the excommunication against him. His collected works, showing well the polemic character of the man, were published at Frankfort in 1608. Consult: Pfizer's poem, *Der Welsche und der Deutsche* (Stuttgart, 1844); Þrockhaus, *Gregor von Heimburg* (Leipzig, 1861); and Joachimson, *Gregor von Heimburg* (Munich, 1889).

HEIMBURG, WILHELMINE. See BEHRENS, BERTHA.

HEIMDAL, hīm'dâl, or **HEIMDALER**, hīm'dâ-lēr (Icel., world-bow). In Norse mythology, a son of Odin, whose mother was of the Jötun race, often said to be the son of nine virgin sisters. He is the guardian of Asgard, for which position he is peculiarly fitted; for he can see as well by night as by day, requires as little sleep as the birds, and can hear the grass grow. Before the last conflict he will rouse the gods by blowing on his horn jallarhorn. According to a later myth he is regarded as the god of the rainbow.

HEIMSKRINGLA, hīms'krĭng'lâ (Icel., world-circle). One of the most important works in early Norse literature, being a history of the Norse Kings from the earliest times, by Snorri Sturluson (q.v.).

HEINE, hī'ne, HEINRICH (1797-1856). The greatest lyric poet of modern Germany, born in Düsseldorf, December 13, 1797. He was called by himself the last of the Romanticists, and by Matthew Arnold the continuator of Goethe, and was the only writer of primary importance with whom German literature has to reckon since Goethe's death. "Your grandfather," he says he was told, "was a little Jew, and had a big beard." He had shrewd sons, for all of them won a competence, and Heine's uncle Salomon became one of the wealthiest bankers of Hamburg. His father had but small part in his life. His mother (named von Geldern), to whom he showed a constant devotion till his death, gave to his fantastic and romantic nature a joy of life and a spirit of naturalism that make him akin to Goethe. He was a precocious boy, educated in a desultory way by Roman Catholic monks and French 'philosophes,' with the result that he became a skeptic before he had any faith to lose. He seems to have suffered little from race prejudice in youth, and for that he was grateful to France and to Napoleon, for whom he retained a kind of hero-worship, and so had little sympathy with the War of Liberation (1813-14), that "contracted the heart so that men learned to hate what was foreign and in ceasing to be citizens of the world became only narrowly German." No reproach belongs to him

that he found small inspiration to patriotism in the thirty years that followed Waterloo.

While preparing himself to become a merchant and learning English, French, and Italian, he began to write poetry under the inspiration of a child-love for 'Veronica,' probably also the 'Reseda' of early poems. He conceived a passing affection, too, for an executioner's daughter, Josepha, the subject of several poems, of his "Dream Pictures," and of the most exquisite passage in his memoirs. She was, he says, his 'love's purgatory' before he fell into love's hell in his unrequited affection for his cousin Amalie at Hamburg, whither he went in 1816. He tried to set up a business there in 1818, but he liked neither the business nor the city. For Amalie, under the names Ottilie, Maria, Clara, Evelina, Agnes, Juliana, he voiced his passion in many beautiful songs, and it has since been made the subject of two novels, Zianirtza's *Heinrich Heine der Liederdichter* (1864), and Dietz's *Heinrich Heine's erste Liebe* (1870). He failed in business, and at the expense of his uncle and Amalie's father, who aided him generously through life, he went in 1819 to study law at Bonn, where he came under the influence of A. W. Schlegel, and the Romantic School, in so far as it stood for the reawakening of the poetic spirit of the Middle Ages. He shared with them also a gift of irony, though in him this sprang from the incompatibility of two elements in his nature, a Greek joy of life inherited from his mother, and fostered by the influence of Goethe, and a congenital Hebrew earnestness. There was never harmony between these antinomies of his character, and from their jarring came a mocking spirit that he possessed in higher degree than any writer of the century. At Bonn under this new influence Heine wrote more lyrics and had begun a tragedy, *Almansor*, when he left Bonn for Göttingen, and being soon suspended from the university there for participation in a frustrated duel he went to Berlin, where he came under the philosophic influence of Hegel and associated with Grabbe, Immermann, Willibald Alexis, Gans, Moser, Zunz, Chamisso, Fouqué, and particularly with Varnhagen and his Rahel, who led him to a juster appreciation of Goethe, though he never became one of his unqualified admirers.

In Berlin, Heine's genius found warm appreciation. He essayed journalism, and in 1822 published a volume of poems (*Gedichte*), which for delicacy, fancy, conciseness, originality, and depth of lyric expression had no equal in Germany. A second volume (1823) contained the *Lyrisches Intermezzo*, which served to carry off two tragedies, *Almansor* and *Ratcliff*, his sole dramatic efforts. The *Intermezzo* is more bitter, reckless, sensual, than the *Poems*, but contains some of his most perfect lyrics. At home, Heine tells us, his mother read it and did not like it; his sister tolerated it; his brothers did not understand it, and his father did not read it at all. In 1823 a visit to the North Sea inspired *Heimkehr*, which with the later North Sea cycle (*Nordsee*) are Germany's best poems of the sea, worthy to rank with the best of Byron or Shelley. The year 1824 brought him to Göttingen again, and in June, 1825, he submitted to baptism that he might obtain an advocate's license. "I assure you," he writes to a friend, "if the law had allowed stealing silver spoons instead, I should not have been baptized." This dishonor, forced on him by the State, makes a melancholy close to a brilliant university career. During the second stay at Göttingen Heine made the tour of the Harz Mountains and wrote the *Harzreise* (1826), the best known of his prose works. After taking his degree he revisited the North Sea and wrote *Nordeney*, incorporated with the *Harzreise* in the *Reisebilder* (Pictures of Travel), which later embraced also *Das Buch Le Grand* and *Die Bäder von Lucca*. Such light, easy, sparkling prose, such graceful, daring, bubbling wit, had never yet been known in Germany, and the *Reisebilder* remains an unapproached model. Heine in this field has never been equaled save by himself, and he has not always maintained the level of the *Harzreise*. The *Buch Le Grand*, written in 1826, was revolutionary in tendency and in its admiration for Napoleon. Heine thought it safer to abide its publication in England (1827). It was enthusiastically received and generally prohibited by the police. It was graceful, grotesque, cynical, naïve; it had a brilliancy, a vigor, a keenness of scorn, a fire of enthusiasm that have seldom been surpassed. Heine made but a short stay in England, which was not congenial to him. He said, "The ocean would have swallowed it long ago if he had not been afraid it would make him seasick." He admired, however, the liberty of England. In September, 1827, he was again in Hamburg, seeing through the press his collected lyrics, the now famous *Buch der Lieder*. Thence he went to Munich, tried journalism, hoped in vain for a Government post, and in July, 1828, went disappointed to Italy, a journey that he describes after his manner in *Die Bäder von Lucca*—brilliant, witty, entertaining, immoral, coarse, revolutionary, and atheistic. After this Prussia was closed to him; influential men had been made his mortal enemies wantonly, and in the case of the poet Platen Heine's enmity assumed an utterly indefensible shape. Having been recalled to Hamburg by his father's death, Heine went in 1829 to Heligoland, where he gave himself up for two months to the fascination of the sea. He returned to his family in Hamburg famous throughout Germany as the author of the *Reisebilder*, the third volume of which appeared early in 1830, but as much feared as admired, and fiercely attacked on the part of those whom his reckless satire had wounded. Prussia, where the government had prohibited the circulation of the third volume of the *Reisebilder*, was now closed to him, and the thought of a professorship, which he had long cherished, had to be abandoned. He turned his thoughts to Paris. The news of the French Revolution of 1830 reached him in Heligoland, where he spent the summer of that year, and filled him with enthusiasm. May, 1831, saw Heine in Paris, which remained his home till death.

Heine's first years in Paris were busied with journalism and dreary feuds with German Liberals. He soon found himself at home in the French capital, and enjoyed the society of Madame Récamier, Balzac, Dumas, George Sand, Béranger, Thiers, Chopin, Liszt, Berlioz, and many lesser celebrities. He considered it his mission to draw Germany and France closer together, and wrote a series of papers on French conditions for the Augsburg *Allgemeine Zeitung*, which

he republished in French. But not a few of his letters to the German press, even his art critiques, fell under the censor's pencil. In 1833, however, his acute critical study, *Die romantische Schule*, established his fame in France and opened to him the great *Revue des Deux Mondes*, in which he printed his *History of Religion and Philosophy in Germany since Luther*, a work of brilliant suggestiveness, which afterwards appeared in Heine's own German version as *Zur Geschichte der Religion und Philosophie in Deutschland*. The satiric *Memoiren des Herrn von Schnabelewopski*, half autobiographic, belong to this time. The scandal caused by his irregular life was checked by his "conscience-marriage" with Mathilde Mirat (1834). They were legally married in 1841, and remained closely attached till the poet's death. He had provided for her and she lived till 1883. Financial embarrassments now led Heine to seek a pension from the French Government. Though he had always criticised his patrons freely, the fact was bitterly remembered against him when it became known in 1848. From 1834 to 1842 his literary work is comparatively unimportant. A fragment of a novel, *Florentinische Nächte*, an essay on German mythology, and a slanderous attack on his fellow exile and journalistic critic Börne, may be merely mentioned. But in 1842 he wrote *Atta Troll* (Hamburg, 1847), a brilliant poetic satire on German politicians and on the Romantic School, and in 1843 a brief visit to Germany evoked *Neue Gedichte* and *Deutschland, ein Wintermärchen* (1844) keenly satiric, which became immensely popular. Disease now laid an unrelaxing hand on him. His eyes were affected, then his vocal cords, then his spine. The death of his patron, Salomon Heine, and the disgraceful meanness of his heir added to his sufferings. But these years of patiently borne sufferings show Heine in a nobler light than any in which he had yet appeared. In sleepless nights he composed wonderful songs on his 'mattress-grave.' His legs were paralyzed; to see he was obliged to hold up an eyelid with an emaciated finger; his hearing was weak. It was, he said, "a grave without rest, death without the privileges of the departed." But it brought a deeper, almost a spiritual earnestness into his life. He "returned to God like a Prodigal Son, after tending swine with the Hegelians." In this mood he wrote the poems of *Romancero* (1851), so tender, so melodious, so exquisite in fancy, that it seems almost past belief that they should have been the product of the sleepless nights of a bedridden sufferer; humorous pieces, like "The White Elephant," fierce political songs, like "The Weaver's Marseillaise," and the weird "Lazarus Cycle," written under the very shadow of death. Never had Heine been so many-sided as now. He continued to work as long as he could hear and speak. Many friends cheered him, among them, as poems testify, the talented Camille Selden and his 'little fairy,' the motherly Caroline Jaubert. Two miscellaneous volumes, headed by *Geständnisse*, appeared in 1854. His *Memoirs*, of which some parts have been published, occupied him to the eve of his death. His last words were, "Paper and pencil." He died February 17, 1856, and was buried in Montmartre Cemetery, without religious service.

Heine was essentially a realist, a revolutionary reformer, but never a blinded partisan. He speaks for a restless, questioning, dissatisfied age that has lost for the moment its ethical moorings. He is the most delicate and graceful song-writer and incomparably the wittiest, clearest, and keenest satirist of Germany, and so he is read with delight by an introspective and critical generation.

Heine's *Works* appeared in twenty-one volumes (1861-63) and in twenty volumes (1865). They have been often reëdited. Translations of the *Poems* by E. A. Bowring are in Bohn's library. There is an American translation of the *Pictures of Travel* and a version of the *Works* (incomplete) by Leland. *Wit, Wisdom, and Pathos of Heinrich Heine*, by J. Snodgrass (London, 1888), is a collection of excerpts. The best English critique of Heine is in Matthew Arnold's *Essays*. There is an English *Life, Work, and Opinions of Heinrich Heine*, by Stigand (London, 1876). The most complete German biography is by Strodtmann (3d ed., Berlin, 1884). Consult also those by Prölss (Stuttgart, 1886); Karpeles (Berlin, 1888); also his *Heine. Aus seinem Leben und aus seiner Zeit* (Leipzig, 1899). Keiter (Cologne, 1891), besides Brandes, *Das junge Deutschland* (Leipzig, 1890), and id., *Die Litteratur des 19. Jahrhunderts*, vol. vi. (ib., 1891); Zetz, *Heine in Frankreich* (Zurich, 1895); Mietzki, *Heinrich Heine als Dichter und Mensch* (Berlin, 1895); Nassen, *Heinrich Heines Familienleben* (Fulda, 1895); Kaufmann, *Heines Liebesleben* (Zurich, 1898); id., *Heines Charakter* (ib., 1901); Steinmann, Heinrich Heine; *Denkwürdigkeiten und Erlebnisse aus meinem Zusammenleben mit ihm* (Prague, 1757); Hüffer, *Aus dem Leben Heinrich Heines* (Berlin, 1878); Franzos, *Heines Geburtstag* (Berlin, 1900).

HEINECCIUS, hī-nēk'tsī-ŭs, JOHANN GOTTLIEB (1681-1741). A learned jurist of Germany, born at Eisenberg. He studied theology at Leipzig, and law at Halle, where, in 1713, he was made professor of philosophy, and in 1720 professor of law. In the latter capacity he went, in 1723, to Franeker, and in 1727 to Frankfort-on-the-Oder; but in 1733 returned, as professor of law and philosophy, to Halle, where he died August 31, 1741. His works display a thorough acquaintance with all departments of jurisprudence, but especially with Roman and German law; and their varied learning, logical arrangement, and elegant Latin, long maintained for them a classical character. His *Antiquitatum Jus Romanum Illustrantium Syntagma* was reëdited as recently as 1841 by Mühlenbruch, and his *Elementa Juris Civilis secundum Ordinem Institutionum* (edited by Biener, 1815); his *Elementa Juris secundum Ordinem Pandectarum*, etc., are still studied by jurists.—Heineccius's son, JOHANN CHRISTIAN GOTTLIEB HEINECCIUS, born 1718, at Halle, died 1791 at Sagan, was for a long time professor in the academy for young noblemen at Liegnitz, and edited, besides several of his father's works separately, a complete collection of them (*H. Opera Omnia*, 9 vols., Geneva, 1771), and wrote an account of his father's life and work, *Commentarius de Vita et Scriptis J. G. Heineccii*.—Heineccius's brother, JOHANN MICHAEL HEINECCIUS, born at Eisenburg, 1674, died September 11, 1722, was a celebrated pulpit orator in Halle, and also the first who studied seals scientifically. His theological writings are forgotten, but he is remembered by his *De Veteribus Germanorum aliar-*

umque Nationum Sigillis (Leipzig, 1710; 2d ed. 1719), and by the work edited in conjunction with Leuckfeld, *Scriptores Rerum Germanicarum* (Frankfort, 1707).

HEINITZ, hī'nĭts, **FRIEDRICH ANTON**, Baron (1725-1802). A Prussian statesman, born at Dröschkau, near Torgau. He studied mining and smelting at Kösen, Dresden, and Freiberg, filled several government positions, and planned the Freiberg Academy of Mines. He also took great interest in forestry and in road-building. In 1777 he left the Saxon for the Prussian service on his appointment as head of the Departments of Mining and Smelting, and in this capacity did much to develop the iron and coal industries. He published: *Mémoire sur ma gestion des 4e et 5e départements* (1788), a defense of his administration of the Bureau of Commerce and Manufacture; and anonymously, *Essai d'économie politique* (1785), and *Mémoire sur les produits du règne mineral de la monarchie prussienne* (1786). Consult Reimann, *Abhandlungen zur Geschichte Friedrichs des Grossen* (Gotha, 1892).

HEINLEIN, hīn'līn, **HEINRICH** (1803-85). A German landscape painter, born at Weilburg, Nassau. He studied drawing and architecture at Mannheim and Munich, and then devoted himself to the painting of landscape, and became one of the first German artists in that genre. His pictures include: "Poachers Attacked in Their Camp" (1823); "View in Grisons" (1839), Leipzig Museum; "The Valley of the Engadine," "Landscape with Castle Tyrol" (Karlsruhe Gallery); "Two Alpine Views" (New Pinakothek, Munich); "Mountain Landscape After Storm" (Vienna Museum).

HEINRICH, hīn'rĭk, **GUSTAV** (1845—). An Hungarian literary critic, born at Budapest and educated at Leipzig and Vienna. He was appointed professor of German philology in the university at Budapest, and became a prominent educator and a special student of the interrelation of German and Hungarian literature. He has edited many German classics for Hungarian readers, and has written: *Bankban in der deutschen Dichtung* (1879); *Boccaccio's Leben und Werke* (1882); *Etzelburg und die ungarische Hunnensage* (1882); *Deutsche Verslehre* (2d ed. 1878); *Faust-Studien* (1888); *Kudrun* (1885), and a valuable history of German literature, in Hungarian.

HEINRICH DER GLÎCHEZARE, dĕr glēk'-e-tsā'rĕ (The Hypocrite). A German poet of the twelfth century, and possibly a traveling player. He wrote (1170) the earliest of German poems on Reynard the Fox, patterned after French models. Of this poem, *Isengrimes Nôt*, in its original form, nothing is left save a few fragments, edited by Grimm, *Sendschreiben an K. Lachmann über Reinhart Fuchs* (1840); a revision, only a little later in date, was published by Reissenberger (1886). Consult Büttner, *Studien zu dem Roman de Renart und dem Reinhart Fuchs* (Strassburg, 1891).

HEINRICH DER TEICHNER, dĕr tīk'nĕr. An Austrian didactic poet of the latter half of the fourteenth century. His poetry consists largely of proverbs in rhymed couplets, valuable for their record of the reconstruction of Austrian life of the period. Consult Karajan, *Ueber Heinrich den Teichner* (Vienna, 1855).

HEINRICH VON DEM TÜRLIN, fŏn dām tŭr'lēn. A Carinthian poet of the earlier half of the thirteenth century. His poems deal with the legends of the Round Table, and are modeled after Chrétien de Troyes. His *Der Aventiure Krone*, the story of Sir Gawain, was edited by Scholl (1852); and *Der Mantel*, which relates the story of the marvelous cloak that will fit none but a pure woman, has been published by Karnatsch (1883). Consult Martin, *Zur Gralsage* (Strassburg, 1880).

HEINRICH VON DIESSENHOVEN, dē'-sen-hō'fen (c.1300-76). A mediæval German historian, canon of the cathedral at Constanz, and chaplain of Pope John XXII. at Avignon. His history completes the ecclesiastical chronicle of Ptolemy of Lucca, and deals with the pontificate of John. It is edited by Böhmer in *Fontes Rerum Germanicarum*, vol. iv. (Stuttgart, 1868).

HEINRICH VON FREIBERG, fŏn frī'bĕrk (or **VRIBERG**). A German poet of the early part of the fourteenth century. He wrote a spiritual poem, *Vom heiligen Kreuze*, probably from a Latin source, edited by Fietz (1881); *Ritterfahrt Johanns von Michelsberg*, written about 1305, edited by Kraus (1888); and a continuation of Gottfried's epic *Tristan*, composed about 1300, in style like Gottfried, but following other originals for material. The farce entitled *Vom Schrätel und vom Wasserbär*, edited in Von der Hagen, *Gesamtabenteuer*, No. 65 (1850), is attributed to Heinrich von Freiberg. Consult Wiggers, *Heinrich von Freiberg als Verfasser des Schwankes vom Schrätel und vom Wasserbären* (1877).

HEINRICH VON HERFORD, fŏn hĕr'fōrt (?-1370). A German Dominican monk, author of many theological works and of a valuable chronicle, *Liber de Rebus Memorabilibus*. Its latter part is one of the most important sources for the history of the thirteenth and fourteenth centuries, and was edited by Potthast (1859).

HEINRICH VON LAUFENBERG, fŏn lou'-fen-bĕrk (c.1390-1460). A German monk and poet, born in Switzerland. He lived at Freiberg and Strassburg, and wrote numerous hymns in honor of the Virgin, of which many are to be found in Wackernagel, *Das deutsche Kirchenlied* (1864-77); a collection of *Carmina Figurata* (1441), also praising Mary; and a German translation of the *Regimen Sanitatis*, under the title *Spiegel menslichen Heils* (1437).

HEINRICH VON MELK, fŏn mĕlk. A German satirist of the twelfth century, a monk in the Austrian cloister of Melk. He wrote a vivid, bitter satire on the morals of the time, and especially on the condition of the clergy, *Von des Todes Erinnerung*, sometimes called, from its opening line, *Von dem gemeinen Leben*. The *Pfaffenleben*, a poem of like character, but probably not by Heinrich, was published with it (by Heinzel, Berlin, 1867). Consult: Lorenz, *Heinrich von Melk* (Halle, 1886), and Kochendörffer, in the *Zeitschrift für deutsches Altertum*, vol. XXXV. (Berlin, 1890).

HEINRICH VON MORUNGEN, fŏn mō'-rung-en. A German minnesinger, of the end of the twelfth and the first quarter of the thirteenth

century, ranking in beauty and originality next to Walther von der Vogelweide. His poems, showing slightly the influence of classic models and very strongly that of the troubadours of Provence, are edited by Von der Hagen in his *Minnesinger* (1838), and in Lachmann and Haupt's *Des Minnesangs Frühling* (4th ed. 1888). Consult: Michel, *Heinrich von Morungen und die Troubadours* (Strassburg, 1880), and Rössner, *Untersuchungen zu Heinrich von Morungen* (Berlin, 1898).

HEINRICH VON MÜGELN, fôn mȳ'gĕln (c.1310-c.1375). A German author and scholar, a counselor of Charles IV. at Prague, and later of Rudolph IV. of Austria. His works include translations of Valerius Maximus (first printed 1489), and of the commentary on the Psalms written by Nikolaus of Lyra; an Hungarian chronicle in Latin (edited by Engel, in *Monumenta Ungrica*, 1809); an allegory, *Der meide cranz;* and fables and *minne* poetry (edited by Müller, 1848), which won him a place among the twelve founders of the art of the minnesingers.

HEINRICH VON NEUSTADT, fôn noi'-stât. A German poet, born at Wiener-Neustadt, who practiced medicine in Vienna in the first quarter of the fourteenth century. His works, imitative of Wolfram von Eschenbach, include a long romance, patterned after the Latin story of Apollonius of Tyre, but with a curious coloring from Arthurian story; and, on the second advent, *Von Gottes Zukunft*, reminiscent of Alanus ab Insulis's *Anticlaudianus*. Excerpts from the two poems are published in Strohl, *Heinrich von Neustadt* (Vienna, 1875).

HEINRICI, hīn-rē'tsē, Karl Friedrich Georg (1844—). A German Protestant theologian, born at Karkeln, in East Prussia, and educated at Halle and at Berlin, where in 1871 he became docent. In 1873 he became professor at Marburg, and went to Leipzig in 1892. He wrote: *Die Valentinianische Gnosis und die Heilige Schrift* (1781); *Erklärung der Korintherbriefe* (1880-87); the commentary on Corinthians in Meyer's *New Testament Commentary* (last ed. 1896 and 1900); *Schriftforschung und Schriftautorität* (1890); *Theologische Encyklopädie* (1893); and *Beiträge zur Geschichte und Erklärung des Neuen Testaments*, vol. i. (1894).

HEINSE, hīn'se, Johann Jakob Wilhelm (1749-1803). A German novelist, translator, and critic of art, born at Langewiesen in Thuringia. He studied at Schleusingen, at Jena, and at Erfurt, where he met Wieland, who greatly influenced his poetry, and Gleim, who procured for him a place as private tutor at Halberstadt, where he lived under the name of Rost. In 1774 he went to Düsseldorf as editor of *Iris*. Here he became so interested in art that he spent three years in Italy, giving most of the time to Rome. He made the acquaintance of the painter Müller, learned much of Italian art and literature, and widened his knowledge of the art and literature of antiquity. While he was in Italy he translated Tasso's *Gerusalemme Liberata* and the *Orlando* into German prose. On his return to Düsseldorf (1784) he wrote *Ardinghello*, his masterpiece. The Elector of Mainz, Friedrich Karl Joseph, now (1786) made him his lektor, and (1787), at Aschaffenburg, his private secretary. On Friedrich's death his library became the property of the State, and Heinse was made librarian. His earliest work was *Sinngedichte* (1771). This was followed by translations and works in classic vein: *Begebenheiten des Enkolp, aus dem Satyrikon des Petron übersetzt* (1773); *Die Kirschen* (1773), a work of equal obscenity; and *Laidon, oder die eleusinischen Geheimnisse* (1774), with the form of a romance, describing the apotheosis of Lais. Like the last-mentioned work, *Ardinghello, oder die glückseligen Inseln* (last ed. 1838), is little more than a series of dazzling pictures, like Pompeian wall paintings. In *Hildegard von Hohenthal* (last ed. 1838), Heinse gives his ideas on music, and in *Anastasia und das Schachspiel* (last ed. 1831) on chess. *Fiormona, oder Briefe aus Italien* (1803), though usually ascribed to Heinse, is not his work. Consult: *Briefe zwischen Gleim, Heinse und Johannes von Müller*, edited by Körte (Zurich, 1806-08), which gives a good picture of the man, and contains his criticism of the paintings in the Düsseldorf Gallery, and Schober, *Heinse, sein Leben und seine Werke* (Leipzig, 1882).

HEINSIUS, hīn'sī-ŏŏs, Antonius (1641-1720). A Dutch statesman, celebrated as a formidable opponent of Louis XIV. of France. He was born at Delft, November 22, 1641, and after pursuing the study of law at the University of Leyden entered the service of the State, and became in 1679 pensionary of Delft. He was the confidential friend of William of Orange, upon whose accession to the throne of England, in 1689, Heinsius, as Pensionary of Holland, succeeded to the virtual control of the foreign policy of the Dutch Republic. The friendship between William and Heinsius continued till the former's death, and their correspondence is of capital importance for the light it throws on the intricate political problems of the period from 1688 to the outbreak of the War of the Spanish Succession. Heinsius was instrumental in bringing about the partition treaties of 1698 and 1700 concerning the devolution of the Spanish throne, and contributed to the formation of the Grand Alliance in 1701. Into that struggle against France he entered heart and soul, and after William III.'s death, in 1702, became the virtual leader of the European combination against Louis XIV. The victories of Marlborough and Prince Eugene were due in no little measure to Heinsius's restless activity in the prosecution of the war. Determined upon the total humiliation of France, he spurned the French King's overtures of peace, made as early as 1706, and only the defection of England and the recrudescence of French resistance that followed induced him to agree to the terms of peace at Utrecht. He died August 3, 1720.

HEINSIUS, Daniel (1580-1655). A Dutch scholar of distinction, and a pupil of Scaliger, born in Ghent. He was a leading figure of the Dutch Renaissance, professor of Greek and Latin at Leyden, and a facile Latin poet. He wrote *Iambi* (1602); *Elegiæ* (1603); *Emblemata Amatoria*, with Dutch verses (1604); *Poemata* (1605). He edited Theocritus, Bion, Moschus, Horace, Aristotle, Seneca, Terence, and Livy, and published Latin *Orationes* (1609 and 1621) and other learned works as well as a Dutch tragedy, *The Massacre of the Innocents* (1613), and Dutch *Poems* (1616).—Nicolaas Heinsius (1620-81), a son of Daniel, was born in Leyden, and educated in the university of his native town. For more

than twenty-five years he led the busy life of traveler, scholar, diplomat, and poet. He ransacked the libraries of France and Italy in search of classical manuscripts. In 1650 he entered the service of Christina of Sweden, and in 1654 became Dutch Minister at Stockholm. In 1669 he visited Russia, and two years later retired to private life. He published editions of Vergil, Ovid, Prudentius, Vellius Paterculus, and Valerius Flaccus, based on manuscripts in his possession. He was also the author of commentaries on many other poets of antiquity. He is said to have supplied Milton with facts for use against Salmasius (q.v.). His Latin poems were published at Amsterdam in 1666. He died at The Hague, October 7, 1681.—His illegitimate son NICOLAAS (1655-?) was a scapegrace of remarkable talent, who wrote the only original Dutch romance of the seventeenth century, *The Delightful Adventures and Wonderful Life of Mirander* (1675), a curious anticipation of *Gil Blas*. He fled from Holland a disowned criminal in 1677, and died in obscurity.

HEINTZELMAN, hīn'tsel-măn, SAMUEL PETER (1805-80). An American soldier, born at Manheim, Lancaster County, Pa. He graduated at West Point in 1826, and was assigned to the Second Infantry, with which he served on the frontier. He took part in the wars with the Florida Indians from 1835 to 1841, becoming a captain in 1838; served with his regiment in the Mexican War, and received the brevet of major for gallantry at the battle of Huamantla, October 7, 1847. Later he served in California, accompanying the expedition against the Yuma Indians in 1852, and in Texas. He attained the rank of major in 1855, and at the outbreak of the Civil War became colonel, and inspector-general of the Department of Washington. On May 17, 1861, he was commissioned brigadier-general of volunteers, and was in command of the forces which occupied Alexandria, Va. In McClellan's Peninsular campaign of 1862 he commanded the Third, and later also the Fourth, Army Corps, and participated in all of the important battles. He received his commission of major-general of volunteers on the day of the battle of Williamsburg (May 5, 1862), and for gallantry at the battle of Fair Oaks received the brevet rank of brigadier-general in the Regular Army. He fought also at Savage's Station, Glendale, and Malvern Hill, and later in the year at the second battle of Bull Run and at Chantilly. In the winter of 1862-63 he was in command of the defenses of Washington, and from February to October, 1863, of the Department of Washington. During the remainder of the war he was not in the field, serving as commander of the Department of the West in 1864, and on court-martial duty in 1865. In March, 1865, he was brevetted major-general in the United States Army for his conduct at Williamsburg, and in 1869 was retired, on account of age, with the full rank of major-general.

HEINZE, hīn'tse, KARL FRIEDRICH RUDOLF (1825-96). A German criminologist, born at Saalfeld, and educated at Leipzig. He served successively in the judiciary of Meiningen and of Saxony; in 1865 was appointed professor at Leipzig, and eight years afterwards at Heidelberg. He was three times representative of the University of Leipzig in the Saxon Diet, and was a prominent member of the party of the opposition. He wrote: *Parallelen-Zwischen der englischen Jury und dem französisch-deutschen Geschworenengericht* (1864); *Ein deutsches Geschworenengericht* (1865); *Das Recht der Untersuchungschaft* (1865); *Verhältnis des Reichsstrafrechts zu dem Landesstrafrecht* (1871); and a report for the International Congress for Prison Reform at Saint Petersburg, *De quelle façon l'ivresse peut-être envisagée dans la législation pénale* (1890).

HEINZEL, hīn'tsel, RICHARD (1838—). An Austrian philologist, born in Capo d'Istria, and educated at Vienna. After teaching in gymnasia at Triest, Vienna, and Linz, he was appointed professor of German at Gratz (1868), and then at Vienna (1873). His work comprises discussions of Germanic phonetics, Teutonic myths, and the relation of German poetry to French. Among his writings are: *Heinrich von Melk* (1867); *Ueber den Stil der altgermanischen Poesie* (1875); *Beschreibung der isländischen Saga* (1880); *Ueber die Nibelungensage* (1885); *Ueber die Hervarasaga* (1887; *Ueber die Walthersage* (1888); *Ueber die ostgotische Heldensage* (1889); *Abhandlungen zum altdeutschen Drama* (1896); *Beschreibung des geistlichen Schauspiels im deutschen Mittelalter* (1898); *Ueber die französischen Gralromane* (1891); *Ueber das Gedicht von König Orendel* (1892).

HEINZEN, hīn'tsen, PETER (better known as KARL) (1809-80). A German-American author, born at Grevenbroich, and educated at Bonn, whence he was expelled because of his radicalism. After two years in the Dutch Army he returned to Germany, and entered the Prussian Government service. But his contributions to the *Leipziger Allgemeine Zeitung* and to the *Rheinische Zeitung* excited the displeasure of the Government; both journals were suppressed; his book, *Die preussische Büreaukratie* (1845), was confiscated, and he escaped trial by flight to Belgium, Switzerland, and finally to America. He returned to take part in the Revolution of 1848; then came once more to the United States; lived in New York, Louisville, Cincinnati, and Boston, and published the very radical organ, the *Pionier*. His collected works were published at Boston (1868-72), and include: *Gedichte; Sechs Briefe an einen frommen Mann; Die Teutschen und die Amerikaner;* and *The True Character of Humboldt*. Many of his writings were published by the Society for the Propagation of Radicalism in the United States—e.g. *Rights of Women* (1891), and *Teutscher Radikalismus in Amerika* (1898).

HEIR (Lat. *heres*). At Roman law, the estate of a deceased person always passed as an entirety (by 'universal succession') to one or more persons described as heirs. The heir or heirs, if not appointed by testament, were designated by the law; and, in the later development of the Roman law, certain near relatives of a testator were entitled to a share of his estate even against his will, unless they had so acted as to give him legal ground for disinheriting them. (See SUCCESSION.) If the heir, whether appointed by testament or designated by law, was under the decedent's household authority, the inheritance vested in him immediately. If, on the other hand, the inheritance was given by testament or assigned by law to a person out of the household, the latter became heir only by

an act of entry. The chief practical importance of the distinction lay in the fact that inheritance established a merger, or 'confusion,' of the inherited estate with the personal estate of the heir, and that the heir was accordingly personally liable for the debts of the estate. If these exceeded the assets, the forced succession of the household heir was an injury to him. The prætors accordingly, toward the close of the Republican period, gave such heirs protection against the creditors of the estate, if they abstained from interfering with the assets—a change which practically abolished the forced or 'necessary' succession. Justinian went further; he allowed the heir who promptly made an accurate list of the assets to take the inheritance without incurring any personal liability for its debts (*beneficium inventarii*). See INVENTORY.

The position of a testamentary heir at Roman law was substantially identical with that of an English executor who is also a residuary legatee. The testamentary heir paid the debts and all special bequests (*legata*), and kept the remainder of the estate. The position of the intestate heir was substantially identical with that of an English administrator who is also next of kin. If the Roman heir was an infant or a lunatic, his guardian administered the inheritance.

MEDIÆVAL LAW. To the Germanic peoples, including the English, testaments were originally unknown. They received them through the Church. Even then they were reluctant to admit that a person could dispose by testament of the real estate, which in the Germanic view belonged to the family rather than to its head. The direct heirs, the 'born' heirs, had rights in the land of which they could not be deprived. The development of the feudal system emphasized in the law of succession, as in other fields of the law, the distinction between realty and personalty. To the Church authorities, accordingly, mediæval custom assigned not only the execution of testaments disposing of the personalty, but also, in many countries, the administration and distribution of the personal estate in cases of intestacy. On the Continent and in Scotland, at the close of the Middle Ages, the reception of the Roman law (see CIVIL LAW) effaced these distinctions; but in England they still underlie the whole law of inheritance and distribution (q.v.). See also DESCENT.

MODERN CIVIL CODES. The modern codes of Europe have reëstablished the principle of the universal succession; the estate of a decedent passes as an entirety to the testamentary or legal heir or heirs. The Roman distinction between household heirs and outside heirs has disappeared; in both cases the inheritance vests at the moment of death; in both cases there is a right of renunciation, and usually a right of entry, with the 'benefit of inventory.' In cases of intestacy, the legal heirs administer the estate; the courts appoint administrators only when the intestate heirs cannot be found, or when they all renounce the inheritance. Unless a testator has appointed special executors, the testamentary heirs liquidate the estate and pay the legacies and statutory shares. In this matter, however, the French law is different. In France, if there be near relatives who are entitled to statutory shares, these, and not the testamentary heirs, administer the estate. The latter are termed 'universal legatees,' and they have the rights of heirs only in the absence of the 'legitimate heirs.'

ENGLISH AND AMERICAN LAW. The feudal separation of real and personal property has maintained itself in the common-law system, even to the present time. It appears in its extremest form in the law of inheritance. The personal property of one who dies intestate passes to a person who may or may not be of the blood of the decedent, and only for purposes of administration, the distribution of the surplus after the payment of debts, etc., being determined by statutes of distribution. Only the real property 'descends,' according to fixed canons of inheritance, to the next of blood of the decedent, under the description of the heir. In our legal system, then, the term heir has reference always to the person or persons to whom the real (not the personal) property passes, and that not by will, but only on intestacy. In the main the English canons of descent laid down by Blackstone still govern the determination of the heirship or inheritance of estates, though these have been considerably modified by statute both in England and the United States. See DESCENT.

In Scotch law, the term heir is often used in a loose sense to denote the persons entitled to succeed to the heritable as well as to the movable estate. In Scotland the same rule exists as in England, that if a person do not by deed *mortis causa* (which operates like an English will) dispone or convey his estate to some other person, the law points out who is to take such estate, and that person is the heir-at-law. The rules by which the heir to heritable estate in Scotland is pointed out differ considerably from the English rules. These rules are the same as to the descendants of the deceased person, A. But after A's descendants are exhausted, differences begin; for then it is not the father, nor yet the eldest brother of A, but the next younger brother of A, who next succeeds; then the next younger again, until the youngest brother—after whom and his descendants comes A's next elder brother, and so on upward to the eldest brother of all. In Scotland, when females succeed equally, they are called heirs-portioners. The mother never succeeds in any event, or any relatives, except brothers and sisters german who trace their descent through her.

Formerly, upon the death of the owner, his heritable estate did not immediately vest in the heir, but lay in an intermediate state, then called the *hæreditas jacens,* and the person entitled to be the heir had to be summoned to the inheritance, and enter upon the estate. This was altered by statute in 1874, and the estate now vests at once upon the death of the former owner (37 and 38 Vict., c. 94). The civil-law rule also exists in Scotland, that the heir-at-law takes the estates subject to his ancestor's debts. Formerly, indeed, he used to be liable for all the debts, though far exceeding the property left, provided that he did not take certain precautions to escape this passive representation, as it was called; for the barbarous maxim prevailed, *hæres est eadem persona cum defuncto.*

HEIR APPARENT. In the common-law system, the person who is entitled to succeed to the inheritance of real property if he outlive his ancestor. The term heir alone is not properly applicable to any one so long as the ancestor from whom he expects to inherit is still alive

(*nemo est hæres viventis*). The expectant heir may be either the person first entitled under the canons of descent, as the eldest son, and who cannot be displaced by the subsequent birth of a nearer relative of the ancestor, or he may be a person in the second or any later degree of consanguinity—in which case he is liable to be displaced by the birth of a son or other person having a prior claim to the inheritance. The expectant heir in the former case is known as the heir apparent, in the latter case as the *heir presumptive*. Under the rule of primogeniture, which still obtains in England, a daughter would be only an heir presumptive, as the subsequent birth of a son to the father would displace her; whereas the eldest living son is, while the father lives, the heir apparent. A younger son, however, is not entitled to the designation of heir-presumptive so long as his elder brother lives, although by the death of the latter he would at once become heir apparent.

In Scotland the phrase is also sometimes used popularly in this sense but the words 'apparent heir,' when used technically there, mean quite a different thing, viz. the person who, after his ancestor's death, is entitled to succeed, provided he make up his titles, but who has not yet actually done so. The apparent heir has a year to deliberate, called the *annus deliberandi*, whether he will enter upon the property, because the responsibility is so much greater in Scotland than in England.

Consult the authorities referred to under CIVIL LAW; DESCENT; LAW; REAL PROPERTY, etc.

HEIR-AT-LAW, THE. A comedy by George Colman the Younger, in five acts, produced in 1797, and still occasionally brought out.

HEIRESS. In heraldry (q.v.), a lady having no brothers who leave issue. The husband of an heiress is entitled to bear her arms in an escutcheon of pretense—i.e. a small escutcheon in the centre of his paternal shield—and the children of an heiress may quarter her arms with their paternal coat. Neither practice is of very early date in heraldry.

HEIRLOOM. In English law, chattels which in some localities go to the heir-at-law by special custom, instead of passing, like other personal property, to the executor or administrator of the decedent. The chattels usually comprehended within this description are such homely but necessary articles as the best bed, table, pot, pan, cart, and the like. But articles of honor and ornament may fall within the category of heirlooms, such as family portraits, ducal coronets, the Crown jewels, etc. The origin of the right is obscure, and it is of rare occurrence. In America it is wholly unknown. In Scotland a somewhat similar, but by no means identical, phrase is used, viz. *heirship movables*, which connotes a wider right, and includes the best articles of furniture in the house of a person who dies leaving heritable property. The extent of this right is also not clearly settled. Consult the *Commentaries* of Blackstone and Erskine.

HEIR OF LINNE, lin. A ballad of unknown date and authorship, preserved in Percy's *Reliques*. It contains the story of a spendthrift who, having sold his patrimony and spent the proceeds, betakes himself to a lodge which alone he has preserved, and by the breaking of the rope with which he tries to hang himself discovers a hidden treasure, and with it redeems his inheritance.

HEIS, his, EDUARD (1806-77). A German astronomer, born at Cologne, and educated at Bonn. He taught at Cologne and Aix-la-Chapelle, and in 1852 was appointed professor of mathematics and astronomy at Münster. Heis edited *Wöchentliche Unterhaltungen aus dem Gebiete der Astronomie und Meteorologie*, and was author of: *Atlas Cœlestis Novus*, marking all stars visible to the naked eye (1872); *Zodiallicht-Beobachtungen* (1875); *Sammlung von Beispielen und Aufgaben aus der allgemeinen Arithmetik und Algebra* (95th ed. 1896); and, with Schweiler, a *Lehrbuch der Geometrie*, in three volumes.

HEISE, hī'ze, PEDER (1830-79). A Danish composer, born at Copenhagen. He studied under Lund, Berggreen, Hauptmann, and Gade. He was a teacher in Copenhagen, and at the Academy of Soröe, and is the author of a number of songs, overtures, cantatas, and sonatas, besides two successful operas, *Pashaens Datter* (1869) and *Drot og Marsk* (1878). He also wrote a ballet, and the incidental music to dramas by Ibsen, Munch, and Von der Recke.

HEISS, his, MICHAEL (1818-90). An American prelate, Archbishop of Milwaukee. He was born at Pfahldorf, Bavaria, studied at Munich, and was ordained in 1840. Two years later he came to the United States, engaged in missionary work in Kentucky and Ohio, and afterwards at Milwaukee, where he founded the Seminary of Saint Francis, of which he was first rector. He was consecrated first Bishop of La Crosse, Wis., in 1868, and established Saint John's College and other schools in his diocese. In 1880 he was appointed coadjutor to the Archbishop of Milwaukee, and two years later became second Archbishop. He was a member of the Vatican Council of 1869-70.

HEJIRA, hĕj'ī-rà (Ar. *hyra*, flight, from *hajara*, to abandon). The flight of Mohammed from Mecca to Medina to escape the persecution of his kinsmen, the Koreish (see MOHAMMED), and the starting-point of the Mohommedan Era. The exact day of the flight is uncertain. The custom of dating events with reference to it originated with Mohammed himself, but the calendar was first instituted by Omar, seventeen years after the event, and was made to begin, not with the day of the flight, but with the first day of the year (i.e. the first of the month Muharram) in which it took place, which corresponds with July 16, 622, of the Christian Era. The Mohammedan year is a lunar year, of 354 days, 9 hours, hence about 11 days shorter than the Christian year, and this fact must be borne in mind in computing the date of the Christian calendar corresponding to any given Mohammedan date. An easy rule, which will give the year approximately, is to deduct three per cent. from the Mohammedan year and add the result to 622. Thus the year of the Hejira 1321 will be found to correspond roughly to the year 1903 of the Christian Era (1321−40 + 622 = 1903). For more accurate results, consult Wüstenfeld, *Vergleichungstabellen der mohammedanischen und christlichen Zeitrechnung*, continued by Mahler (Leipzig, 1854-87).

HEL, hăl (Icel., probably meaning hidden, *sc.* goddess). The Northern goddess of the dead, who dwelt beneath one of the three roots of the sacred ash Yggdrasil, and was the daughter of Loki (q.v.), by the giantess Angurboda. Hel, together with her brothers, the wolf Fenrir and the serpent Jormundgand, was bred up in the giant's home of Jötunheim, where she remained till, at the request of the Æsir, or gods, the All-father sent for her and her brothers. Knowing that by their origin these children must prove a source of calamity, he resolved upon their destruction, and after casting the serpent into the deep ocean which surrounds all lands, and where it has grown so large that it encircles the whole world and bites its own tail, he hurled Hel into Niflheim (q.v.), over which he gave her authority, and in which she was to assign places to all who die of sickness and age. Her abode is surrounded by a high inclosure with massive gates. Her dwelling is *elindnir* (dark clouds); her dish, *hungr* (hunger); her knife, *sullt* (starvation); her servants, *ganglâti* (slow moving); her bed, *kör* (sickness); and her curtains, *blikiandaböl* (splendid misery); and she is easily recognized by her fierce aspect and her half black, half flesh-colored skin; and she rides a horse with only three feet. Faith in this goddess is not yet extinct. Hel-shoes (hell-shoon) are still put on the feet of the dead, and her dog is heard barking to give warning that death is at hand. In Norway, when any one recovers from dangerous illness he is said to have given Hel a bushel of oats, in allusion to the belief that she wanders around in the form of a horse.

After the introduction and diffusion of Christianity, the ideas personified in Hel gradually merged, among all the races of Northern and German descent, in the local conception of a hell, or dark abode of the dead. Consult: Thorpe, *Northern Mythology* (London, 1863); Grimm, *Mythologie*, edited by Meyer (Berlin, 1875-78).

HELBIG, hĕl'bĭk, Wolfgang (1839—). A German archæologist. He was born at Dresden, and was educated at Göttingen and Bonn. After he had taught one year in the Joachimsthaler Gymnasium of Berlin, he went to Rome as scholar in the German Archæological Institute, of which he was made second secretary in 1865. This office he resigned in 1885, but did not leave Rome, save for occasional trips through Italy, Greece, Northern Africa, France, and Russia. His more important works are: *Wandgemälde der vom Vesuv verschütteten Städte Campaniens* (1868); *Untersuchungen über die campanische Wandmalerei* (1873); *Beiträge zur altitalienischen Kultur- und Kunstgeschichte* (1879); *Das homerische Epos aus den Denkmälern erläutert* (1887); *Führer durch die öffentlichen Sammlungen klassischer Altertümer in Rom* (last ed. 1899); *La collection Barracco d'après la classification et aveo le texte de G. Barracco et W. Helbig* (1893).

HELD, hĕlt, Adolf (1844-80). A German economist, born at Würzburg, and educated there, at Munich, and at Berlin, where, in 1880, he became professor. He was drowned in the same year. A 'Socialist of the chair,' Held wrote: *Careys Sozialwissenschaft und das Merkantilsystem* (1866); *Die Einkommensteuer* (1872); *Die deutsche Arbeiterpresse der Gegenwart* (1873); *Grundriss für Vorlesungen über Nationalökonomie* (1876); *Sozialismus, Sozialdemokratie und Sozialpolitik* (1878); and, edited by Knapp, *Zwei Bücher zur sozialen Geschichte Englands* (1881).

HELD, Hans Heinrich Ludwig von (1764-1842). A Prussian patriot, born at Auras, and educated at Frankfort-on-the-Oder, Halle, and Helmstedt. For his open attack on the integrity of the Minister, Count Hoym, he was removed from his post in the customs service at Posen (1797); but four years afterwards he published the famous 'Black Book'—so called from its binding—a second attack on the Ministers Hoym and Goldbeck, under the title *Die wahren Jakobiner im preussischen Staat, oder aktenmässige Darstellung der bösen Ränke und betrügerischen Dienstführung Zweier preussischen Staatsminister.* For this publication, after a long trial, he was sentenced to eighteen months in prison. His later writings were two pamphlets attacking Napoleon, and, in 1805, a eulogy of his patron, Struensee. In 1812 he received a minor appointment from the Minister Hardenberg; but the ill fortune of the preceding years had broken his spirit, and when the State money in his possession was stolen from him he despaired of life and committed suicide. He wrote a *Geschichte der drei Belagerungen Kolbergs im Siebenjährigen Kriege* (1848). Consult Grünhagen, *Zerboni und Held in ihren Konflikten mit der Staatsgewalt* (Berlin, 1897).

HELDENBUCH, hĕl'den-bōōg (Ger., book of heroes). A collection of old epic poems, connected with the heroic legends of Germany. No manuscript exists, and the oldest printed edition is without date. The second copy was printed in 1491, and was afterwards reprinted in 1509, 1545, 1560, and 1590, and edited by A. von Keller at Stuttgart in 1867. It is an adaptation preserving the general characteristics of the older poetic form, and contains the poems "Ornit," "Hugdietrich," "Wolfdietrich," the "Great Rosegarden," and the "Little Rosegarden, or King Laurin." A similar but inferior adaptation of the same material, with additions from the tales of Attila and Dietrich, appeared about 1472. Of the latter work one manuscript exists, now in Dresden. The collection is known by the name of one of its two writers, Kaspar von der Rhön (Gaspard de la Roen).

HELDER, hĕl'dĕr. A strongly fortified seaport town of the Netherlands, situated on the narrow passage of Marsdiep which separates the mainland of the Province of North Holland from the island of Texel (Map: Netherlands, C 2). The city and surrounding country are protected from the inroads of the sea by an enormous dike nearly 5 miles long and 30 feet wide at the top, built of Norwegian granite. A road on the top of the dike connects Helder with the harbor of Nieuwediep, the sea entrance to the North Holland Canal, which connects Helder with Amsterdam. Nieuwediep is one of the chief naval stations of the Netherlands, where are large docks, ship-yards, barracks and magazines, a naval hospital, and the royal cadet school. Owing to its position at the northern end of the North Holland Canal, Helder has rapidly developed from a small fishing village into a city. Population, in 1900, 25,159. Helder is noted for the famous naval battle which took

place there in 1673 between the united fleets of England and France, on one side, and the Dutch, on the other. The latter, led by Tromp and De Ruyter, were victorious. The fortifications of the town were begun in 1811 by Napoleon, and completed afterwards by the Dutch.

HELE, hā'le, PETER (1480-1542). A German clockmaker of Nuremberg, who is credited with having made the first pocket timepiece, about 1511. His name is also spelled 'Hell' and 'Henlein.'

HEL'EN (Lat., from Gk. Ἑλένη). The daughter of Zeus and Leda (q.v.), wife of Tyndareus, King of Sparta, or, according to the epic poem *Cypria*, of Zeus and Nemesis, whom the god pursued in the form of a swan. Nemesis brought forth an egg, which was found by Leda, who on the birth of Helen reared her as her foster-child. According to the ancient legend she was so exceedingly beautiful that at the age of ten she was carried off by Theseus and Pirithous, but was recovered subsequently by her brothers, Castor and Pollux. Tyndareus afterwards engaged her suitors, who numbered about thirty, in a solemn oath to unite together to aid the husband whom Helen should choose, in case of any attempts being again made to carry her off. In accordance with this oath, her husband, Menelaus, when she was afterwards carried off by Paris, son of Priam, King of Troy, summoned all the princes of Greece to avenge the injury he had sustained, and thus gave rise to the Trojan War. The ordinary legend states that after the death of Paris she voluntarily married his brother, Deïphobus, and that on the taking of Troy, in order to recover the favor of Menelaus, she betrayed Deïphobus into his hands. Another version told how she fled to the temple of Aphrodite, and was pursued with drawn sword by Menelaus, but such was the power of her beauty that he laid aside his thought of vengeance, and took her once more as his wife. Their voyage home was long, as they were driven to Egypt, but at last reached Sparta in safety, where the *Odyssey* shows them living in happiness. By her husband Menelaus she had one daughter, Hermione, but some writers said that by Theseus she was the mother of Iphigenia. Of her death also there were many versions. Her grave was shown at Therapne, near Sparta, where she and Menelaus were worshiped. On the other hand, the Rhodians told how she was driven out of Sparta after the death of Menelaus, and came to her friend, Polyxo, in Rhodes. Polyxo, however, had lost her husband in the Trojan War, and consequently forced Helen to hang herself. Hence she was worshiped at Rhodes in connection with this tree, as Helena δενδρῖτος. Another story told how she was translated by the gods to the Islands of the Blest, where she was wedded to Achilles. She received divine honors at many places, and was believed by the sailors to appear in the single flame of Saint Elmo's fire, which was regarded as a sign of disaster, while the double flame, or Castor and Pollux, was believed to insure safety. In art, scenes from the story of Helen are frequent, and represent almost all the episodes in her eventful life. It was a curious variation that Stesichorus introduced, in that he made Helen remain in Egypt, whither she had come with Paris on her way to Troy, detained by the King, who later restored her to her husband. Paris took to Troy only a phantom, for whom Greeks and Trojans fought. Much in the nature of the legends of Helen, and in the characteristics of her worship, seems to originate that she was originally a moon-goddess, who has been superseded by Selene and Artemis, and thus transferred to the heroic legends. For a full collection of the ancient material relating to Helen, consult Engelmann's article in Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. i. (Leipzig, 1886-90).

HELEN: A TALE. A novel by Maria Edgeworth, published in 1834. It was her last story, and, though not lacking in power, had not the success of her earlier work.

HELENA. A city and the county-seat of Phillips County, Ark., 82 miles south by west of Memphis, Tenn.; on the Mississippi River, and on the Arkansas Midland, the Saint Louis, Iron Mountain and Southern, and the Yazoo and Mississippi Valley railroads (Map: Arkansas, E 3). It is an important shipping point for lumber, cotton, and cottonseed oil; and has lumber-mills, cotton-compresses, cottonseed-oil mills, foundries, etc. Here on July 4, 1863, General Holmes, commanding a Confederate force of 9000, attacked General Prentiss with a Union army of about 4500, but was repulsed with a loss in killed, wounded, and prisoners of one-fifth his number. Population, in 1890, 5189; in 1900, 5550.

HELENA. A city, the capital of Montana, and the county-seat of Lewis and Clarke County, 73 miles north by east of Butte; on the Great Northern and the Northern Pacific railroads (Map: Montana, D 2). It lies at an elevation of 4200 feet, in Prickly Pear Valley, a fertile agricultural district, and is surrounded by a highly productive mineral region. It is the commercial centre of the State; is extensively engaged in gold, silver, and iron mining; and has foundries and machine-shops, flour, saw, and planing mills, quartz-crushing plants, and smelters. From the famous Last Chance Gulch which traverses the city, it is estimated that more than $30,000,000 worth of gold has been mined. Helena was settled as a mining camp in 1864, and laid out as a town in the same year, and was incorporated in 1881. The city is the seat of the Montana Wesleyan University (Methodist Episcopal), opened in 1890, and has public, State, and other libraries, and a United States Assay Office. The State Capitol is an imposing structure. Under the general code provision passed in 1895, the city government is vested in a mayor, elected biennially, and a unicameral council which confirms the executive's nominations to all subordinate offices except those of police magistrate and city treasurer, which are filled by popular election. Population, in 1890, 13,834; in 1900, 10,770.

HELENA (Lat., from Gk. Ἑλένη, *Helenē*). The name of several saints of the Catholic Church, the most celebrated of whom is the Empress Helena, wife of Constantius Chlorus, and mother of Constantine the Great. She was born probably in Dardania, about 248, became concubine to Constantius and bore him Constantine about 274, when she became his wife; but in 292 when he became Cæsar, Constantius divorced her so that he might marry another. In 306 Constantine succeeded his father, and it is likely re-

called his mother to the Court. It is also probable that late in life Helena became a Christian through Constantine's influence, and won the gratitude of the Christian community by her zeal for the advancement of religion, and her acts of piety and munificence. Among the public events of her Christian life, the most remarkable is the discovery (according to the belief of the time) of the cross of the Lord during the memorable visit she made to the Holy Land, after 326. (See CROSS, INVENTION OF; HOLY SEPULCHRE.) She died in the year 328, or later. Other saints of the same name are Olga, wife of the Grand Prince Igor of Kiev (died 969), who is honored in the Russian Church; and Helena of Sköfde, Sweden, who suffered martyrdom in the twelfth century.

HELENA. A fantastic tragedy by Euripides (B.C. 412), founded on the story that the real Helen never was at Troy, but was represented there by a phantom, while she was carried to Egypt by the gods. There she was found by Menelaus after the Trojan War and rescued from the Egyptian King, and the phantom Helen vanished.

HELENA. (1) The leading character in Shakespeare's *All's Well that Ends Well*, in love with Bertram, who leaves her on their wedding day. (2) An Athenian lady, enamored of Demetrius, in Shakespeare's *Midsummer Night's Dream*.

HELENA, THE. A name given in Germany to Act iii., Part 2 of Goethe's *Faust*, which was begun in 1800 and published separately in 1827, under the title of *Helena: A Classic-Romantic Phantasmagoria*. It is a complete allegorical poem in itself, and only slightly connected with the action of the drama. In it Helen marries Faust, signifying the fostering of Hellenism in German literature, and bears him a son Emphorian, typifying Byron, who soon destroys himself by his restless activity. Helen also disappears, leaving Faust only her veil and garments.

HÉLÈNE, Ā'lān'', LOUISE ELISABETH, Duchess of Orleans. See ORLEANS.

HELENSBURGH, hĕl'ənz-bŭr'ŭ. A favorite watering-place in Dumbarton, Scotland, on the right bank of the Firth of Clyde, opposite Greenock, from which it is four miles distant (Map: Scotland, D 3). Population, in 1891, 8409; in 1901, 8554.

HEL'ENUS (Lat., from Gk. Ἕλενος, *Helenos*). The one son of Priam to survive the siege of Troy. After the death of Paris, he vainly wooed Helen, and either withdrew to Mount Ida, where at the instance of Calchus he was captured by Odysseus, or deserted to the Greeks outright. He was the twin brother of Cassandra, and, like her, gifted with prophecy. He declared that Troy could not be subdued without Neoptolemus and Philoctetes, and his was the suggestion that the Greeks steal the Palladium and build the wooden horse. Fallen, along with Andromache, to the share of Neoptolemus, he won this prince's good will by foretelling the tempest which the embarking Greeks should encounter, and by dissuading him from starting. He was taken to Phthia, but advised his master to settle in Epirus. Grateful for his fidelity, Neoptolemus bestowed upon him Andromache, by whom he had a son, Cestrinus. After the death of his King, Helenus ruled over a part of Epirus which he called Chaonia.

HELFERT, hĕl'fĕrt, ALEXANDER, Baron (1820—). An Austrian author and politician, born at Prague, where his father, an ecclesiastical historian, was professor. After serving as assistant to his father and as instructor at the University of Cracow, he was elected to the Austrian Parliament of 1848. He soon became connected with the Ministry of Education, of which (1860-61) he was provisional head, and then was made head of the educational bureau in the Ministry of State, and president of the Imperial Commission on Art and Archæology. He became prominent as leader of the Clerical Federalist Party in the Austrian House of Peers, which he entered in 1881. He was editor of the *Oesterreichische Jahrbuch* (1885 sq.), and of a popular *Oesterreichische Geschichte* (1863); author of many historical works, of which the following may be mentioned: *Huss und Hieronymus* (1853); *Die österreichische Volksschule* (1860-61); *Die Schlacht bei Kulm, 1813* (1863); *Geschichte Oesterreichs vom Ausgange des Wiener Oktoberaufstandes 1848* (1869-86); *Maria Luise* (1873); *Joachim Murat* (1878); *Fabrizio Ruffo* (1882); *1814. Ausgang der französischen Herrschaft in Oberitalien* (1890); *Gregor XVI. und Pius IX.* (1896); and *Kaiser Franz I. von Oesterreich und die Stiftung des lombardo-venetianischen Königreichs* (1901).

HELGOLAND, hĕl'gō-lānt, or **HELIGOLAND.** A small German island in the North Sea, situated about 35 miles off the western coast of Schleswig-Holstein, in latitude 54° 10′ N., and longitude 7° 53′ E. (Map: Germany, B 1). It covers only a little over one-fifth of a square mile. A few centuries ago the island had five times its present area, but the sea is fast consuming it. Helgoland has two good ports, one on its northern and another on its southern side. The inhabitants are supported chiefly by fishing and commerce, by serving as pilots, and by catering to the needs of the strangers who come for sea-bathing. A lighthouse stands on the cliff near the village. Helgoland is important strategically, and is strongly fortified. The population in 1900 was 2307. The natives are of Frisian origin and speak a Frisian dialect, although German is the official language. Helgoland was anciently sacred to the goddess Hertha, and was known as Fosetisland, from the Frisian goddess Foseta, who had a temple on the island. From the middle of the tenth century it was an independent republic, but came into the possession of the dukes of Schleswig in the fourteenth century, and was captured in the beginning of the eighteenth century by Denmark. In 1807 it was occupied by Great Britain, to whom it was officially ceded by Denmark in 1814. By treaty between England and Germany the island became a German possession in 1890.

HELI'ACAL RISING (from Lat. *heliacus*, Gk. ἡλιακός, *hēliakos*, pertaining to the sun, from ἥλιος, *hēlios*, sun; connected with Lat. *sol*, Goth. *sawil*, AS., Icel. *sōl*, Ir. *sul*, Lith., Lett., OPruss. *saule*, Skt. *sūra*, *svar*, sun). A star is said to rise heliacally when it rises just before the sun. When the sun approaches a star which is near the ecliptic, the star becomes for a season invisible—the heavens being too bright in the quarters of sunrise and sunset, at the time of its

rising and setting, to allow it to be seen. But when the sun, progressing in its apparent orbit, separates from the star, and the latter begins to rise first, it in time rises so much earlier than the sun as just to be visible before daylight. The heliacal risings of various bright stars, such as Sirius, were used by the ancients to mark definite dates in the year. See CANICULA.

HELIADE-RADULESCU, hĕl'ĭ-ăd rā'doo-lĕs'kōō, JOAN (1802-72). A Rumanian author, born at Targovistea, and educated under Lazare at Saint Sava until this school was closed by the Government, in 1821. Then he went to Bucharest, as professor and publisher; founded the *Curierul Roman* (1831-48) and the *Curierul de Ambe Seze* (1840-44) the earliest Rumanian literary periodicals, and busied himself with almost endless translations—of the Bible, of Dante, Aristotle, Tasso, Molière, Ossian, Byron, and Lamartine. He took so active a part in the Revolution of 1848 that he became a member of the Provisional Government, and in consequence was banished when the Russians and Turks overthrew the Government. He returned to Bucharest with Omer Pasha in 1854. In his later years he lost much of his national influence, and became insane shortly before his death. He wrote: *Paralelismul intre dialectele roman si italian* (1841); *Souvenirs et impressions d'un proscrit* (1850); *Le protectorat du Czar* (1850); and a *Mémoire sur l'histoire de la régénération roumaine* (1851); an heroic drama, *Mircea* (1844), and many other plays; a national epic, *Mihaida* (1846); and *Cursŭ de poesie generalŭ* (1868 sqq.).

HELI'ADES, or **HELI'ADÆ** (Lat., from Gk. Ἡλιάδες). The daughters of Helios and the oceanid Clymene. They made ready the sun-chariot for their brother Phaëthon without the command of Helios, and at his death were changed into poplars, while their tears became amber. Some accounts name three Heliades—Ægle, Phaëthusa, and Lampetie; others mention seven.

HE'LIÆ'A (Lat., from Gk. ἡλιαία, *hēliaia*). A higher court at Athens composed of 5000 citizens over thirty years of age chosen by lot annually. It was divided into ten sections, each of which constituted a court by itself. Its sessions were public.

HELIAND, hā'lē-ănd (OS. *Hēliand*, Savior). A Saxon poem of the ninth century. The portion still preserved relates the life of Christ as told by the four Evangelists, whose various narratives the author seeks to harmonize. It is thought to have been composed by a Saxon writer of unknown name at the request of the Emperor Louis the Pious. Like all early Germanic poems, the *Heliand* is written in alliterative verse, in the use of which the author shows marked skill. Until the publication by Zangenmeister and Braune in 1894 of fragments of a Saxon paraphrase of Genesis, the *Heliand* was the only important monument of Saxon known to the present age. Apart from its great value to the student of language, the *Heliand* is of interest because of its spirited and sympathetic treatment of the Gospel narrative. The author shows himself to be no mere slavish transcriber, but a true poet. In accordance with the taste and knowledge of the age, scenes and incidents are strongly localized, the spirit of the whole work being Germanic rather than Christian. To modern readers the intense reality of the characterization often seems irreverent, suggesting the later treatment of biblical narratives in the religious drama; but the purpose of the poet is evidently earnest and extremely reverent. It is doubtful whether an historically correct treatment of the New Testament would have appealed to the primitive audience for whom the poem was composed. The most recent and the fullest edition of the *Heliand* is that of Piper, the first volume of which, containing the text, appeared in 1897. The latest German translation is by E. Behringer (Aschaffenburg, 1898).

HE'LIAN'THUS. See ARTICHOKE, JERUSALEM; SUNFLOWER.

HELIAS, HELIS, or **HELYAS**, hē'lē-ăs. See SWAN, KNIGHT OF THE.

HELICE, hĕl'ĭ-sē (Lat., from Gk. Ἑλίκη, *Helikē*). (1) In Greek mythology, the daughter of Lycaon, beloved by Zeus and transformed by Hera into a bear. Zeus thereupon placed her in the heavens as the constellation of the Great Bear. (2) The daughter of Selinus and wife of Ion. She gave her name to the town of Helice, in Achæa.

HELICIDÆ, hē-lĭs'ĭ-dē (Neo-Lat. nom. pl., from Lat. *helix*, Gk. ἕλιξ, spiral). A large cosmopolitan family of terrestrial pulmonate gastropod mollusks, the land-snails. They have a part of the mantle-cavity formed into an air-breathing organ, or lung, and the shell coiled. See SNAIL.

HELICOCERAS, hĕl'ĭ-kŏs'ĕr-as (Neo-Lat., from Gk. ἕλιξ, *helix*, spiral + κέρας, *keras*, horn). A curious fossil ammonoid shell found in Cretaceous rocks of Europe, Asia, and America, characterized by the looseness of the turreted shell, the last coil of which is of irregular curvature. It is one of the peculiar aberrant forms evolved in the last stages of a race that began in Jurassic time with closely wound discoid shells of the normal ammonoid form. See AMMONOIDEA; CEPHALOPODA.

HEL'ICON (Lat., from Gk. Ἑλικών, *Helikōn*). A mountain, or rather a mountain range, in the southwest of Bœotia, in Greece, forming a continuation of the range of Parnassus. The loftiest summit (now called Palæovouno) is 5738 feet high. At the foot of Helicon stood the village of Ascra, now Pyrgaki, the native place of Hesiod (q.v.), and the seat of an early school of didactic epic. The mountain was the seat of a very ancient worship of the Muses, and with this is probably to be connected the poetic school at Ascra. The grove of the Muses was at the northern foot of Helicon, in a valley near the Monastery of Saint Nicholas; higher up the mountain (20 stadia according to Pausanias) was the fountain of Hippocrene (q.v.), probably the modern Kryopegadi or cold spring. Near Ascra was the celebrated fountain of Aganippe.

HELICON (Gk. ἑλικών, *helikōn*, musical instrument with nine strings, from ἕλιξ, *helix*, spiral, from ἑλίσσειν, *helissein*, to turn; connected with Lat. *volvere*, to turn, Eng. *wallow*). (1) An ancient stringed instrument for illustrating the theory of musical intervals. (2) The lowest of all brass instruments. It is constructed in various pitches (F, E♭, C, B♭) and has much the quality and range of the bass tubas. The

helicon is built in the form of a circle and carried around the body. For this reason it is generally used in military bands in preference to the tuba, because it can be carried with less effort when marching. See SAXHORN.

HELICONIDÆ. A family of butterflies noted in the study of mimicry. See MIMICRY.

HE'LIOCEN'TRIC (from Gk. *ἥλιος, hēlios,* sun + *κέντρον, kentron,* centre). A term in astronomy, signifying that the sun is taken as the centre of reference or view. It is opposed to geocentric (q.v.), which indicates that the earth is taken for centre.

HEL'IODO'RUS (Lat., from Gk. *Ἡλιόδωρος*). A Greek romance-writer, born at Emesa, in Syria. He flourished, probably, at the end of the third century A.D., and is not to be confused with Heliodorus, the Bishop of Trikka in Thessaly, who, according to the Church historian Socrates (q.v.), wrote a romance in his youth. His work, in ten books, entitled *Æthiopica* (*Αἰθιοπικά*), narrates the loves of Theagenes and Charicleia. At times the work shows almost epic beauty and simplicity. The descriptions are excellent, and the interest of the reader is in general well maintained; but in the presentation of the emotions the work is far less successful. The language betrays the Semitic origin of the author, and the style shows his rhetorical training and adherence to the Neo-Pythagorean School. Heliodorus was strongly influenced by Homer and Euripides, and in his turn has been a favorite model of many French dramatists—for example, of Racine (q.v.). There are editions by Bekker (Leipzig, 1855), and Hirschig (Paris, 1856); English translations by Rowland Smith (London, 1855) and Underdowne (1857; last printed London, 1895). Consult Rhode, *Der griechische Roman* (Leipzig, 1900).

HE'LIODO'RUS, treasurer of Seleucus IV. of Syria (B.C. 187-175). Seleucus sent him to Jerusalem to rob the temple, but he was refused admittance by Onias, the high priest, on the first day, and on the next was driven away, according to the story (II. Macc. iii.), by a terrible angel. He murdered his master and usurped the throne, from which he was driven by Attalus and Eumenes, princes of Pergamus, after a few months.

HE'LIOGAB'ALUS. See ELAGABALUS.

HELIOGRAPH (from Gk. *ἥλιος, hēlios,* sun, *γραφία, graphia,* writing, from *γράφειν, graphein,* to write). An instrument used for communication between distant stations by reflections of the sun from a mirror or system of mirrors. The great advantage of this method over the ordinary signal system is that the apparatus is more portable and can be used over greater distances, but only with success in regions where the atmosphere is clear of clouds for considerable periods of time. There are two methods of using the heliograph, which are based in the main on the dot and dash: the reflection may be obscured except when the screen is temporarily removed to produce a flash or letter; or the reflection may be kept exposed except when it is obscured to produce a letter. The first method is said to be the easier for the beginner, but the second less fatiguing to the eye. The distance through which this mode of communication may be carried on varies with the size of the mirrors and the clearness of the atmosphere. In 1890 messages were signaled along the Arizona mountains for 215 miles. When the signaling station forms an angle greater than a right angle between the sun and the receiving station, two mirrors are used to prevent too great a loss of rays by oblique reflection. The mirrors are mounted on tripods, and are held by a socket, or a universal joint. Besides its use as a signaling instrument, the heliograph has served to define distant points in a geodetic survey, and for this purpose has been employed in triangulation. Perhaps the chief use of the heliograph is in military operations in the field. It formed the sole means of communication between the besieged British garrisons and the relief columns attempting to relieve them during the Boer-British War. See SIGNALING AND TELEGRAPHING, MILITARY.

HELIOLITES, hē'lī-ō-lī'tēz (Neo-Lat., from Gk. *ἥλιος, hēlios,* sun + *λίθος, lithos,* stone). A genus of fossil alcyonarian corals found in Ordovician and Silurian rocks and less abundantly in the Devonian formations. Heliolites is the type of an important family, Heliolitidæ, comprising about 10 genera and 45 species. All the members of the family have rounded coral masses that consist of larger tubes surrounded by smaller tubes. The genera and species are based upon modifications of the horizontal and vertical walls that traverse the interior of the mass. They have been found in all countries where Silurian and Lower Devonian formations exist and they often form fossil coral reefs of considerable extent. Heliolites interstinctus, the best-known species, is of world-wide distribution. Consult Lindström, "Remarks on the Heliolitidæ," in *Kongliga Svenska Vetenskaps-Akademiens Handlingar,* vol. xxxii. (Stockholm, 1899). See CORAL; OCTOCORALLA.

HE'LIOM'ETER (from Gk. *ἥλιος, hēlios,* sun + *μέτρον, metron,* measure). An instrument originally intended for measuring the angular diameter of the sun. It is a telescope in which the object-lens is in two halves, each of which will form a perfect image in the focus of the eye-piece; and the images may be made to diverge, coincide, or overlap each other by varying the distance between the half-lenses. If the diameter of the sun is to be measured, the two lenses are adjusted so that the images will touch each other, then the distance between the centres of the two object-glasses measured in seconds gives the diameter of the sun. Fraunhofer made many remarkable improvements in the heliometer, but the perfected type of instrument as used to-day is the work of A. Repsold & Sons of Hamburg. The original use of the heliometer has been greatly extended, especially in the hands of Gill at the Cape of Good Hope Observatory. As now made, angular distances above two degrees can be measured on the sky with extreme precision. On the whole, the modern heliometer is considered the most precise measuring instrument known to astronomy.

HE'LIOPHYL'LUM (Neo-Lat., from Gk. *ἥλιος, hēlios,* sun + *φύλλον, phyllon,* leaf). A fossil coral very common in the Hamilton shales of central and western New York and other localities in America. This coral is usually simple, of conical form, with a large shallow cup in which a great number of slender septa or walls radiate from the centre toward the elevated edge.

Perfect specimens, which are quite common, are really beautiful objects. Sometimes the coral branches, and then two or more cups or calyces are found on the same stem. Heliophyllum Halli is the common species. See CORAL.

HE'LIOP'OLIS (Lat., from Gk. Ἡλίου πόλις, *Hēliou polis*, City of the Sun). The Greek name of the ancient Egyptian city On, situated on the east side of the Pelusiac branch of the Nile near the apex of the delta. Its site is occupied by the modern village of Matariah. Heliopolis was the seat of worship of the god Tum or Atum, who later came to be regarded as one of the forms of the sun-god Rê. Its sacred name was Per-Rê, 'house or city of Rê,' and of this the Greek name is a translation, as was also the Hebrew name *Bethshemesh*. As On, it is often mentioned in the Bible. Although a very ancient and important city—according to Manetho, it existed in the time of the Second Dynasty—it is seldom mentioned in Egyptian texts before the Twelfth Dynasty. Amenemhat I. built here a splendid temple, on the site of an older sanctuary, and his son and successor, Usertesen I., erected before it two great obelisks, of which one is still standing. The obelisks known as Cleopatra's Needles, of which one is now in New York and the other in London, were originally erected at Heliopolis by Thothmes III. Under Rameses III. (about B.C. 1200) the temple was at the height of its influence, standing second only to that of Amon at Thebes; 12,693 persons are said to have been engaged in its service. The theological school of Heliopolis had a strong influence upon Egyptian religious thought, and to it is due a very considerable portion of the religious literature of ancient Egypt. Greek writers mention the great reputation for wisdom enjoyed by the Heliopolitan priests, and Thales, Solon, and Plato are said to have studied under them. Under the later dynasties Heliopolis seems to have declined, since Herodotus speaks only of the wisdom of its priests, not of the splendor of its buildings; and Strabo, at the beginning of the Christian Era, states that the place was practically deserted, though the temple and college still existed. The ruins of the city and temple existed in a fair state of preservation far down into Arab times, but now little remains except the obelisk of Usertesen I.

HELIOPOLIS (in Syria). See BAALBEK.

HE'LIOS (Gk. Ἥλιος, or in the epic Ἠέλιος, *Eelios;* connected with Lat. *sol*, Goth. *sauil*, AS., Icel. *sōl*, Ir. *sul*, Lith., Lett., OPruss. *saule*, Skt. *sūra*, *svar*, sun). The Greek name of the sun-god. He was, according to the *Theogony*, a son of the Titan Hyperion and of Thea or Euryphaëssa, and is described by the same poet as giving light to both gods and men. He rose in the east from the marshy borders of Oceanus, into whose dark abysses he also sank at evening. The later poets, however, gave him a splendid palace in the east, somewhere beyond Colchis, and described him as being conveyed, after the termination of the burning labors of the day, in a winged boat of gold, along the northern coasts of the sea back to Colchis. In the earlier poets Helios is a distinct personality, all-seeing, the possessor of herds on Trinacria, a powerful deity. Later, much of his personality is obscured, and the real sun-god becomes Apollo, probably because the word Helios, denoting the actual sun, was not felt so fully as a proper name. Euripides contributes much to this fusion. His worship was widely spread. He had temples in Corinth, Argos, Trœzene, Elis, and many other cities; but his principal seat was Rhodes, where four white horses were annually sacrificed to him. A similar sacrifice was offered in his honor on the summit of Mount Taygetus in Laconia. In art, he was represented as a young man in the full vigor of his strength and beauty, with flowing hair, and a crown of rays. Often he was represented in his four-horse chariot, as in a celebrated group by Lysippus at Rhodes.

HE'LIOSTAT. An instrument used in astronomy, physics, and engineering to reflect the light from the sun or other luminous body in a certain desired direction. It consists of a mirror so mounted that it is capable of being moved by clockwork in such a direction and with such velocity that it will reflect the light of the sun to the same point independent of its motion. The first instrument of this kind is described by s'Gravesande (1688-1742) in his *Physices Elementa* (3d ed. 1742). The heliostat is used with the spectroscope (q.v.), where it is desired to keep the sun's rays on the slit or in connection with a permanently mounted telescope, such as that constructed for the Paris Exposition of 1900. So large a telescope (see TELESCOPE) it would have been next to impossible to mount equatorially, and it was necessary to reflect the light from the heavenly objects under observation into its object-glass. The heliostat has also been used for observing eclipses, especially where it is desired to photograph the eclipse or make extensive spectroscopic observations. The term heliostat is also used to name an instrument which is more usually known as the *heliotrope*, used by surveyors and engineers in making long-distance observations for distant stations. This consists of a mirror at the distant station which is so mounted and adjusted that it will reflect a beam of light to the observing station. (See ENGINEERING INSTRUMENTS.) The heliostat of Thomas Drummond was an instrument of this kind, and was employed in geodetic surveying in England with considerable success.

HE'LIOTAX'IS (Neo-Lat., from Gk. ἥλιος, *hēlios*, sun + τάξις, *taxis*, arrangement). Same as phototaxis (q.v.). See, also, HELIOTROPISM.

HE'LIOTROPE. See ENGINEERING INSTRUMENTS.

HELIOTROPE (from Lat. *heliotropum*, Gk. ἡλιοτρόπιον, *hēliotropion*, heliotrope, sun-dial, from ἥλιος, *hēlios*, sun + τροπή, *tropē*, a turning, from τρέπειν, *trepein*, to turn), *Heliotropium*. A genus of plants of the natural order Boragineæ (q.v.). Many of the species have fragrant flowers which are used by perfumers. The Peruvian heliotrope (*Heliotropium Peruvianum*), a small shrub, seldom more than two feet high, with oblong-lanceolate wrinkled leaves and small lilac-blue flowers, is in almost universal cultivation for its fragrance, which resembles that of vanilla. The European or common heliotrope (*Heliotropium Europœum*), a native of the south and west of Europe, is an annual with small white, or rarely pale-red, flowers. A white flowered species (*Heliotropium curassavicum*) grows wild in the Southern United States. *Heliotropium co-*

rymbosum is a large trussed, large-flowered, narcissus-scented species. Many hybrid heliotropes are now to be seen in flower-gardens and greenhouses, which exhibit great variety in the size

HELIOTROPE.

and color of their flowers. They delight in a light, rich soil. The shrubby kinds are generally propagated by cuttings.

HELIOTROPE, or BLOODSTONE. A variety of chalcedony that is of a green color, with small spots of red jasper. It is found in Siberia, in the Hebrides on the west coast of Scotland, and in the United States—in Chatham County, Ga., Orange County, N. Y., and at various localities in Oregon and Colorado. It was known to the ancients, who valued it for gem purposes. During the early ages of the Christian Church it was used for the engraving of sacred subjects, the figures being so arranged that the red spots were made to represent drops of blood. It is still frequently used as a seal.

HE'LIOT'ROPISM, or **PHOTOT'ROPISM** (from Gk. ἥλιος, *hēlios*, sun + τροπή, *tropē*, a turning). The sensitiveness of plant organs to the direction of light-rays incident upon them.

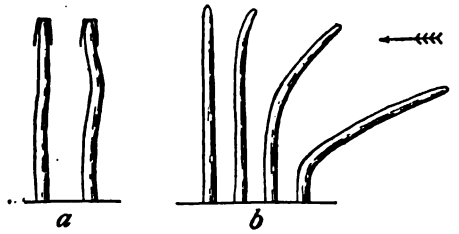

FIG. 1. POSITIVE HELIOTROPISM.

Seedlings of oats grown in darkness: a, two exposed to light from direction of arrow, but with sensitive tips capped with tin foil; b, four, whose tips were not shaded, sketched at intervals as the bending toward the light increased. Growth is accelerated on the side less illuminated.

The organ responds to lateral illumination by bending in such a way as to bring its axis into a certain fixed position with reference to the direction of the rays of light. The main shoots of most higher plants are positively heliotropic—i.e. they bend so as to direct their axes toward the source of illumination (Fig. 1). Thus, whenever plants are grown in front of a window, the stems bend toward the light. Some organs are negatively heliotropic. This is seen best in the case of certain roots (especially those of plants belonging to the mustard family) when grown in water. If such roots are laterally illuminated after having been grown in the dark, they bend away from the light.

Another mode of response to the stimulus of one-sided illumination is known as 'diaheliotropism.' Most leaves are diaheliotropic; they bend so as to bring their blades into a plane at right angles to the direction of the incident rays, the normally upper side of the leaf always facing the light (Fig. 2). This reaction is well shown by many house plants, such as the geranium (Pelargonium), when subjected to one-sided lighting. The form of heliotropic response may be very different when the intensity of the illumination varies. Many leaves, when exposed to a light of medium intensity, are diaheliotropic; but when the intensity of the light increases beyond a certain limit, they bend so as to direct their tips either toward or away from the source of the stimulating rays. They thus present less surface for the light to fall upon. Oxalis leaves show this response on bright summer days. The leaflets fold along the midrib and drop downward as though wilted. Clover (Trifolium), the sensitive plant (Mimosa), cassia, the bean (Phaseolus), and many

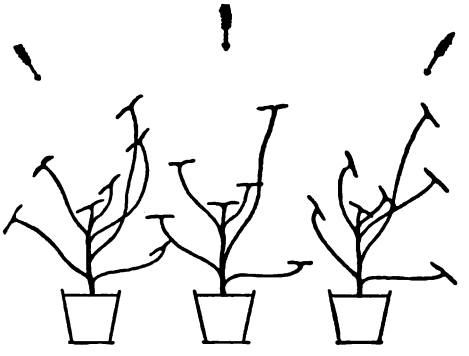

FIG. 2. TRANSVERSE HELIOTROPISM OF LEAVES.

Diagrams showing the plane of the leaves of tropæolum with light successively from the direction of the arrows.

others exhibit this phenomenon also. The final position assumed by any plant organ is never due, in nature, to the heliotropic response alone, but results from the combined action of many factors, of which light and gravity are the most important. See PHYSIOLOGY OF PLANTS.

HE'LIOZO'A (Neo-Lat. nom. pl., from Gk. ἥλιος, *hēlios*, sun + ζῷον, *zōon*, animal). An order of rhizopods, comprising forms naked, or clothed with a siliceous skeleton, and with fine, more or less stiff pseudopodia radiating from all sides. Contraction vacuoles are generally present. They are fresh-water forms, and are frequently called 'sun-animalcules.' They are sometimes supplied with a stalk, and occasionally form colonies, but many of them are free-swimming. They take their food into the body by means of the currents of protoplasm on the

pseudopodia. A widespread and familiar species is *Actinophrus sol.*

HE'LIUM (Neo-Lat., from Gk. ἥλιος, *hēlios*, sun). A gaseous element, first isolated by William Ramsay in 1895. Lockyer discovered it, spectroscopically, in the solar chromosphere as far back as 1868. Ramsay obtained it originally by heating the Norwegian mineral clevite; but it has since been found in other uranium minerals, in mineral waters, in meteorites, and in small quantities in atmospheric air. Helium (symbol He, atomic weight 3.96) is a colorless gas scarcely twice as heavy as hydrogen. It was liquefied in 1898. Like argon, it shows a disinclination to enter into chemical union, and therefore its compounds have not been studied. Its molecules, like those of argon, are assumed to be made up of single atoms. Its spectrum has been examined by Sir William Crookes, who found the line D_3, which corresponds to the yellow double line observed in the spectrum of the solar chromosphere by Lockyer.

HE'LIX (Lat., from Gk. ἕλιξ, spiral). (1) In architecture, a spiral form, as when a flight of steps winds round a cylindrical space or centre post. The name is also given to the little volutes under the flowers of the Corinthian capital. The *helical* line is the central line of such a helix or spiral, and corresponds to the *axis* of the usual rectangular constructions. (2) A genus of land-snails. Fossil forms are often found in great abundance in both the fresh-water and marine limestones and marls of Tertiary age in America, Europe, Asia, and Africa.

HELL (Icel. *hel*, AS. *hel*, *hell*, OHG. *hella*, Ger. *Hölle;* probably connected with AS., OHG. *helan*, Ger. *hehlen*, to cover, and ultimately with Lat. *celare*, Gk. καλύπτειν, *kalyptein*, to hide, OIr. *celim*, I hide; hence, the hidden, unseen place). In common use, the place or state of the wicked after death, or the abode of evil spirits. Among the early Teutons the term signified the place under the earth whither all men, good or bad, went after death, and consequently denoted a conception similar to the Semitic Sheol (q.v.). There is evidence, however, that already before contact with Christianity this nether world was divided into distinct parts. Thus in the realm over which the goddess Hel rules there is the blessed place where Balder and Nanna dwell, and also Lif and Lifthraser, who are to become parents of a new and better human race; and there is Nastrand, where the monster Nidhögg feeds upon the bodies of murderers, perjurers, and adulterers. How strongly intrenched the original meaning was is evident from the fact that the early translators of the Bible did not hesitate to use the word as a rendering of Sheol, the pit, or the grave, even in passages where good men are said to descend into these places. Modern translators generally restrict the word to those cases where the original has Gehenna (q.v.) or Tartarus, in harmony with the significance that the term has gradually attained. The Greek conception of Hades, or the unseen world, as seen in the Homeric poems, is substantially the same as that of the early Teuton. To the animistic origin of the idea the Mycenæan tombs bear testimony. Whatever native tendencies there may have been in the direction of a moral distinction and a differing lot among the shades in Hades, they were greatly strengthened in the seventh and sixth centuries B.C. by the establishment upon Grecian soil of the originally Thracian Orphic cult societies. Those initiated in the Orphic mysteries secured for themselves a blessed immortality, while the uninitiated were liable to severe punishment for their sins in Hades. In a society where the *lex talionis* prevailed, it is natural that the punishment conceived to be inflicted upon men in a future world should be related to the crimes committed, and Greek imagination nicely adjusted the penalty to the sin. Through Pythagoras of Samos in the sixth century B.C., the idea of a transmigration of souls and the necessity of expiating the sins of a past age grafted itself upon the Orphic conceptions. With the expansion of Greek civilization through the conquests of Alexander, Orphic and Pythagorean speculation spread in the East, modifying or transforming many native ideas. As in other Semitic nations, so in ancient Israel, the shadowy existence in Sheol was in marked contrast with existence in the land of the living and could not be called life at all. In Sheol there were no moral distinctions and no rewards for virtue or punishments for crimes. "The wicked ceased from troubling and the weary were at rest." This attitude toward the future was preserved throughout the Old Testament. There is not a single passage in which Sheol is represented as a place where the wicked are punished. When for the first time the idea of a resurrection is found in the Book of Daniel (written B.C. 165), the tyrants that are raised to obloquy and shame, as well as the martyrs that rise to life and glory, undoubtedly continue their existence on earth. In an addition to the last chapter of the Book of Isaiah, probably made in the second century B.C. (lxvi. 23, 24), it is predicted that the pious Jews who visit the temple in Jerusalem on Sabbaths and other holidays will go out to look with pleasure upon the carcasses of the enemies that are being consumed by fire and worms. Probably the Valley of Hinnom (q.v.) is meant. It is significant that this place of punishment has not yet been transferred to the unseen world. There was no allusion to this passage in the original text of Ecclus. vii. 17, where the Hebrew has only "the hope of man is the worm." But substantially the same conception of the Valley of Hinnom is found in Enoch xxvii. 2, 3, and xc. 24-26. While the growth of the doctrine of Gehenna can be explained from national premises (see HINNOM), the transformation of a Sheol without wide distinctions into a hell where the wicked are punished, seen for the first time in Enoch xxii., can scarcely be accounted for without resorting to Greek influence. In this place of punishment some sinners remain, according to the author, even after the general judgment, being neither slain nor raised. In the Slavonic Enoch, the prison of the apostate angels is in the second heaven (vii.), and the place of the damned in the northern part of the third heaven (x.); and in the Testaments of the Twelve Patriarchs, the spirits of the lawless are confined in the second heaven. In the Wisdom of Solomon, iii. 10, 14; iv. 10, 19, Hades is practically identical with Gehenna, since the author does not believe in a resurrection. The influence of Orphic-Pythagorean thought is particularly evident in the fullest description of hell preserved from the early Church, the Apocalypse of Peter, where the different punishments are carefully adjusted to

the different kinds of sin. Among early Christian writers, the word hell is variously employed, sometimes to signify a place of temporary purgation, in which sense it comprehends the Roman Catholic purgatory; sometimes the place (*limbus patrum*) in which the souls of the just of the old law awaited the coming of Christ, who was to complete their felicity; sometimes the place in which unbaptized children are believed to be detained, on account of the stain of unremitted original sin; and lastly, the prison of those who die stained with the personal guilt of grievous sin. As to the nature of the punishment to which they are subjected, whether it is confined to the 'pain of loss'—that is, to the remorseful consciousness of having forfeited the presence of God and the happiness of heaven—or whether and to what degree it further includes the 'pain of sense,' there is some difference between the Eastern and the Western churches, and it is sometimes alleged that the Eastern Church altogether rejects the idea of punishment of sense. This, however, is a mistake; both churches agree that the punishment of hell includes the 'pain of sense,' the controversy between them having regarded not the existence of the pain of sense, but certain questions as to its nature, and especially whether it consists of material fire, a point which, in the decree for the union of the Greek and Latin churches at the Council of Florence, was left undecided. The controversy on the subject of the eternity of the punishment of hell dates from an early period, Origen and his school having taught that the punishment was but purgatorial in its object; that its purifying effect having once been attained, the punishment would cease for all, even for the devils themselves; and that its duration in each case is proportioned to the guilt of the individual. This doctrine of the final restoration of all to the enjoyment of happiness was the well-known Origenistic theory of the *apocatastasis*, to which so many of the early writers refer. It was condemned by the second council of Constantinople, and a belief in the eternity of the punishments in hell became characteristic of both the Eastern and the Western churches, and from them passed into the creeds of the churches of the Reformation. The more radical thinkers of the Renaissance period rejected the doctrine of hell, and especially many Baptist and Anti-Trinitarian churches. In modern times the belief in physical punishment after death has been abandoned by certain Protestants, and the endless duration of this punishment is rejected by many, either on the ground of a future acceptance of Christ after a punishment commensurate with the offenses committed during a brief lifetime, or for reasons connected with their general interpretation of life. Consult: Söderblom, *La vie future* (Paris, 1901); Dieterich, *Nekyia* (Leipzig, 1893); Charles: *Eschatology* (London, 1899); Bautz, *Die Hölle* (Mayence, 1882); Passaglia, *De Æternitate pœnarum deque Igne Inferno* (Regensburg, 1854). See ESCHATOLOGY; HEAVEN; INTERMEDIATE STATE; JUDGMENT, FINAL.

HEL'LA. A town in Asiatic Turkey. See HILLAH.

HEL'LADOTHE'RIUM (Neo-Lat., from Gk. Ἑλλάς, *Hellas*, Greece + θηρίον, *thērion*, diminutive of θήρ, *thēr*, wild beast). A fossil giraffe with hornless skull and legs of nearly equal length, skeletons of which have been found in the Pliocene deposits of Europe, Persia, and India. See GIRAFFE.

HELLANI'CUS (Lat., from Gk. Ἑλλάνικος, *Hellanikos*) (c.496-c.406 B.C.). A Greek logographer (q.v.) of the fifth century B.C., born at Miletus. Although a contemporary of Herodotus, Hellanicus's attitude was essentially that of the older Ionian logographers, rather than that of the historian. He traveled extensively, and the titles of his works show that he had an intimate knowledge of many parts of Greece. He wrote a chronicle based upon the records of the priestesses of Hera at Argos (Ἱέρειαι αἱ ἐν Ἄργει), and another based on the lists of victors at the Carneian games (Καρνεονῖκαι). He also composed special histories of a number of districts in Greece, such as the Ἀτθίς (history of Attica), Φορωνίς (history of Argos), Ἀσωπίς (history of Bœotia), *Arcadica*, *Æolica*, *Lesbica*, etc., as well as accounts of special events, such as the Trojan War (Τρωϊκά) and the Persian invasian (Περσικά). He is blamed by Thucydides and subsequent historians for inaccuracy in his chronological statements, but there can be no doubt that his work was employed by Herodotus and later historical writers. All that is preserved of his writings is given in Müller, *Fragmenta Historicorum Græcorum* (Paris, 1841-70). Consult Koehler, *Leipziger Studien zur klassischen Philologie*, xviii. (Leipzig, 1898).

HEL'LAS (Lat., from Gk. Ἑλλάς). In the Epos, a district of southern Thessaly, near Phthiotis, with which it is sometimes identified. As the name Hellenes (Ἕλληνες, or, at first, Πανέλληνες) came to be applied to the whole Greek race, so the name Hellas was applied to the lands where the Greeks were settled, and in a more restricted sense to the mainland of Greece, especially the district north of the Peloponnesus. The Hellenes, or Greeks, seem to have received this name as a collective title with the growth of the legend that Hellen (q.v.), son of Deucalion, was the father of the race. Originally it must have meant only the inhabitants of the little district of Hellas.

HELLBENDER. A large, ugly-looking, but harmless salamander (*Cryptobranchus Alleghaniensis*), which occurs in Ohio, Pennsylvania, Tennessee, and southward. It is also commonly known as 'alligator' and 'water-dog.' It is voracious, and feeds on crayfish, fish, and other water animals, and readily takes the bait from the fisherman's hook. It exudes much slime, and is consequently difficult to handle. It is tenacious of life, and can live for hours out of water. The spawn much resembles that of frogs, but is lighter in color. It may reach a length of about twenty inches. See Plate of SALAMANDERS.

HELLE, hĕl'lē (Lat., from Gk. Ἕλλη). In Greek mythology, a daughter of Athamas, King of Orchomenus in Bœotia, and the goddess Nephele ('a cloud'). When Athamas married Ino, daughter of Cadmus, Nephele punished the land by a drought. Ino plotted the sacrifice of Phrixus, brother of Helle, but Nephele rescued her children by giving them the ram with the golden fleece, on which they escaped over the sea to Colchis. While passing through the strait between Asia and Europe, Helle fell from the ram and was drowned. The strait was called Hellespont, or sea of Helle, in her honor.

HEL'LEBORE (Lat. *helleborus, elleborus*, from Gk. ἑλλέβορος, ἐλλέβορος). A name applied to a number of plants of different genera, but properly to the species of Helleborus, a genus which belongs to the order Ranunculaceæ, and which contains about a dozen species, most of which are natives of Europe. The species are perennial herbs, with short rootstocks and few stem-leaves; the leaves are deeply divided, and the flowers terminal. One of the best-known species is the black hellebore (*Helleborus niger*), which has evergreen leaves, and is so called from its black rootstock. Its flowers, which are white or tinged with red, appear very early in the season; in England, frequently during the winter, on which account it is called Christmas rose. The leaves and flower-stalks arise from the rootstock. In former times this plant was reputed as efficacious in the treatment of insanity, but it is little used at present. It has some medicinal properties, but in over-doses is an acrid poison. A second species, common in Europe, is the stinking hellebore (*Helleborus fœtidus*), which grows upon hills in England and elsewhere, has leafy stems, and greenish flowers tinged with purple. It is noted for its disagreeable smell. Green hellebore (*Helleborus viridis*), which has large, greenish-yellow flowers, is another common European species. It has escaped from cultivation in the eastern part of the United States. *Helleborus orientalis* is the species known to the ancients. To it was first attributed the virtue of a specific for insanity. It is particularly abundant in Greece and the Levant, and was formerly very plentiful about Anticyra, where the best was obtained. Of these different species there are many horticultural varieties, some of which are beautiful. On account of their early

HELLEBORUS NIGER.

flowering, they are planted usually in shrubberies and borders. Closely allied to the above, and often called winter hellebore, is *Eranthis hyemalis*, the winter aconite, a native of Central Europe introduced into England, and sparingly escaped in the United States. This plant is employed in horticulture in the same way as the species of Helleborus. It has a single large yellow flower surrounded by an involucre of a single leaf.

A third plant, to which the name white hellebore is given, is *Veratrum album*. This genus belongs to the order Liliaceæ, or, according to some authorities, to the Melanthaceæ. White hellebore has a leafy stem, 3 to 4 feet high, and a long compound panicle of yellowish-white flowers. It is a native of Central and Southern Europe, and abounds in mountainous regions. The root of this plant is an active, acrid poison, and is used in medicine. In a powdered state it is an important insecticide, and is especially valuable for dusting over currant-bushes as a protection against the currant-worm. The American hellebore (*Veratrum viride*) also known as swamp hellebore, Indian poke, and itch weed, is a common plant in wet grounds from Canada to Alabama. Its properties are similar to those of white hellebore. A species commonly known as *Veratrum Californicum* is found from the Rocky Mountains to the Pacific Coast. Its properties are doubtless similar to those of the other species, and it is reputed to be the cause of considerable loss to stockmen through its being eaten by stock. The active principle seems in all of the species to be the alkaloid veratrine, or a substance similar to it. Some pharmacologists restrict the production of veratrine to the related Schœnocaulon officinale, and call the corresponding alkaloid of Veratrum viride veratroidine.

HELLEBORE. The president of a medical school, in Foote's *Devil upon Two Sticks*. The part is one of the incarnations assumed by the Devil, and was generally taken by the author himself.

HEL'LEN (Lat., from Gk. Ἕλλην). In Greek tradition, the son of Deucalion and Pyrrha, and father of Dorus, Æolus, and Xuthus; from Æolus were descended the Æolians, from Dorus the Dorians, while from the two sons of Xuthus, Ion and Achæus, came the Ionians and Achæans. From Hellen came the collective name of the Greeks, Hellenes. The whole story is relatively late, being unknown to the Homeric poems, where the Hellenes are a tribe of the Phthiotis, and is probably a creation of the eighth century B.C. or later, when the feeling of national unity developed among the Greeks, and the name Hellenes received its later meaning. We are told that Hesiod and Archilochus were the first to call the body of Greeks Hellenes.

HELLENES, hĕl'lēnz. The name applied by ethnologists to the earliest Greek-speaking Aryans, who on their arrival in the peninsula found the land already inhabited by the Pelasgians, the eastern division of Sergi's Mediterranean species. The Pelasgi, excepting a few scattered groups, became Hellenized, the heterogeneous elements being fused with a Hellenic nationality, built upon a Pelasgic substratum and possessed of Hellenic culture. See GREECE.

HELLEN'ICA (Lat., from Gk. Ἑλληνικά, *Hellēnika*, neu. pl. of Ἑλληνικός, *Hellēnikos*, relating to Greece, from Ἑλλάς, *Hellas*, Greece). An historical work in seven books by Xenophon, taking up the history of Greece from the point at which the history by Thucydides ends, and covering the forty-eight years prior to the battle of Mantinea. The work is trustworthy and the most important authority for the period covered, but suffers from incompleteness, failure to men-

tion momentous events, and the prejudice of the author.

HELLENIC STUDIES, SOCIETY FOR THE PROMOTION OF. An English society, organized in 1879 for the advancement of the study of the Greek language, literature, and art, and for the perpetuation of the history of the Greek race in the ancient, the Byzantine, and the Neo-Hellenic periods. It has devoted itself to the collections of drawings, facsimiles, transcripts, plans, and photographs of Greek inscriptions, works of art, ancient sites and remains, and to organizing means for the pursuit of archæological researches in countries which at any time have been the sites of Hellenic civilization. The society issues annually the *Journal of Hellenic Studies*, which contains the results of the researches prosecuted under its auspices. It has members in every quarter of the globe. Among those who were active in the work of organization were: J. S. Blackie, Sidney Colvin, J. P. Mahaffy, A. H. Sayce, Sir Richard Jebb, Sir John Lubbock, and Hon. A. J. Balfour. The society has about 880 members, including foreign members in every quarter of the globe. The annual meeting of the society takes place in June.

HELLENIST (Gk. Ἑλληνιστής, *Hellēnistēs*, one who speaks Greek, from Ἑλληνίζειν, *Hellēnizein*, to speak or make Greek, from Ἕλλην, *Hellēn*, Greek, from Ἑλλάς, *Hellas*, Greece). In biblical and Jewish history, a Jew distinguished by the adoption or affectation of Greek thought, manner, or language. The word is found in the Bible only in Acts vi. 1; ix. 29; xi. 20 (cf. the Revised Version, margin), and in the last two of these passages the Codex Alexandrinus reads not Hellenist, but Greek (*Hellēn*). The latter term occurs rather frequently in the Greek version, chiefly in the Books of the Maccabees, the writings of Paul, and the Acts. There is little reference to the Greeks in Jewish literature prior to the time of Alexander the Great and his successors. Indeed, apart from the Wisdom of Solomon and Fourth Maccabees in the Greek Old Testament, and in the Epistle to the Hebrews, the Fourth Gospel, Second Peter, and to a lesser degree in Paul, in the New Testament, Greek thought did not essentially affect Judaism or primitive Christianity. The tone of the Bible is overwhelmingly Jewish, not Greek. Hellenism, which before the Maccabean revolt (c.150 B.C.) had stood to the Jew for what is characteristic of Greek culture, stands after that time also for what is anti-Jewish, Gentile, heathen. As the Greeks had divided the world into Greeks and barbarians, so now the Jews divided the world into Jews and Greeks. The term Greek (*Hellēn*) came to be used by the Jew not only specifically of Greeks as opposed to other nations (II. Mac. xi. 2; Rom. i. 16), but also generally of 'foreigners' (II. Mac. xi. 24; Gal. ii. 3); while Hellenist (*Hellēnistēs*) seems to refer now to Greek-speaking Jews (Acts vi. 1; ix. 29), now to Greeks as such in contrast with Jews (Acts xi. 19, 20, Codex Vaticanus). The reading of the Codex Alexandrinus in ix. 29 and xi. 20 is *Greeks*, not *Hellenists*—a reading which suggests that the terms are interchangeable, the context alone determining the nationality. Indeed, *Hellēn*, in the Fourth Gospel, may, like *Hellenist* in Acts vi. 1, ix. 29, refer not to Greeks as such, but to Greek-speaking Jews. See JEWS; and for the Hellenistic Greek dialect, see BIBLE.

HELLER, hĕl'lĕr, KARL BARTHOLOMAUS (1824-80). An Austrian naturalist, born at Mysliboŭitz, Moravia, and long professor in the Theresianum at Vienna. He is best known for his attempt to classify the fauna of Central America in his *Reisen in Mexiko in den Jahren 1845-48* (1853).

HELLER, STEPHEN (1814-88). An Hungarian composer and pianist, born in Budapest. When only nine he performed so successfully in public that he was sent to Vienna to continue his studies. In 1827 he played in Vienna, and in 1829 began a concert tour through Europe with his father. At Augsburg the young pianist fell ill, and was adopted by a wealthy family, with whom he lived until 1838. He had meanwhile continued his musical studies, and upon going to Paris became an intimate friend of Chopin, Liszt, and Berlioz. As a pianist, Heller now became well known, but his compositions gained favor more slowly. They are characterized by a fresh, natural beauty, forceful treatment of themes, and exquisite melody. In the originality of his themes Heller far outranks Mendelssohn, with whom, however, he has much in common. His studies for the pianoforte are among the very best, and are in universal use. With the exception of two visits to London, Heller lived in Paris from the time of his first journey there in 1838 to his death. For his *Life*, consult Barbadette (Paris, 1876; Eng. trans. 1877).

HEL'LESPONT. See DARDANELLES.

HELLEU, ā'lē', PAUL (1859—). A French dry-point artist, born at Vannes. He studied painting at the Ecole des Beaux-Arts, but became interested in dry point through James Tissot, who gave him his first instruction. He made this art his special study, and achieved a reputation for his poetical etchings, particularly his portraits of women and children. He works very quickly; often his plates have but a few lines, and there is an effect of improvisation about them that is characteristic and charming. Helleu is well known in the United States through special exhibitions.

HELLEVOETSLUIS, hĕl'le-vōōt-slois'. A fortified seaport of the Netherlands, situated on the southern coast of Voorne in the Province of South Holland (Map: Netherlands, C 3). It has a good harbor, an arsenal, shipyards, a naval school, and large artillery stores. Population, in 1900, 4299. Hellevoetsluis is noted as the place where William of Orange embarked for England in November, 1688.

HELL-FIRE CLUBS. The name given to certain associations in England, Ireland, and Scotland, formed of profligate persons of both sexes, which came into existence in the early part of the eighteenth century. Several were suppressed by royal proclamation in 1721.

HELL GATE. A passage, called by the Dutch settlers of New York Helle Gat, being that part of the East River between Long Island and Manhattan Island, also between Long Island and Ward's Island, and between Ward's Island and Manhattan Island. The reefs of rock in the main passage, some of which were islands at low

tide, caused with the rising and falling of the tide numerous whirlpools and eddies, which rendered navigation at times dangerous, always difficult, and for large ships impossible, although the depth in the tortuous channel might be sufficient. The East River receives the Sound tide from the east and the Sandy Hook tide from the south. The times as well as heights of these tides being different, additional force is imparted to these treacherous currents. It was claimed that one out of every fifty sailing vessels attempting to go through Hell Gate was more or less damaged by the rocks.

A survey was made in 1848 by Lieutenants Charles H. Davis and David Porter, of the United States Navy, and in their report they recommended the destruction by blasting of Pot Rock, Frying Pan, and Ways' Reef, which lie between Long Island and Ward's Island.

The first attempts at removing the obstructions in Hell Gate were made by M. Maillefert, with whom a contract was made by citizens of New York. He commenced work in August, 1851, and by surface blasting operated upon the most prominent surface of the rocks and reduced them to an average depth of about sixteen feet. Congress, in 1851, appropriated for the work $20,000 and placed it under the direction of Major Fraser. The method was by surface blasting, as had been practiced by M. Maillefert. The reefs in this channel are largely composed of a stratified gneiss, and the layers, being tipped up nearly perpendicular, were unevenly affected by the action of the water, the softer parts being worn away and the harder parts left in vertical sheets or points. In 1866 Gen. John Newton, of the United States Engineer Corps, was ordered to make a survey, and proposed the construction of a drilling scow which should be securely moored at the site of operations. The machine was constructed, and put into operation on Diamond Reef, near the mouth of the East River, in May, 1871. Coenties Reef was also operated on with this scow in alternation with the work on Diamond Reef. These operations proving satisfactory, the machine was taken to Hell Gate, where it was in operation nearly three years, and effected a great improvement in the channel.

The first really important engineering accomplishment was the removal by tunneling and blasting of Hallet's Point Reef, which extended from the Astoria shore into the East River. By means of diverging tunnels and transverse galleries the reef was thoroughly undermined and nitroglycerin in cans was introduced into a large number of holes drilled in the pillars supporting the roof and in the roof itself. After water was let into the mine the nitrogen was exploded and the reef was destroyed, the debris being removed by grappling and dredging, so that there was a depth of 26 feet at low water over the site of the reef. The explosion at Hallet's Point took place September 24th, 1876, and was followed by energetic prosecution of work on Flood Rock or Middle Reef, where similar tunnels were constructed. After over 21,000 feet of tunneling had been constructed and holes aggregating 113,102 feet had been drilled, 300,000 pounds of explosives were put into the holes, and water was let into the tunnel. The result of the explosion and subsequent dredging that took place October 10, 1885, was to provide a channel of uniform depth of 26 feet through Hell Gate.

HELLGRAMMITE FLY, or **HELLDEVIL**. See CORYDALIS.

HELLIN, ā-lyēn'. A district town of the Province of Albacete, Spain, situated 69 miles by rail from Murcia (Map: Spain, E 3). In its vicinity are sulphur springs and mines. The sulphur-mines have been worked since Roman times, and their exploitation is still the principal industry of the town. It is a market for agricultural products, and produces woolen textiles. Population, in 1900, 12,787.

HELLMANN, GUSTAV JOHANN GEORG (1854—). A German meteorologist and geographer, born at Löwen, and educated at Göttingen. In 1879 he was made assistant, and in 1882 temporary head of the Meteorological Institute of Berlin. He was vice-president of the Berlin Geographical Society, and a director of the *Meteorologische Zeitschrift*. Besides his contributions to the latter, Hellmann's more important works are: *Repertorium der deutschen Meteorologie* (1883); *Meteorologische Volksbücher* (1891); *Das Klima von Berlin* (1891); *Schneekrystalle* (1893); *Regenkarte der Provinz Schlesien* (1899); *Regenkarte der Provinzen Ostpreussen, Westpreussen und Posen* (1900); *Regenkarte der Provinz Brandenburg und Pommern* (1901); and the series *Meteorologische Neudrucke* (1893-1900).

HELLMESBERGER, hĕl'mĕs-bĕrK'ĕr. A family of Austrian musicians whose founder, GEORG (1800-73), was a celebrated violin-teacher in Vienna. In 1829 he became conductor of the Imperial Opera, and in 1833 a professor at the Vienna Conservatory. He made several successful tours and composed considerable music for the violin. His two sons, GEORG, Jr. (1830-52), and JOSEPH (1829-93), were talented violinists. The former produced two operas, *Die Bürgschaft* and *Die beiden Königinnen*, and made a tour through Germany and England. Joseph was first violin of the 'Hellmesberger Quartet' (1849-87); violin professor at the conservatory (1851-77), and director (1851-93); concertmeister at the Imperial Opera (1860); and soloist in the Court orchestra (1863). His son JOSEPH (1855—) is the most important member of the family. He was second violin in his father's quartet, and in 1887 succeeded him as leader. In 1878 he became a professor at the Vienna Conservatory, and after having been a violinist in both the Imperial and Opera orchestras, was made leader in 1884, and kapellmeister in 1887 of the Court Opera. His compositions are wholly dramatic, and include six operettas, produced at Munich, Vienna, and Hamburg; numerous ballets; and some incidental music.

HELLMUTH, hĕl'mo͝ot, ISAAC (1820-1901). An English clergyman, born at Warsaw, Poland, of Jewish parentage. He was educated at Breslau, became converted to Christianity, and entered the Anglican ministry in Canada. He founded Huron College and other schools, and was Bishop of Huron from 1871 to 1883. He then went to England to become Assistant Bishop of Ripon. In 1885 he was made rector of Bridlington, and in 1891 chaplain at Holy Trinity, Pau. Among his published works are: *The Genuineness and Authenticity of the Pentateuch* (1867); and a *Biblical Thesaurus* (1884).

HELLQUIST, hĕl'kvĭst, CARL GUSTAF (1851-90). A Swedish historical painter, born in Kungsör. He was a pupil of the Stockholm Academy, and studied under Lefebvre in Paris. He became professor at the Berlin Academy in 1886, and afterwards lived in Munich. His mannered historical pictures are usually of scenes from Swedish history. They include: "Disgraceful Entry of Sumanväder into Stockholm, 1526" (1878); "Sack of Wisby by Waldemar IV., 1361" (1882), both in National Museum, Stockholm; "The Death of Sten Sture" (1879); "The Embarkment of the Body of Gustavus Adolphus" (1885); and "Huss Going to the Stake" (1887).

HELLRIEGEL, hĕl'rē-gel, HERMANN (1831-95). A noted German agricultural chemist, born at Mausitz, in Saxony. In 1857 he became director of the agricultural experiment station of Brandenburg and Niederlausitz at Dahmę, from which he resigned in 1873, and in 1882 accepted a similar post at Bernberg, where he died. From 1873 to 1882 he was wanderlehrer at Bernberg. Among his many agricultural investigations with plants none rank in importance with his demonstration of the ability of leguminous plants to assimilate the free nitrogen of the air, and his discovery of the tubercles on the roots as the agency through which this takes place. The question of the ability of leguminous plants to use the nitrogen of the air had long been one of inquiry, and its settlement by him marked an epoch in the agricultural world. The important parts of these experiments he published in *Untersuchungen über die Stickstoffnahrung der Gramineen und Leguminosen* (Berlin, 1888), and *Ueber Stickstoffnahrung landwirtschaftlicher Kulturgewächse* (Vienna, 1890). See LEGUMINOSÆ. Consult Römer, *Hermann Hellriegel, Nachruf* (Leipzig, 1896).

HELLWALD, hĕl'vält, FERDINAND VON (1843-84). An Austrian historian of literature, born in Vienna. In 1862 he was employed in the Imperial Library there, studied the North Germanic dialects and literatures, and was sent to the Netherlands by the library. He published (1866) the *Voyage au Maroc 1640-41* by the painter Adrian Mathan, and (1873) the second part of *Spieghel historiael* by Jakob von Maerlant, which he discovered in the library at Vienna, and other valuable works. His own writings are: *Vlämisches Leben, Geschichten und Bilder* (1867); *Geschichte des holländischen Theaters* (1874); and *Geschichte der niederländischen Litteratur,* completed and edited by Schneider (1887).

HELLWALD, FRIEDRICH VON (1842-92). An Austrian writer on geography and the history of civilization; brother of Ferdinand von Hellwald, and born at Padua. He entered the Austrian Army in 1858, and was lieutenant of cavalry (1866) in the war with Prussia; from 1871 to 1873 at Augsburg, then till 1882 at Cannstatt, he was editor of *Das Ausland.* His many works, which are more popular than scientific, include: *Maximilian I., Kaiser von Mexiko* (1869); *Kulturgeschichte in ihrer natürlichen Entwicklung bis zur Gegenwart* (4th ed. 1896-98); *Die Erde und ihre Völker* (4th ed. 1897); *Naturgeschichte des Menschen* (1883-84); *Amerika in Wort und Bild* (1883-85); *Frankreich in Wort und Bild* (1884-87); *Die menschliche Familie nach ihrer Entstehung und natürlichen Entwicklung* (1889); and the posthumous work, edited by Möller, *Kulturbilder* (1894).

HELM (AS. *helma,* Icel. *hjalma,* helm). The steering apparatus of a vessel. It consists of a rudder and tiller, and, in ships, of a steering wheel supplemented in large vessels by a steering engine. The rudder, which may be of either iron or wood, is the part of the apparatus which is in the water. Its shape is variable, but is usually nearly that of a rectangle, with rounded corners, and in old ships slopes upward at the top from the after edge toward the rudder-post, to which it is ordinarily pivoted along the forward edge. In many modern ships the rudder is more or less perfectly balanced as to pressure by having the rudder post or pivot nearly in the centre (but always somewhat nearer the forward edge); this reduces the power necessary to put it over and keep it there. The rudder is supported by *pintles* or arms bent at right angles and projecting from the rudder-post; by a skeg or shoe at the heel; and by a collar around the rudder-head. The tiller is the lever which works the rudder. It either passes through a slot in the rudder-head or fits over it, and consists of a straight bar of wood or steel; or in some ships it is replaced by a *quadrant,* which consists of a sector of a circle secured to its centre, which is the rudder post or head, and having chains attached to its corners and passing around its surface before leading to the wheel or engine. The *wheel* consists of one or more wheels, with eight to sixteen spokes projecting through the rims to form handles, and a barrel or axle around which the wheel-ropes are wound. One wheel-rope winds around its forward end in one direction and the other around the after end in the opposite direction; so that one unwinds as the other winds up, when the helm is put over to one side.

When steering engines are used, the rudder and tiller are large, or when it is desired to effect quick working of the rudder by affording extra power. The engines are operated by electric gear in the pilot-house or on the bridge, or by means of small wire ropes leading from the valve-gear of the engine to a wheel located in those places. In steering, the terms used to designate the position of the rudder, except in Germany, refer to the placing of the tiller. Thus, when the *helm* is *a-port* the tiller is pressed over toward the port side of the ship; similarly, we have the helm *amidships* and *a-starboard;* the helm is *a-lee* when the tiller is pressed over to the lee side, that is, the side away from the wind; the helm is *a-weather* when over toward the other side, and it is *hard a-port, hard a-starboard, hard a-lee,* etc., when it is pressed as far over as it will go in that direction. To *right* the helm is to put the tiller amidships; to *shift* it is to put it from one side to the other. To *ease* the helm is to let the tiller come more nearly amidships so as to ease the strain on the tiller. When a vessel is turning under control of the rudder, to *meet her* with the helm is to shift the helm and prevent her from turning any farther. *Nothing to starboard* (or port) is a direction to the helmsman cautioning him to steer as good a course as possible, but in any case not to run to starboard (or port) of the desired course.

HELMSMAN. In large ships without steering engines two or more men are necessarily stationed at the wheel; in sailing ships the man on the weather side is the helmsman, and the others

are assistants. In men-of-war a quartermaster is in charge of the steering; he keeps watch of the course, sees that the helmsman steers correctly, and tends to other matters, such as reading the barometer, thermometer, and hygrometer, and filling in the columns of the log every hour (if there is no junior officer).

HELM, hĕlm, ISRAEL (c.1615-c.1695). A Swedish colonist in America. Probably a soldier in Sweden, he was one of the earliest settlers on the Delaware; lived at Passyunk (now Philadelphia), where he was collector of customs (1659); in 1668 became a member of Captain Carr's council, and was one of the number who received a grant of Calken Hook in the same year; and, about 1674, was justice 'for the river' and probably a member of the earlier Upland Court. Helm did much service as interpreter in conferences with the Indians, especially in 1675, in the meeting of the New Jersey Indians, Governor Andros, and the Swedish authorities at New Castle, Del. He is possibly to be identified with Israel Holms, an old Swede, on whose authority Rudman tells of the end of Peter Minuit.

HELMBOLD, hĕlm'bôlt, LUDWIG (1532-98). A German theologian and hymnologist, born at Mühlhausen, Thuringia, and educated at Leipzig and Erfurt. At the latter university he taught (1554-86), but was finally forced out because of his bitter opposition to the Catholic members of the faculty. He went back to Mülhausen, and became superintendent of the town. He was a skillful Latin versifier, and besides Latin hymns wrote spiritual songs in the vernacular, which won him the name 'the German Asaph'; among these mention should be made of: *Von Gott will ich nicht lassen Du Friedefürst, Herr Jesu Christ;* and *Es stehn vor Gottes Throne.* For his biography, consult Thilo (Berlin, 1851).

HEL'MER, NORA. The heroine of Ibsen's drama of modern life, *A Doll's House.* She is, at the opening of the play, a thoughtless superficial creature, who is alternately petted and scolded by her narrow-minded husband, and thus becomes wholly unfitted to face or even comprehend life's realities. She impulsively commits a heinous crime, and only then discovers her own and her husband's actual natures. She escapes paying the legal penalty, but leaves her home with the determination to learn the truth regarding life, humanity, and herself.

HELMERS, hĕl'mĕrs, JAN FREDERIK (1767-1813). A Dutch poet, born at Amsterdam. His first work, a tragedy, was moderately successful, and he followed it by a poem, *Socrates* (1790). But his patriotic verses, published in 1810, and *The Dutch Nation* (1812), an heroic poem in six cantos, are what made his reputation. At a time when Holland was under French rule, these fiery patriotic poems revived the nation's enthusiasm. A posthumous volume of his poetry appeared in 1815.

HEL'MERSEN, GRÉGORY PETROVITCH (1803-85). A Russian geologist, born at Duckershof, in the Government of Livonia. He was educated at Dorpat and various German universities, from 1838 to 1863 was professor of geognosy and geology in the school of the mining engineer corps, and from 1865 to his retirement in 1872 director of the Mining Institute. He attained the military rank of lieutenant-general, and was a member of the Saint Petersburg Academy of Sciences. In 1829 he accompanied Alexander von Humboldt in the exploration of the lower courses of the rivers Volga and Ural. His chief published writings were his contributions to the extensive scientific work on the Russian Empire and the adjacent Asian countries, published by the Saint Petersburg Academy of Sciences, under the editorship of himself and Von Baer (26 vols., 1839-71).

HEL'MERT, FRIEDRICH ROBERT (1843—). A German geodesist, born at Freiberg, Saxony. He was educated at the Polytechnic of Dresden and Leipzig University, in 1869-70 was observer in the Hamburg Observatory, and in 1870 became instructor in geodesy in the Technical College of Aix-la-Chapelle. In 1886 he was appointed director of the Royal Geodetic Institute of Prussia, and in 1887 professor of geodesy in Berlin University. In addition to numerous contributions to the *Astronomische Nachrichten*, the *Zeitschrift für Vermessungswesen*, and other technical periodicals, he published several volumes, including *Die Ausgleichungsrechnung nach der Methode der kleinsten Quadrate* (1872), and *Die mathematische und physikalische Theorien der höhern Geodäsie* (1880-84).

HELMET (diminutive of *helm*, Goth. *hilms*, OHG. *helm*, Ger. *Helm*, helmet; connected ultimately with Skt. *śarman*, protection, AS., OHG. *helan*, Ger. *hehlen*, Lat. *celare*, Gk. *καλύπτειν*, *kalyptein*, to hide, OIr. *celim*, I hide). A covering wholly, or in part, of metal, used in warfare to protect the head. Such protections have been used from the earliest times, and have been made in many different forms. The simplest form is in the shape of a close-fitting skull-cap. Such helmets are represented on the Assyrian monuments. They were of metal, and sometimes were provided with a defense for the neck. A tendency toward decoration is shown in some of the bas-reliefs, where warriors are represented with elevated helmets terminating in a point. The Greeks of the Homeric age are occasionally described as wearing very elaborate helmets. In the *Iliad*, Agamemnon places on his brow a lofty helm, four-crested, double-peaked, with horsehair plumes. At a later period the Greeks used helmets of different shapes, usually with protections for the face and neck, and sometimes surmounted by figures of birds or animals. Many of these were richly decorated. The Etruscans wore bell-shaped helmets, which often had projecting pieces like wings, which gave them a very peculiar appearance. The Romans ordinarily used a plain, undecorated skull-cap, strengthened by cross-bands of iron, and with a neck-guard. On the march this helmet was removed and carried slung from the right shoulder. Under the later Empire the Greek fashion of helmet became common. The Anglo-Saxons appear to have used a skull-cap with a figure of a boar on top. The Franks, on the contrary, used no protection for the head. But under Charles the Great the Imperial household guards wore helmets of a triangular shape, surmounted by conventionalized scrollwork or foliage. In the Bayeux tapestry the warriors wear conical helmets, with a straight piece descending in front to protect the nose. The most characteristic helmet of the Middle Ages, which was in vogue from the twelfth to the fourteenth century, was cylindrical in form and covered the head and a part of the neck. There were round openings

through which the warrior could see and breathe. It was so heavy that it was put on only at the moment of combat, and only when the knight fought on horseback. It was a very effective defense against a cut from a mediæval weapon, but no protection against bruises. In great contrast with this was the headpiece worn by the Saracens, with whom the Crusaders came into contact. They used light globular helmets of iron, richly ornamented and adorned with plumes. In the fourteenth century the heavy helmet was to a great extent discarded by the Western knights for the lighter bascinet (q.v.); but it continued to be used in tournaments until the eighteenth century. As the employment of firearms became more general, helmets naturally lost their utility, especially as regards the face. Those still remaining are, in the equipment of troops, limited for the most part to heavy cavalry, afford no protection to the face, and must be considered as rather for ornament than use. Firemen wear a heavy headpiece of leather and brass to protect them as far as possible from falling brands and cinders at conflagrations. In India and other hot climates, helmets of white felt, with the additional screen of rolls of linen, are worn by the military as well as by members of the civil service to protect them from the hot rays of the sun.

In heraldry, the helmet, from the early simple form known as the Norman, came at a later period to vary in shape according to the degree of the person who bore it, and helmets were set over coats of arms to bear the crest and to indicate by their form the rank of the bearer. The following forms of helmet are in use in English heraldry: (1) The helmet assigned to the King and to the princes of the blood royal; it is full-faced, composed of gold, and has the visor divided by six projecting bars. (2) The helmet of a duke or marquis is of steel, with five bars of gold. (3) The helmet of earls, viscounts, and barons is of silver, adorned with gold, has five bars, and is set in profile. (4) The helmet of knights and baronets is of steel, full-faced, with the visor thrown back and without bars. (5) The helmet of esquires is always presented in profile, and is of steel with the visor closed. These distinctions are of comparatively recent date. A much greater variety of helmets is in use in Continental heraldry. A helmet is never placed over the arms of any woman except the sovereign. See HERALDRY.

HELMET-BIRD. One of the names given to the turacos (q.v.), on account of their high, brilliantly colored crests. An Australian cockatoo, the ganga (q.v.), is called 'helmet-cockatoo,' and a genus of African shrikes (Prionops) are called 'helmet-shrikes' for a similar reason.

HELMET-CRAB. See KING-CRAB.

HELMET-CREST. A South-American humming-bird of the genus Oxypogon (in which there are three species) which has a tall, pointed, erectile crest suggesting a helmet-plume, and also chin-feathers resembling a long beard. See Plate of HUMMING-BIRDS.

HELMET-HORNBILL. See HORNBILL.

HELMET-QUAIL. A California crested quail (q.v.).

HELMET-SHELL (so called from the resemblance of the shell to a helmet). One of a genus (Cassis) of large, active gastropods, allied to the strombs, and typical of the family Cassidæ. They have thick, heavy shells, boldly ridged, and often handsomely colored, and some species, as the black helmet-shell of the West Indies (erroneously named *Cassis Madagascarensis*) and *Cassis glauca* of the East Indies, are extensively used for making cameos (q.v.), because the shell is in layers of different colors. About fifty species are known, mostly Oriental; but some inhabit the Mediterranean and West Indian waters, and all are carnivorous, preying mostly on bivalve mollusks.

HELMHOLTZ, hĕlm'hôlts, HERMANN VON (1821-94). A German physicist, one of the most distinguished scientific men of the nineteenth century, and an authority in several departments of science. He was born at Potsdam, and studied medicine in Berlin, subsequently serving as a surgeon in the army (1843-47). He then became assistant in the Berlin Anatomical Museum, and a professor of physiology, occupying chairs at Königsberg (1849-58), at Bonn (1855-58), and at Heidelberg (1858-71). In 1871 he became professor of physics at the University of Berlin. For several years prior to his death Helmholtz was president of the Physikalisch Technische Reichsanstalt at Charlottenburg, and supervised the researches of this important institution. He was equally distinguished in physiology and in experimental and mathematical physics. He was selected as honorary president of the International Congress of Electricians held at Chicago in 1893, and it was said then of him that he might have been easily first in several other departments of human knowledge quite distinct and apart from that of electricity. His physiological works are principally connected with the eye and the nervous system. As a physicist Helmholtz first attracted attention from the scientific world by a paper which he presented to the Physical Society of Berlin in 1847 on the "Conservation of Force." This paper, regarded by many as a fantastic speculation, provoked considerable discussion and established Helmholtz's reputation. His invention of the ophthalmoscope (q.v.), an instrument which enables an observer to examine the interior of the eye, gave to the oculist a most useful device now in universal use. His wonderful monograph on *Sensations of Tone* was first published in 1863, and is the most important work on acoustics of the nineteenth century. To Helmholtz is due the generally accepted theory of color, which is that of Young (q.v.) in a modified form, wherein the perception of color depends upon the three fundamental sensations of red, green, and violet or blue. He also developed the electro-magnetic theory of light in a manner which indicated its general possibilities. Another important research was on the theory of vortex motion, and not only did he discover the fundamental properties of such motion, but he so stated his conclusions that they have been used to explain various physical phenomena and in hypotheses concerning the constitution of matter and the luminiferous ether. He was the inventor of many ingenious methods in practical physics, as well as new apparatus. In 1883 the German Emperor conferred upon him a title of nobility. He visited the United States in 1893, and died in Berlin, September 8, 1894. The first edition of *Die Lehre von den Tonempfindungen, als Physiologische Grundlage*

für die Theorie der Musik, appeared in 1863, and several other editions and translations have since been published. The *Handbuch der physiologischen Optik* was published in 1867, and Helmholtz's *Gesammelte wissenschaftliche Abhandlungen* in 1882-83. Helmholtz was a contributor to the leading scientific journals of the world, and was the recipient of many honors. An interesting biographical sketch, by Prof. A. W. Rücker, F.R.S., was published in the *Fortnightly Review* for November, 1894, and reprinted in the *Smithsonian Report* of the same year.

HELMOLD, hĕl'mōlt. A twelfth-century German historian of the Slavs. He was born in Holstein, and was a priest at Bosau. He was intimate with Gerold, the Bishop of Lübeck, who had done missionary work among the Slavs, and who urged him to write a history of the wars with them and the missions among them. This history, *Chronica Slavorum*, covered the period from Charlemagne to Helmold's own time and the days of Henry the Lion (1772), and was continued to 1209 by Arnold of Lübeck (q.v.). It is best edited by Lappenberg (1868), separately, and in vol. xxi. of *Monumenta Germaniæ*.

HELMOLT, hĕl'mōlt, Hans F. (1865—). A German editor and historian, born at Dresden. He obtained a university education, and was appointed to an editorial post in the Bibliographic Institute at Leipzig. His publications include historical studies, such as *König Ruprechts Zug nach Italien* (1892), and *Fabricius und Siber* (1895), and the compendious *Weltgeschichte* (1899-1901), a work based on an ethnographic method, in the preparation of which he was assisted by German and other specialists.

HELMOND, hĕl'mōnt, *Fr. pron.* ĕl'mōN'. A town in the Province of North Brabant, Holland, situated on the Zuid Willems Canal, 23 miles by rail northwest of Venlo (Map: Netherlands, D 3). There are a number of extensive textile mills, dyeing establishments, cigar-factories, and various other manufacturing establishments. Population, in 1890, 9029; in 1900, 11,436.

HELMONT, hĕl'mōnt, Jan Baptista van (1577-1644). A Belgian physician and chemist, born at Brussels. He studied at Louvain, and on the completion of his education accepted the chair of surgery in that university, the duties of which he discharged for two years. The study of the work of Paracelsus seems to have turned his attention to chemistry and natural philosophy, and in the pursuit of these sciences he spent several years in different universities of Italy and France; after which he returned home, married Margaret van Ranst, a noble lady of Brabant, and settled down at his estate near Vilvorde, where he spent the remainder of his life in investigations of various kinds. Writers of the history of chemistry regarded him as one of the greatest chemists who preceded Lavoisier. He paid much attention to the study of gases, and is supposed to have been the first to use the word *gas* as a generic name for all elastic aëriform fluids. Of these gases he distinguished several kinds. He was also the first to take the melting-point of ice and the boiling-point of water as standards of the measurement of temperature. In his works the term 'saturation' was first employed to signify the combination of an acid with a base, and he was an early investigator of the chemistry of the fluids of the human body. Along with other physiologists of his day, he speculated much on the seat of the soul, which he placed in the stomach. His reasons are chiefly these two: (1) It cannot exist in the brain, because, as he thought, that organ contains no blood; (2) it does exist in the stomach, because, when we hear bad news, we lose our appetite.

The most important of his works is his *Ortus Medicinæ*, which was published by his son, four years after his death; it passed through a very large number of editions, and was translated into Dutch, French, German, and English. A curious volume, containing translations of some of his works, was also published by W. Charlton, in 1650, under the title of *The Ternary of Paradoxes; the Magnetic Cure of Wounds; the Nativity of Tartar in Wine; and the Image of God in Man.* See Chemistry.

HELMSTEDT, hĕlm'stĕt. A town in the Duchy of Brunswick, Germany, situated 25 miles by rail from the city of Brunswick (Map: Germany, D 2). It was formerly famous for its university, founded here in 1575, and suppressed in 1809. The university buildings now contain the remnants of the university library. Helmstedt manufactures agricultural machinery, pottery, woolens, soap, etc. About two miles from the town are the Helmstedt springs, whose waters, containing iron salts, are much used. Population, in 1890, 10,955; in 1900, 14,259.

HEL'MUND, or **HIL'MEND**. The largest river of Afghanistan. It rises in the Koh-i-Baba chain, and flows southwest, receiving numerous tributaries by which it drains the southern part of the country (Map: Asia, Central, H 5). It discharges into the lake, or rather swamp, of Savaran, near the Persian frontier. Its total length is estimated at over 600 miles. The channel of its lower course is very wide and deep, but is filled only during the summer. The region traversed by the lower course of the Helmund is well populated, and the water-power of the river is used by numerous mills.

HEL'MUTH, William Tod (1833-1902). An American homeopathic physician. He was born in Philadelphia, and studied medicine there and in San Francisco. In 1888 he received the degree of LL.D. from Yale. He was dean and professor of surgery in the New York Homeopathic Medical College, had several hospital positions, and published numerous essays, both literary and medical, such as: *Scratches of a Surgeon* (1879); *A Steamer Book* (1880); *Diphtheria; Medical Pomposity; System of Surgery; Suprapubic Lithotomy;* and some verses, *With the Pousse-Café.*

HE'LODER'MA (Neo-Lat., from Gk. ἧλος, *hēlos*, nail, wart + δέρμα, *derma*, skin). A genus of North American lizards, with two species, of which one is the poisonous Gila monster. It represents, according to Cope, a family (Helodermatidæ) and superfamily (Helodermatoidea), characterized prominently by the fact that the eight to ten acrodont teeth in each jaw are anchylosed by oblique bases, and each is fang-like and grooved both before and behind, as if designed for conducting fluid poison. For full structural details, consult Cope, *Crocodilians, Lizards, and Snakes* (Smithsonian Institution, Washington,

D. C., 1900); for external appearance and habits, see GILA MONSTER.

HELOÏSE, ā'lō'ēz'. See ABÉLARD.

HĒ'LOS (Lat., from Gk. Ἕλος, from ἕλος, *helos*, marsh). A town of Laconia, near the coast and a short distance east of the mouth of the Eurotas, said to have been founded by Heleus, son of Perseus. When the Dorians invaded the Peloponnesus, Helos defended itself with great stubbornness; it was finally taken and the inhabitants were made slaves. In Strabo's time it had become a village, and when Pausanias visited it it was already in ruins. The Helots were supposed to have received their name from this town; but the most probable view is that the ethnic term is related to the root ἑλ-, *take*. The plain of the lower Eurotas is still called *Helos*. There were several other towns of this name in ancient Greece—one mentioned in the *Iliad*, and one situated in Argolis.

HELOTS, hē'lots *or* hĕl'ots (Lat. *Helotæ*, from Gk. Εἵλωτες, *Heilōtes*, or Εἱλῶται, *Heilōtai*; probably connected with ἑλεῖν, *helein*, to seize, less plausibly with Ἕλος, *Helos*, a town of Laconia, whence the first Helots were said to have been enslaved). The lowest of the three classes into which the population of ancient Laconia was divided. The Helots were serfs of the soil, the property of the State, by whom alone they could be freed, but assigned to individual Spartans for the cultivation of their allotments of land. If the Helots were originally the descendants of the pre-Dorian population, the distinction of dialect and descent was early lost, for there is no indication of any social or linguistic difference between them and the ruling Spartans. The Helots paid the Spartan proprietors a fixed amount of produce, but could keep the remainder, and were thus enabled to acquire property. In fact, in general appearance and intelligence they seem to have been much like the free village population in other parts of Greece. In war they served as light-armed troops or on shipboard, and after the Peloponnesian War were sometimes employed in the heavy infantry, especially in Asia Minor. They were subject to harsh treatment, and were in the absolute power of the Ephors, though many of the ancient stories are scarcely trustworthy. Their great superiority in numbers and their known discontent rendered them objects of suspicion; and during the Peloponnesian War 2000 of them, who claimed to have rendered distinguished services, were freed and then secretly murdered (see Thucyd. iv. 20). The Spartan secret service (κρυπτεία), in which the young men were sent singly through the land to endure hardships and watch symptoms of discontent, kept the Helots under close observation, and any who showed special strength or intelligence are said to have been secretly assassinated. The statement that the Ephors annually declared formal war upon the Helots is doubtless an error.

HEL'OTISM (from Lat. *Helota*, Gk. Εἱλώτης, *Heilōtēs*, or Εἵλως, *Heilōs*, Helot). A symbiotic relation in which one subject (see SYMBIOSIS) is regarded (perhaps somewhat fancifully) as enslaved by another. This relation differs from parasitism in that the enslaved form is not necessarily harmed; it may even be benefited. Lichens (q.v.) have been given as the type of helotism, the alga being regarded as enslaved by the fungus.

HELP. The character in Bunyan's *Pilgrim's Progress* by whom Christian is rescued from the Slough of Despond.

HELP'ER, HINTON ROWAN (1829—). An American author and railway projector. He was born near Mocksville, N. C.; graduated at Mocksville Academy in 1848, and from 1851 to 1854 lived in California. In 1857 he published a book entitled *The Impending Crisis in the South, and How to Meet It*, which perhaps did more to arouse a widespread opposition in the North to the institution of slavery than any other book except *Uncle Tom's Cabin*. This book was dedicated to the 'non-slaveholding whites' of the South, and was written to prove that, wholly aside from its immorality, slavery was an economic curse. Between 1857 and 1861 nearly 150,000 copies of the book were circulated, and in 1860 the Republican Party distributed it as a campaign document. From 1861 to 1866 Helper was United States Consul at Buenos Ayres, Argentine Republic, and afterwards devoted his attention chiefly to the promotion of his projected intercontinental railway, or 'Three Americas Railway,' to extend eventually from Bering Sea to the Strait of Magellan. In addition to *The Impending Crisis*, his publications include: *The Land of Gold* (1865); *Nojoque: A Question of a Continent* (1867); *The Negroes in Negroland, the Negroes in America, and the Negroes Generally* (1868); *Oddments of Andean Diplomacy* (1879); and *The Three Americas Railway* (1881).

HELPS, Sir ARTHUR (1813-75). An English essayist, born at Streatham, Surrey. He was educated at Eton, and at Trinity College, Cambridge, where he graduated B.A. in 1835 and M.A. in 1839. He obtained a post in the civil service, but resigned in 1841 and retired to the country, where he cultivated his taste for literature. In 1860 he was appointed clerk of the Privy Council, a post which he held until his death. For Queen Victoria he edited the speeches of the Prince Consort (1862), and prepared for the press her own Highland journals (1868-69). After beginning his literary career in 1835 with a series of aphorisms entitled *Thoughts in the Cloister and the Crowd*, Helps attempted the essay, the novel, the drama, and history. With the drama and the novel he failed utterly; with history he succeeded moderately. In this field his best work is represented by *Las Casas* (1868), *Columbus* (1869), *Pizarro* (1869), and *Cortes* (1871)—biographies which grew out of his *Conquerors of the New World and Their Bondsmen* (1848-52), and *The Spanish Conquest in America* (4 vols., 1855-61). By his essays he won his contemporary fame, especially by *Friends in Council* (1st series 1847; 2d series 1859). It consists of conversations on social and intellectual questions. Helps exhibits throughout these dialogues acuteness, humor, a satire which gives no pain, and a quiet depth of moral feeling and sense of man's social responsibilities.

HELSINGBORG, hĕl'sĭng-bōr-y'. A fortified seaport of Sweden, situated at the narrowest point of the sound, opposite the Danish town of Elsinore, with which it is connected by ferry (Map: Sweden, E 8). Several railroad lines run into the town, and it carries on a flourishing trade with Denmark. It exports iron ore, bricks, earthenware, grain, and fish; imports coal, min-

erals, gun-metal, and fertilizers. It has considerable manufactures of sugar, chemicals, and machinery, and has a slaughter-house and shipbuilding yards. Population, in 1901, 24,670. Helsingborg has played a prominent part in the Scandinavian wars. It was almost destroyed in the war between Sweden and Denmark during the reign of Charles XI., and was the scene of a Danish defeat at the hands of Swedish peasants in 1710.

HELSINGFORS, hĕl'sĭng-fôrs. The capital of the Grand Duchy of Finland, as well as of the Government of Nyland (Map: Russia, B 2). It is beautifully situated on a peninsula on the Gulf of Finland, 191 miles west of Saint Petersburg by sea. The entrance to the harbor is protected by a series of formidable batteries, called the fortifications of Sveaborg, and consisting of seven strongly fortified islands and numerous islets, while the harbor itself is further defended by two forts. Helsingfors is next in importance to Cronstadt as a naval station on the Baltic, and the largest and handsomest town of Finland. Its streets are broad and regular, and there are a number of handsome squares. Of the public buildings, the most prominent are the residence of the Governor, the Senate House, the university buildings, the Lutheran Church of Saint Nicholas, the Russian Church (completed in 1868), the Athenæum (built in 1887), with a picture gallery, and the new theatre. The university, originally founded at Åbo in 1640, and removed to Helsingfors in 1829, comprises four faculties, with over 2500 students, a library of 190,000 volumes, a hospital, a zoölogical and botanical museum, a botanic garden, and a valuable observatory. Another prominent educational institution is the Polytechnical Institute. Helsingfors is the seat of many learned societies. Since 1840 Helsingfors has been a favorite bathing-place, and attracts many visitors from Saint Petersburg during summer. The town carries on a considerable trade in agricultural and dairy products with Saint Petersburg, England, and Swedish and German ports. It has manufactures of beer, sugar, tobacco, liquors, carpets, linen, etc. Helsingfors is the seat of the Governor-General of Finland, the Finnish Diet, and numerous consular representatives, including one from the United States. Population, in 1900, 93,217, of whom over 50 per cent. are Swedes, nearly 43 per cent. Finns, and the rest Russians and Germans.

Helsingfors was founded by Gustavus I. of Sweden in the middle of the sixteenth century, a short distance inland; it was removed to its present site in 1642. It was fortified in 1729, and came into the possession of Russia in 1809. In 1812 it became the capital of Finland. During the Crimean War it was bombarded for two days and nights by the allied fleet without any appreciable injury to its fortifications.

HELSINGÖR, hĕl'sĭng-ör. A seaport of Zealand, Denmark. See ELSINORE.

HELST, hĕlst, BARTHOLOMEUS van der (c.1611-70). A Dutch portrait painter. His birthplace is uncertain, being assigned to Haarlem and to Dordrecht, and the year of his birth falls between 1611 and 1614. He is reputed to have been a pupil of Frans Hals (q.v.) at Haarlem, and a few of his works, indeed, show this influence. But his art on the whole was directly the opposite of Hals's, and he was more influenced by his other master, Nicolaes Elias of Amsterdam. The researches of Scheltema show that he was living in Amsterdam in 1636, and probably much earlier. There he married the attractive Constantia Reinst, and in 1654, in conjunction with Nicolaes de Helt Stokade, he founded the Painters' Guild of Saint Luke. He died at Amsterdam, December 16, 1670.

His best-known work is the "Banquet of the Civic Guard," now in the Museum of Amsterdam, which was painted to represent the celebration of the Peace of Westphalia in 1648. It contains twenty-four full-length portraits, characteristic, well modeled, and rich in color. In the same museum are the "Syndics of the Brotherhood of Saint Sebastian" (1663), of which there is a replica in the Louvre; the four "Syndics of the Marksmen;" the "Company of Captain Rogloff Bicker" (1639), thirty-two figures in all; the portraits of the Princess Maria Henrietta Stuart, Burgomaster Andries Bicker, Admirals Kortenaar, Van Ness, and others. Among his other portraits are those of a "Protestant Dame" (1638), and of Paul Potter, at The Hague; a "Lady in Blue," in the National Gallery of London; Admiral Van Tromp, at Munich; and the portrait of the artist in the Uffizi, Florence. In America there are portraits of an "Unknown Lady," in the New York Historical Society, and of a "Dutch Burgomaster," in the Metropolitan Museum, New York. The heads of Helst's portraits are well characterized, and all the details, especially the hands, are carefully carried out, though without sacrifice of breadth. His color is clear and powerful.

HEL'STON, DOCTOR MATTHEWSON. The rector of Briarfield, in Charlotte Brontë's novel *Shirley*, the uncle of Caroline, and a man of imperious temper though upright principles. The character was suggested in part by Patrick Brontë, the author's father, and in part by a friend of his, Mr. Roberson, Vicar of Heckmondwike.

HELVE'DIUS. The nom-de-plume signed by James Madison to his five essays, published in various public journals (1793-96), criticising the foreign policy of the Administration, and replying to the letters of Hamilton, signed 'Pacificus.'

HELVELLYN, hĕl-vĕl'ĭn. One of the highest mountains in England, 3118 feet high, in the Lake District, Cumberland, between Keswick and Ambleside (Map: England, C 2).

HELVET'IC CONFESSIONS. See CREEDS AND CONFESSIONS.

HELVETIC REPUBLIC. See SWITZERLAND.

HELVE'TII (Celtic, possibly connected with Welsh *elw*, gain). A Celtic people inhabiting, according to Cæsar, the region between the Jura Mountains on the west, the Rhône on the south, and the Rhine on the east and north, the region corresponding closely with the western part of modern Switzerland. They are first mentioned as defeating a Roman army in B.C. 107, and in 101 they accompanied the Cimbri on their invasion of North Italy. The great event in their history is their attempted irruption into Gaul, in which they were repulsed by Cæsar. They collected three months' provisions, burned 12 cities, 400 villages, and all isolated dwellings, and made a general rendezvous by Lake Leman,

in the spring of B.C. 58. Cæsar hastened to Geneva, destroyed the bridge there, raised two legions in Cisalpine Gaul, and when the Helvetians sent delegates to demand a passage delayed them until he had built a wall along the Rhône 19 Roman miles in length, flanked with redoubts. Having vainly attempted to pass this barrier, the Helvetii took another route, but were followed and defeated with a terrible slaughter at Bibracte (modern Mont-Beuvray, in Burgundy), and the remnant were obliged to return to their own country, where they became subject to the Romans. Of 368,000 who left their homes, according to Cæsar, including 92,000 fighting men, only 110,000 returned. In the commotions which followed the death of Nero, the Helvetians met with another catastrophe. Remaining faithful to Galba, they were attacked by Cæcina, a general of Vitellius, who gave them over to the rapacity of his legions. From this time they scarcely appear as a distinct people.

HELVÉTIUS, hĕl-vē'shĭ-ŭs, *Fr. pron.* ĕl'vā'-sē'ŭs', CLAUDE ADRIEN (1715-71). A noted French encyclopædist. He was born in Paris in 1715, educated at the Collège Louis-le-Grand, and after some practical training at Caen appointed at the age of twenty-three to the lucrative office of farmer-general; but as he was of a very humane and gentle disposition, the cruel and odious duties connected with the post decided him to resign it subsequently for the situation of chamberlain to the Queen's household. He wearied of the idle and dissipated life of the Court, and marrying in 1751 the daughter of the Comte de Ligneville, he withdrew to a small estate at Voré, where he spent the most of his life in the education of his family, the improvement of his peasantry, and literary labors. In 1758 appeared his celebrated work, *De l'esprit*, in which he endeavored to prove that sensation (*sensibilité*) is the source of all intellectual activity, and that the grand lever of all human conduct is self-satisfaction. But he admits, at the same time, that self-satisfaction assumes different forms; e.g. the self-satisfaction of a good man consists in the subordination of private to more general interests—first to the circle among which he lives, then to the community, and finally to the world at large. The book was denounced by the doctors of the Sorbonne, and condemned by the Parliament of Paris to be publicly burned. He then went to England and to Germany, where Frederick II. received him with distinction. He died in Paris, December 26, 1771, leaving behind him, besides some other writings, a work called *De l'homme, de ses facultés intellectuelles, et de son éducation* (published 1772). His collected works were published in Paris in 1791, in 14 volumes. Consult: Morley, *Diderot and the Encyclopædists* (London, 1878); Avezac-Lavigne, *Diderot et la société du Baron d'Holbach* (Paris, 1875).

HELVIG, hĕl'vĭK, AMALIE VON (1776-1831). A German poet, born Amalie von Imhoff, at Weimar. She received a careful education, and traveled much. In 1803 she married a Swedish officer, Karl Gottfried von Helvig, who entered the Prussian service in 1815. Several of her poems were first published by Schiller in the *Musenalmanach*, and her "Abdallah und Balsora" appeared in the *Horen*. She read Greek, and Goethe taught her to use the hexameter, in which she composed the epic *Die Schwestern von Lesbos* (1800). Her other works include a translation of the *Fridthofssaga* (last ed. 1879); the collection *Taschenbuch der Sagen und Legenden* (1812-13); and the poems *Die Schwestern auf Corcyra* (1812), *Die Tageszeiten* (1812), *Die Sage vom Wolfsbrunnen* (1821), and *Helene von Tournon*. For her biography, cc sult Bissing (Berlin, 1889).

HEL'VIUS CIN'NA, GAIUS. An eminent Roman poet, who lived about B.C. 50. He was a friend of Catullus, and was considered by Vergil a poet superior to himself. On the day of the funeral of Julius Cæsar, he was killed by the infuriated rabble, which, defeated in its attempt to fire the houses of Brutus and Cassius, encountered him, and mistook his name for that of Cornelius Cinna, the prætor of the year, and one of the conspirators against Cæsar. By the ancient historians who narrate this, he is called a tribune of the plebeians. The story of his dream as given by Plutarch (*Cæs.* 68) has been introduced by Shakespeare into the drama of *Julius Cæsar* (act iii., scene 3). His most highly esteemed work was the *Smyrna*, whose subject is unknown, but whose style is shown by two extant fragments to have been epic. He wrote also a poem entitled "Propempticon Pollionis," in respect to which the few lines preserved afford no information. Prior to the publication of the *Æneid*, the *Smyrna* was regarded as the most complete thesaurus of Roman mythology. Consult: Weichert, *Commentationes II. de Caio Helvio Cinna, Poeta* (1822-23); and Kressling, "De C. Helvetio Cinna Poetica," in *Commentationes Mommsenianæ* (Berlin, 1877).

HE'LY-HUTCH'INSON, JOHN, Baron HUTCHINSON (1757-1832). An English general, son of John Hely-Hutchinson (1724-94). He was educated at Eton and at Trinity College, Dublin, and in 1798 was in command at Castlebar when the French landed in Killalla Bay, but General Lake succeeded him previous to the flight of the raw Irish troops. Two years after he was appointed a chief of division in Abercromby's army in Egypt, and assumed command in the battle of Alexandria when that general was mortally wounded. He succeeded, in spite of disaffection among his officers, in separating the two superior French forces; then forced the surrender of Cairo (June, 1801), and two months later of Alexandria.

HELY-HUTCHINSON, Sir WALTER FRANCIS (1849—). An English colonial administrator, born in Dublin, and educated at Harrow and at Trinity College, Cambridge. He was attaché to Sir Hercules Robinson in Fiji (1874), and, after serving as private secretary for Fiji Affairs and for New South Wales Affairs, became Colonial Secretary of the Barbadoes (1877), and chief secretary to the Governor of Malta (1883), where he was Lieutenant-Governor for five years (1884-89). He was then appointed Governor of the Windward Islands (1889), and four years later of Natal, where he introduced 'responsible government,' and of Zululand, to which he annexed the territories across the Pongola (1895). In 1895 he was made Special Commissioner for Tongaland, and in 1901 was transferred to the Cape of Good Hope as Governor of the Colony.

HÉLYOT, ā'lyō', PIERRE (1660-1716). A French Franciscan scholar. He was born and died

in Paris; entered the Franciscan convent of the strict observance, 1683; devoted himself to the exhaustive study of the monastic Orders and congregations, and produced the masterpiece, which has been the source whence innumerable writers have drawn, *Histoire des ordres monastiques religieux et militaires et des congrégations séculières de l'un et l'autre sexe, qui ont été établies jusqu'à présent* (8 vols., 1714-19); an enlarged edition in four volumes by Migne, *Encyclopédie théologique*, appeared in Paris, 1858-59.

HEM'ANS, Felicia Dorothea (Browne) (1793-1835). An English poet, born in Liverpool. Her early taste for poetry was so far encouraged that she was permitted to publish a volume of juvenile verse in 1808. This was followed with another volume in 1812, in which year she married Captain Hemans, an Irish gentleman, who had served in Spain. In 1818, after the birth of five sons, she separated from him. She spent the rest of her life in North Wales, in Lancashire, and in Dublin, where she died. Among her works are: *The Forest Sanctuary* (1825), in the second edition of which, published in 1829, first appeared "Casabianca;" *Records of Women* (1828); *Songs of the Affections* (1830); *Hymns for Childhood; National Lyrics and Songs for Music;* and *Scenes and Hymns of Life* (1834). She also wrote three dull plays, and contributed to the magazines. A volume of *Poetical Remains* appeared after her death, and a complete edition of her works, with a memoir by her sister, in seven volumes, in 1839. Mrs. Hemans, without great daring or force, is sweet, natural, and pleasing; but too fluent, she wrote too much and too hastily. Her lyrics are her best productions, her more ambitious poems being very insipid. Still, she was a woman of talent, and some of her little pieces, such as "The Graves of a Household," "The Treasures of the Deep," and "The Homes of England," are admirable in pathos and sentiment. Consult: Chorley, *Memorials of Felicia D. Hemans* (London, 1836); *Poetical Works*, with memoir, ed. by W. M. Rossetti (ib., 1873); and Espinasse, *Lancashire Worthies* (ib., 1874).

HEM'ATITE (Lat. *hæmatites*, from Gk. *αἱματίτης, haimatitēs*, blood-like, from *αἷμα, haima*, blood), or Specular Iron. An iron sesquioxide that crystallizes in the hexagonal system. The spectacular varieties are crystallized and have a metallic lustre, whence their name. Hematite also occurs in fibrous varieties, which have a sub-metallic or metallic lustre, and are brownish-red to black in color; while the earthy varieties, known as *red ochre* and *argillaceous hematite*, are red to brownish-black in color. It is a valuable ore of iron, containing when pure 70 per cent. of that metal, and is widely distributed throughout the world. In North America, deposits of great thickness are found in the Lake Superior region, which includes the famous deposits of the Gogebic, Marquette, Menominee, Mesabi, and Vermilion ranges, where the output in 1899 reached a total of 17,802,955 long tons. Deposits at Pilot Knob and Iron Mountain in Missouri were formerly famous, but have not been extensively worked in recent years. See Iron.

HEM'EL HEMP'STEAD. A market-town and municipal borough in Hertfordshire, England, 23 miles northwest of London (Map: England, F 5). Its industries comprise boat-making, paper-making, straw-plaiting, iron-foundries, tanneries, and breweries. Its incorporation dates from 1898, and much activity is being shown in public works and improvements. The town owns fine town hall buildings and a corn exchange and markets. Population, in 1891, 9700; in 1901, 11,300.

HEM'ERALO'PIA. A disorder of vision in consequence of which objects cannot be seen well in ordinary daylight. Distant vision is only possible by strong artificial light or in twilight. See Eye, Diseases of the; Sight, Defects of.

HEM'EROBAP'TISTS (from Gk. *ἡμεροβαπτιστής, hēmerobaptistēs*, from *ἡμέρα, hēmera*, day + *βαπτιστής, baptistēs*, baptist, from *βαπτίζειν, baptizein*, to baptize). A sect of Jews mentioned by Eusebius (*Hist. Eccl.* iv. 22) on the authority of Hegesippus, by Epiphanius (*Haer.* 17), and Justin Martyr in the *Dialogue with Tryphon*. Their distinguishing feature seems to have been the daily ablution. Nothing further is known of them except that the Clementine Homilies speak of John the Baptist as a member of the sect. Some have thought that the term was not properly the name of a sect, but a derisive epithet applied to certain of the Pharisees and others who were particularly scrupulous about the ritual washings. The name is also applied to the Mandæans or Christians of Saint John. See Mandæans.

HEM'EROCAL'LIS. See Day-Lily.

HEM'ESSEN, HEMISHEM, or **HEM'SEN,** Jan van (c.1500-1566). A Dutch painter, born at Hemixhem, near Antwerp. His real name was Jan Sanders. He was a pupil of Hendrik van Cleve, became dean of the Antwerp Guild (1548), and in 1551 went to Haarlem, where probably he lived for the remainder of his life. He was an imitator of Quentin Massys, and is noticeable for having remained steadfast to the Dutch traditions when the influence of Italian art was dominant. His works include some portraits. His daughter, Catharina, married a Dutch musician, and entered the service of the Queen of Hungary, with whom she went to Spain. There is a picture by her, dated 1552, in the National Gallery, London.

HEM'IANOP'SIA. See Hemiopia.

HEMICHORDA, hĕm'ĭ-kôr'dȧ. Same as Adelochorda (q.v.). See Balanoglossus.

HEM'ICRA'NIA (Lat., from Gk. *ἡμικρανία, hēmikrania*, pain on one side of the head, from *ἡμι-, hēmi-*, half + *κρανίον, kranion*, skull). A headache affecting one side of the head. See Headache, Migraine.

HEM'ICYCLE, The. A painting by Paul Delaroche (1835) on the wall of the amphitheatre at the Ecole des Beaux-Arts, Paris. Seventy-five figures, 23 feet in height, represent the artists, and symbolize the art of all periods. Phidias, Ictinus, and Apelles are in the centre of the group.

HEMIGALE, hĕ-mĭg'a-lē (Neo-Lat., from Gk. *ἡμι-, hēmi-*, half + *γαλῆ, galē*, weasel). An East Indian weasel-like civet (*Hemigalea Hardwickii*), about the size of an ichneumon, and grayish-brown, with six or seven dark wide stripes across the back. It feeds on eggs and small animals.

HEM'IMET'ABOL'IC INSECTS (from Gk. *ἡμι, hēmi-*, half + *μεταβολή, metabolē*, transformation, from *μεταβάλλειν, metaballein*, to transform, from *μετά, meta*, after + *βάλλειν, ballein*, to throw). Insects that have a partial or incomplete metamorphosis. There are often very great differences between the habits and the structure of the young and the adults. For example, in the case of the cicadas, the larvæ live in the ground and have fore legs fitted for burrowing, while the adults, which appear only after a period of pupation, fly about and rest in herbage. In other forms, such as dragon-flies, the larvæ are aquatic and have tracheal gills, while the adults are winged and have open trachea. The orders of the hemimetabolic insects are Plecoptera, or stone-flies; Isoptera, white ants or termites; Corrodentia, psocids and book-lice; Mallophaga, bird-lice; Euplexoptera, earwigs; Hemiptera, cicadas, chinch-bugs, squash-bugs, bedbugs, plant-lice, etc.; and Orthoptera, grasshoppers, crickets, and walking-sticks. Fossil insects belonging to this group have been found in the coal basins of Illinois, Pennsylvania, and Colorado. See METAMORPHOSIS.

HEMI'NA, LUCIUS CASSIUS. A Roman annalist who lived about 145 B.C., and wrote a history of Rome from the founding of the city to the end of the Third Punic War (Pliny xiii. 84; xxix. 6). Though the work is frequently cited by Pliny, Nonius, and Aulus Gellius, only a few fragments are preserved. These are given in Peters, *Fragmenta Historicorum Romanorum* (Leipzig, 1883).

HEM'ING, JOHN. coeditor with Condell of the first folio of Shakespeare. See CONDELL, HENRY.

HEM'IO'PIA, HEM'IANO'PIA, or **HEM'-IANOP'SIA** (Neo-Lat., from Gk. *ἡμι-, hēmi-*, half + *ὄψ, ὄps*, eye). A disorder of sight, consisting in loss of vision for corresponding halves or sections of the visual field. It depends upon the arrangement of the nerve-fibres running from the brain through the optic nerves to the eyes. The fibres coming from each half of the brain, through the optic tracts, meet at a point called the optic chiasm, where some fibres cross over to the optic nerve of the opposite side and some go to the eye of the same side. From the way in which this crossing and subsequent arrangement of the fibres takes place, the right halves of both retinæ, and so the left halves of both visual fields, are supplied from the right half of the brain through the right optic tract. An affection of one optic tract will, therefore, cause loss of vision in the corresponding half of each retina, and so loss of the field of vision of the opposite side. This is homonymous or lateral hemiopia. A lesion in the chiasm destroying all the crossing fibres causes loss of vision in the outer half of the field of both eyes, bitemporal hemiopia, known, together with a possible loss of the inner field of both eyes, as crossed hemiopia.

HEM'IPLE'GIA (Neo-Lat., from Gk. *ἡμιπλήξ, hēmiplēx*, smitten on one side, from *ἡμι-, hēmi-*, half + *πλήσσειν, plēssein*, to strike). Paralysis (q.v.) limited to one side of the body. In some cases part of the face is also involved, if the cause of the paralysis affects the origin or the course of the facial nerve. The cause is usually a hemorrhage within the brain-cavity, that is, apoplexy (q.v.); or a collection of fluid; or a tumor. Because of the fact that about 90 per cent. of the fibres in the pyramids of the brain pass to the opposite side of the body (see NERVOUS SYSTEM), the paralysis occurs on the opposite side of the body from the site of the lesion in the brain, unless the lesion is situated below the decussation of the fibres. While the motor nerves are principally affected, the nerves of sensation are also more or less involved. Besides the causes named, epilepsy, hysteria, and chorea may also operate to cause hemiplegia, which in these cases is temporary. The treatment varies with the cause, and must always be under a physician's direction. Stimulants should never be administered to a paralyzed patient unless ordered by a physician. The prognosis varies according to the cause. If hemiplegia is due, as it very frequently is, to apoplexy, the first attack may terminate in more or less complete recovery; but even then subsequent attacks are likely to occur.

HEM'IPODE (Gk. *ἡμίπους, hēmipous*, half-footed, from *ἡμι-, hēmi-*, half + *πούς, pous*, foot). A book name for certain gallinaceous birds, usually regarded as a family (Turnicidæ), distinguished by a slender beak, and by the want of a hind toe. They are especially notable because all of the vertebræ remain distinct instead of being extensively anchylosed, as is usual in birds. The palate is like that of the Passeres, and Huxley and some other systematists have placed them in a separate order, the Hemipodii or Turnicomorphæ. They are the smallest of gallinaceous birds, and inhabit cultivated grounds and sterile sandy plains in warm countries. There are rather more than twenty species, in three genera. See BUTTON-QUAIL; ORTYGAN.

HEMIP'TERA (Neo-Lat. nom. pl., from Gk. *ἡμι-, hēmi-*, half + *πτερόν, pteron*, wing). An order of insects commonly known as bugs, and divided into the suborders Homoptera and Heteroptera. The name 'Hemiptera' was suggested by the appearance of the first pair of wings, the proximal half of which in many of the species (suborder Heteroptera) is thickened much like that of beetles. The wings of the suborder Homoptera, when present, are of equal thickness throughout. The mouth-parts of the Hemiptera are fitted for sucking, and the young undergo incomplete metamorphosis. The order is one of the most destructive to agriculture of all the insects. A few of the forms are useful in the economy of plants and man, for certain species prey upon injurious insects, while the species producing cochineal and wax furnish materials of commercial value. The injurious species include the loathsome lice and bedbugs, redbugs which do much damage to the cotton and orange crops, the vastly destructive chinch-bug, squash-bug, plant-lice, and scale-insects (qq.v.).

FOSSIL HEMIPTERA. The oldest known fossil insect, represented by a fragmentary wing of hemipteran relations, was found in the Upper Ordovician shales of Sweden. The earliest fossil bugs that have the mouth-parts preserved have been obtained from Carboniferous rocks and show these parts to have been, at that early period, of the highly specialized lancet form characteristic of the order, an indication of the very early evolution of the type. The scale-insects and mealy-bugs (Coccidæ), the harvest-flies (Cicadidæ), lantern-flies (Fulgoridæ), and tree-

HEMLOCK

1. TREE SHOWING FORM OF GROWTH

2. SPRAY SHOWING CONES

hoppers (Membracidæ) have their fossil ancestors in the Tertiary rocks. Some of the Heteroptera, such as the water-bugs, appear in the Jurassic. Chinch-bugs, squash-bugs, and bedbugs appear in the Liassic and Tertiary.

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HEM'IRAMPH (from Gk. *ἡμι-, hēmi-*, half + *ῥάμφος, rhamphos*, snout). A fish of the family Hemiramphidæ. See HALFBEAK.

HEM'ISHEN. See HEMESSEN.

HEM'LING, HANS. A Flemish painter, more correctly MEMLING (q.v.).

HEMLOCK (AS. *hemlic, hymblicæ*, hemlock), *Conium*. A genus of plants of the natural order Umbelliferæ, the members of which have compound umbels of small white flowers, small involucres and involucels, the former consisting of several small leaflets, the latter of three leaflets all on one side; the limb of the calyx merely rudimentary, and a compressed ovate fruit with five prominent wavy ridges and no vittæ. The best known and only important species is the common or poison hemlock (*Conium maculatum*), which grows by waysides on heaps of rubbish, and in other similar situations throughout Europe, in some parts of Asia, and naturalized in North America and Chile. It has a root somewhat resembling a small parsnip; a round, branched, hollow, bright-green stem, two to seven feet high, generally spotted with dark purple; large tripinnate, dark shining green leaves with lanceolate pinnatifid leaflets. All parts of the plant are destitute of hairs. The whole plant has a nauseous smell, particularly if rubbed or bruised. The leaves and fruits are employed in medicine. The leaves should be gathered just before the time or at the commencement of flowering, and after the removal of the larger stalks they should be quickly dried by a heat not exceeding 120°. As, however, they sometimes yield little or none of the active principles in the plant, the fresh leaves are preferred. The whole plant contains the active principles, and many fatal cases of poisoning have been attributed to eating the roots under the mistaken idea that they were parsnips.

The uses of hemlock in medicine are few and unimportant and depend chiefly upon its action upon the motor nerves, beginning with their end-organs. Although large doses cause complete paralysis by their action upon the peripheral nerves, sensation and consciousness are not affected; death finally occurs by extension of the paralysis to the muscles of respiration. In large or poisonous doses it sometimes gives rise to coma, and sometimes to convulsions or violent delirium. Among the ancient Greeks poisoning by hemlock was a common mode of death for condemned criminals, but whether it was the juice of the common hemlock or the water-hemlock that was used is unknown. The strength of its preparations is very variable, as its active principles are volatile. Practically the only use of the drug is in tetanus, hydrophobia, strychnine poisoning, and other convulsive disorders. Even in these it is rarely used, and only to prevent exhaustion by lessening muscular contractions. Water-hemlock, or cowbane (*Cicuta virosa*), is also an umbelliferous plant, of a genus having vaulted umbels, a five-toothed calyx, and almost globose fruit, each carpel with five broad flattened ribs and evident single vittæ. Water-hemlock grows in ditches, the margins of ponds, and wet grounds in Europe and the north of Asia. It has a large fleshy white root, covered externally with fibres; an erect much-branched stem, two to five feet high; tripinnate leaves, with linear-lanceolate regularly and sharply serrated leaflets, one general involucre or only a single small leaflet, partial involucres of many short narrow leaflets, and white flowers. It is a virulent narcotic acrid poison. Another species, *Cicuta maculata*, is common in North America, growing in many places. It has a spotted stem, like that of true hemlock, the name of which it very generally receives in North America. The leaves are triternate, the leaflets ternate. It is a very poisonous plant, and is the cause of many deaths. Cicuta, in Latin, seems to have been the name of the same plant called *coneion* by the Greeks, but it is not known whether this or the previous plant was so denominated. See CONIINE.

HEMLOCK-TREE, or HEMLOCK SPRUCE. A name applied to the coniferous trees which belong to the genus Tsuga, especially to *Tsuga Canadensis*. This is a large, graceful tree with much the habit and appearance of some spruces. It is found from Nova Scotia to Alabama and Georgia, and west to Wisconsin and Minnesota. The leaves are one-half inch long, bright green above and silvery beneath. The cones, which have few thin bracts, are scarcely longer than the leaves. The wood, light, soft, brittle, and light-red in color, is extensively used in building. It warps badly when exposed. The bark is largely employed in tanning leather, for which purpose it is preferred and more extensively used than any other American product. Hemlock oil is distilled from the branches and leaves, and pitch is obtained from the trees. There are numerous cultivated varieties which are very ornamental, especially while the trees are young. *Tsuga Caroliniana* is a second species, which occurs locally in Virginia, North Carolina, and Georgia. Other species are found in Asia. See SPRUCE.

HEMP (AS. *henep*, OHG. *hanaf, hanof*, Ger. *Hanf;* connected with Lat. *cannabis*, Gk. *κάνναβις, kannabis*, OChurch Slav. *konoplya*, Lith. *kanapes*, hemp, and probably with Skt. *śana*, hemp); *Cannabis sativa*. A fibre plant of the natural order Urticaceæ (q.v.), which has the male and female flowers on different plants. There is only one known species of the genus, which varies considerably, however, in different soil, climate, and cultivation. It is an annual, a native of the warmer parts of Asia, but has been cultivated in Europe from the earliest historic times, and is now naturalized in many parts of Europe and America. Like flax, it adapts itself to diversities of climate, and is cultivated equally well under the burning sun of the tropics, and in the northern parts of Russia. It is, however, readily injured by frost, particularly when young; and in many countries where it is cultivated, it succeeds only because the summer is sufficiently long for its whole life. Hemp varies very much in height, according to the soil and climate; some-

times it is only three or four feet, sometimes fifteen or twenty feet. Notwithstanding the nettle-like coarseness of its leaves, it is an elegant plant, and is sometimes utilized in shrubberies and large flower borders. The stem is erect, more or less branched; the leaves are five to nine-fingered, the flowers yellowish-green, small, and numerous. It is hollow or filled with only a soft pith, surrounded by a tender brittle substance, consisting chiefly of cellular tissue, with some woody fibre, which is called the 'reed,' 'boon,' or 'shive' of hemp. Over this is the thin bark, composed chiefly of fibres extending parallel with the stalk, with an outer membrane or cuticle. The female plants are taller and stronger than the male.

Hemp is cultivated for its fibre in almost all countries in Europe; most extensively in the centre and south of European Russia, which is the chief hemp-exporting district. French hemp is much esteemed in the market, as is also that of England and Ireland, of which, however, the quantity is comparatively inconsiderable. Hemp is cultivated to some extent in the United States; especially Kentucky, Missouri, and Illinois. The production has been greatly reduced in the last quarter century, owing to the introduction of Manila hemp and jute. Limestone soils and alluvial soils are best adapted to this plant. It is very necessary to have the soil so rich, and to sow the seed at such a season, that the plants shall grow rapidly at first, as they thus form long fibres. Hemp sown thinly produces a coarser fibre than that sown thickly. It is not considered an exhaustive crop when the leaves of the plant and the shive or boon are returned to the land. As with flax, a thorough preparation of the soil is necessary. With the ground well prepared there is little trouble with weeds, as hemp occupies the entire ground. The crop is ready to cut when the first seeds are ripe, or about 100 days from planting. Cutting is done by a knife or by a heavy mower. The treatment of hemp by 'retting,' etc., is similar to that of flax (q.v.). It is usually dew-retted by spreading evenly over the ground to rot out the gums that hold the filaments together. The hemp-stalks are afterwards decorticated by hand beating or machinery and cleaned from the fibre by 'hackling.' The fibre is tied up into 'hands' and baled. The average yield of hemp-fibre is about 1000 pounds per acre. The fibre of hemp is generally used for coarser purposes than that of flax, particularly for sail-cloth, pack-sheet, ropes, and the calking of ships.

The seed of hemp is produced in great abundance. It is commonly sold as food for cage-birds; and birds are so fond of it that not only the ripening fields, but the newly sown ground, must be carefully guarded against their depredations. Hemp is cultivated in warm countries for a resinous secretion which has narcotic or intoxicating qualities. In India the resin is commonly known as churrus or charras. See HASHISH.

While strictly speaking the name hemp belongs to the plant *Cannabis sativa*, by common usage it is now applied to other fibre-plants that in a great measure supply the uses once filled by common hemp alone. These are designated as bowstring, Manila, Sisal, and Sunn hemp (see below). Many lesser known fibre-plants pass under the general name of hemp, though they vary widely in their botanical aspects and relations.

HEMP, BOWSTRING. The fibre produced by *Sansevieria* spp., a genus of Liliaceæ with representatives in tropical regions of both hemispheres. The employment of the fibre for making bowstrings led to this name. The plants are stemless perennials which grow wild in the jungles and increase by runners. The leaves, which yield readily to treatment in the fresh state, are thick and fleshy, sword or lance-shaped, and rich in fine lustrous fibre which ranges from two and one-half to seven feet in length, does not rot readily in water, and by experiment has been found to be the strongest and best-fitted fibre for deep-sea sounding. The plant, which is propagated readily from cuttings, requires a good rich soil in which, under favorable conditions, it will reach its full growth in one year. Ordinarily, however, it does not acquire its full size until the second season, and some species do not yield a crop until the third year. When once the land is stocked with it a full crop may be expected from the roots within twelve months after cutting. It does not appear to exhaust the soil materially, and will continue to make vigorous growth for a number of years in the same place. The yield is about 50 pounds of fibre per ton of green leaves. The total yield per acre has been reported by experiments to be nearly two and a-half tons of fibre annually.

HEMP, INDIAN. See HASHISH.

HEMP, MANILA, or ABACA. The fibre of a species of plantain or banana (*Musa textilis*), a native of the Philippine Islands, where it is extensively cultivated. It is most widely grown in the southern part of Luzon, and less extensively on the islands of Samar, Leyte, Cebu, and Mindanao. The fibre is white, easily separated, and very tenacious. The harder and stronger outer fibre is used for cordage, the finer inner fibres for weaving delicate fabrics, and the intermediate layers for manufacture of web-cloths and gauzes. From the finer sorts of the fibre, veils, crapes, robes, and women's hats of great beauty are made; also various articles of men's wear, as shirts and suitings of remarkable durability. Manila hemp is largely used in the United States for making binding twine and cordage. Manila cordage is now used for every purpose for which rope is employed. The best conditions for the growth of abaca are shade and abundant moisture, with good drainage. The finest growth is obtained on the slopes of the volcanic mountains. A new plantation is generally made of young shoots, which very quickly throw out suckers. Occasionally the plants are raised from seed. The cultivation of the plant is simple. Weeds and undergrowth must be kept down during the first season, but after that the plants will exterminate other growths. Plants raised from year-old seedlings need at least two years, while those raised from suckers require four years before they will produce fibre of value.

The abaca is cut just before flowering, near the roots, split open longitudinally, and the central peduncle separated from the sheathing layers of fibre. The fibrous coats are dried two or three days in the shade, and are then scraped until only the fibres remain. Two men will cut and scrape about twenty-five pounds of the fibre in a day. It takes about 3200 plants to produce a

FIBRE PLANTS

JULIUS BIEN & CO. LITH. N.Y.

1 RAMIE - BŒHMERIA NIVEA
2 JUTE - CORCHORUS CAPSULARIS
3 BOWSTRING HEMP - SANSEVIERIA ZEYLANICA
4 HEMP - CANNABIS SATIVA
5 COTTON - GOSSYPIUM HERBACEUM

ton of 2240 pounds of fibre. The yield is about one and one-third tons of fibre per acre annually. The output of abaca is fairly uniform under natural conditions. The exports for several years preceding the cession of the islands by Spain averaged about 100,000 tons annually.

HEMP, SISAL. The fibre of *Agave rigida sisalana*, order Amaryllideæ, native of Yucatan, Mexico, Central America, and West Indies, and closely related to the century plant. It has been introduced into the Bahamas and Florida. As a cordage fibre it is second only to Manila hemp in strength. Its straight smooth strands of fibre become white upon drying without washing. The plants yield best on a gravelly, rocky soil in comparatively arid districts only a few feet above the level of the sea. It thrives upon the Florida Keys, upon the almost naked coral rock, but will not thrive when even slightly shaded. Plants set out at 18 inches high from the nursery will produce leaves fit for cutting in three years. The life of a plant when undisturbed is six or seven years, after which it sends up its blossom-stalk and then dies. Cutting, however, extends its life fifteen to twenty years. No special cultivation is needed except that the land be kept clean and the suckers kept down. The cutting of the leaves is done in Yucatan by Indians, who use a heavy-bladed, sabre-like knife called a machete. The spine at the leaf-end is cut off and the leaves bundled for removal to the machines. On large plantations they are transported by steam-power over tramways which reach different parts of the estate. The fibre is separated from the fresh leaf by a specially constructed machine called a raspodor. The annual yield of fibre is from 1000 to 1470 pounds per acre, 50 to 70 pounds of fibre being derived from 1000 leaves.

HEMP, SUNN. The fibre derived from the bark of *Crotalaria juncea*, order Leguminosæ, a native of India. The plant has been in cultivation from time immemorial upon the high, sandy lands less suited for the more exacting crops. Seed is generally sown in April or May, and in August the plant, if grown for its fibre, is pulled or cut close to the ground, laid in long rows till the leaves begin to rot and separate from the stalks, which are then steeped in water for a few days, till the bark separates freely. The average yield is about 640 pounds of fibre per acre. The fibre is not so strong as hemp, but good cables, canvas, and cloth are made of it. It is now exported in considerable quantity, and is known by various names, as brown hemp, Bengal hemp, etc. Jubbulpore hemp (*Crotolaria tenuifolia*) is considered by some authorities to be a variety of *Crotalaria juncea*. See CROTALARIA.

HEMP-AGRIMONY. A European medicinal plant. See EUPATORIUM.

HEMPEL, CHARLES JULIUS (1811-79). An American homeopathist. He was born at Solingen, in Prussia, and was educated there, at the University of Paris, and, after coming to the United States (1835), at New York University. In 1857 he became professor of materia medica at the Hahnemann Medical College in Philadelphia, and later practiced at Grand Rapids, Mich., where he died. A man of considerable literary ability, Hempel, who when a student in Paris had assisted in the preparation of Michelet's *Histoire de la France*, published translations of Hahnemann's *Chronic Diseases* (1846), and of Jahr's *Mental Diseases* (1853), as well as other homeopathic manuals. His most important works, however, were: *A System of Materia Medica and Therapeutics* (1859); *The Science of Homœopathy* (1874); and among several miscellaneous studies, *Christendom and Civilization* (1840).

HEMP-PALM (*Trachycarpus excelsus*). A palm of China and Japan, the fibre of the leaves of which is much employed in those countries for making cordage. Hats are also made of its leaves, and even cloaks and other garments for wet weather. See CHAMÆROPS.

HEMP-SEED OIL (*oleum cannabis*). An oil obtained from the seeds of the *Cannabis sativa*, or common hemp (q.v.). It has a mild odor, nauseating taste, and a greenish-yellow color which turns to brown with age. Its specific gravity at 15° C. is .9276. It is freely soluble in boiling alcohol. It has weaker drying properties than linseed, for which it is sometimes used as a substitute in making paints and varnishes. It is also used in soap manufacture. The seeds contain about 30 per cent. of oil. Consult Sadtler, *Industrial and Organic Chemistry* (Philadelphia, 1900). See OIL.

HEMP'STEAD. A village in Nassau County, N. Y., about 20 miles east of New York City; on the Long Island Railroad (Map: New York, G 5). Its principal interests are in farming and market gardening, though there are some manufacturing establishments. The village is a popular suburb of New York, and has the Hempstead Institute. Camp Black was established here during the war with Spain, as an encampment for State troops. The water-works are owned by the municipality. Hempstead was settled by New Englanders in 1643. The Presbyterian Church, organized the following year, claims to be the oldest Presbyterian society in the country. Population, in 1900, 3582. Consult Onderdonk, *The Annals of Hempstead, 1643-1832* (Hempstead, 1878).

HEMPSTEAD. The county-seat of Waller County, Tex., 50 miles northwest of Houston; on the Houston and Texas Central Railroad (Map: Texas, G 4). It is an important shipping point, especially for garden truck, being situated in a farming and cotton-growing region, and has cotton-gins, cottonseed-oil mills, etc. Population, about 2000.

HEMS. A city in Asiatic Turkey. See HOMS.

HEMSEN. See HEMESSEN.

HEMSTERHUIS, hĕm'stĕr-hois, FRANS (c.1721-90). A Dutch writer on moral philosophy and æsthetics. He was born at Groningen, the son of Tiberius Hemsterhuis; studied at the University of Leyden, and held a subordinate place in the Council of State of the United Provinces. He also devoted himself to literature and art, and especially to philosophy, and is classed with the sentimentalists of the eighteenth century. His chief works are: *Lettre sur la sculpture* (1769); *Lettre sur l'homme et ses rapports* (1772); *Aristée, ou de la divinité* (1778); and *Des facultés de l'âme* (1791).

HEMSTERHUIS, TIBERIUS (1685-1766). A celebrated Dutch philologist. He was born at Groningen, studied at the university there, and in 1704 was appointed professor of mathematics and philosophy at Amsterdam. In 1717 he was

made professor of Greek at Franeker, although he did not take up his residence there until three years later. In 1740 he received a call to the University of Leyden, where he remained until his death. One of the greatest Greek scholars of his time, he may be said to have created a new school of Greek philology, to which belong his distinguished pupils Ruhnken and Valckenaer. His editions of the *Onomasticon* of Pollux (2 vols., 1706), of the *Colloquia* of Lucian (1708 and 1732), and of the *Plutus* of Aristophanes (1744) are his principal literary works. From Hemsterhuis's manuscripts, *Anecdota Hemsterhusiana* (1825) have been edited by Geel, and *Orationes et Epistolæ* (1839) by Friedmann. Consult: Ruhnken, *Elogium Hemsterhusii* (Leyden, 1768; reprinted in the *Bibliotheca Teubneriana*); Lindemann, *Vitæ Duumvirorum T. Hemsterhusii et D. Ruhnkenii* (Leipzig, 1882), and Müller, *Geschichte der klassischen Philologie in den Niederlanden* (Leipzig, 1869).

HEN. See FOWL.

HÉNAULT, ā'nō', CHARLES JEAN FRANÇOIS (1685-1770). A French historian. He became president of the *cour d'equêtes* in 1710, and member of the French Academy in 1723. Later he was the head of the household of Maria Leszczynska, wife of Louis XV. He wrote much light and graceful verse, and some mediocre plays; but is best known for his excellent *Abrégé chronologique* (1744), the first successful attempt at a general history of France. His *Mémoires* (1854) are of value mainly because they contain interesting anecdotes of men of note in his day.

HENBANE (*Hyoscyamus*). A genus of plants of the natural order Solanaceæ, the members of which have a five-toothed calyx, an irregular funnel-shaped corolla, and a capsule which opens by a lid and is inclosed in the hardened calyx. The species are mostly annual and biennial herbs, natives of the Mediterranean region. The common henbane (*Hyoscyamus niger*) is not uncommon in waste places in the neighborhood of towns and villages in Europe, Northern Africa, Asia, and as an escape in the Eastern United States. It is also cultivated to some extent. It is an annual or biennial, somewhat bushy, one to four feet high, with large sinuated or sharply lobed leaves without leafstalks, and large, dingy yellow flowers, with brownish-red or purple veins. The whole plant is covered with clammy hairs, and has a nauseous smell, which gives warning of its strong narcotic, poisonous quality. Cases of poisoning by henbane are not rare, since its root somewhat resembles small parsnips. The seeds contain in largest quantity the peculiar alkaloid hyoscyamine, on which the properties of the plant chiefly depend. The symptoms of poisoning by henbane are similar to those produced by other narcotic poisons, and the proper treatment is the same as in cases of poisoning by opium. In medicine the leaves are commonly used internally. They are gathered and quickly dried when the plant is in full flower. Fomentations of henbane are applied to painful glandular swellings, parts affected with neuralgia, etc., and are often found to afford relief. Their action is almost the same as that of belladonna, and tincture and extract of henbane are often administered in cases of annoying cough, spasmodic asthma, and other diseases that seem to demand sedatives and anti-spasmodics. Henbane is also employed to calm mental irritation and to induce sleep. For many cases it has one great advantage over laudanum in not producing constipation. The other species of henbane possess similar properties. In Greece the dried stalks of *Hyoscyamus albus* are smoked to allay toothache.

HENCKE, hĕŋk'*e*, KARL LUDWIG (1793-1866). A German astronomer, born at Driesen, where he was long postmaster. He discovered the planetoids Astræa (1845) and Hebe (1847), and contributed some additions to previous lists of stellar magnitudes to Peter's *Zeitschrift für Astronomie* (1860) and the *Monthly Notes* of the Astronomical Society (1859).

HEN'DERSON. A city and the county-seat of Henderson County, Ky., 10 miles below Evansville, Ind., on the Ohio River, and on the Louisville and Nashville, the Illinois Central, and other railroads (Map: Kentucky, D 3). A magnificent bridge crosses the Ohio at this point. Among the attractions of the place are Atkinson Park, containing 100 acres, and the county fair grounds. The city has fine public school buildings, and owns a well-equipped sanatorium. Henderson controls an important trade in tobacco, corn, and wheat; and among its industrial establishments are cotton and woolen mills, grain-elevators, tobacco-stemmeries, hominy-mills, saw and planing mills, a furniture-factory, wagon-works, coal-mines, etc. First incorporated in 1797, the city is now governed under a charter of 1893, by a mayor, elected for four years and ineligible for a second term, and a common council, chosen by popular vote. The water-works, gas plant, and electric-light plant are owned and operated by the municipality. Population, in 1890, 8835; in 1900, 10,272.

HENDERSON. A town and the county-seat of Vance County, N. C., 44 miles north of Raleigh, on the Seaboard Air Line and the Southern railroads (Map: North Carolina, D 1). It carries on an important trade in tobacco and cotton, and has several extensive tobacco-warehouses, cotton-mills, knitting-mills, cottonseed-oil mills, buggy and wagon factories, etc. Settled in 1820, Henderson was first incorporated in 1842. Under a charter last revised in 1893, the government is vested in a mayor, biennially elected, and a municipal council. Population, in 1890, 4191; in 1900, 3746.

HENDERSON. The county-seat of Chester County, Tenn., 180 miles west southwest of Nashville; on the Mobile and Ohio Railroad (Map: Tennessee, C 5). It is the seat of the Georgia Robertson Christian College, and of the Vanderbilt Training School. Henderson is the centre of an agricultural region, and has some manufactures, and considerable cotton trade. Population, about 2000.

HENDERSON. The county-seat of Rusk County, Tex., 160 miles north by east of Houston; on a branch of the International and Great Northern Railroad (Map: Texas, G 3). It has a normal college. There are cotton-gins, a pottery, and other industries, and a trade in cotton, live stock, etc. Population, about 2000.

HENDERSON, ALEXANDER (c.1583-1646). One of the greatest men in Scottish history, and, next to Knox, the most renowned ecclesiastic of Scotland. He was born in the Parish of Criech, Fifeshire, about 1583, and educated at Saint Andrews (M.A. 1603). He was presented to the

living of Leuchars (1614) by Archbishop Gladstanes, where he was for a time unpopular; but as he changed his views he became one of the most influential ministers of Scotland. In 1639 he was transferred to Edinburgh. He took an active part against Episcopal innovations, and was mainly responsible for the 'National Covenant,' which was publicly signed in Greyfriar's Church, Edinburgh, 1638. During the troubled times of Charles I.'s reign Henderson's influence was felt in the negotiations for peace between the Scottish ecclesiastics and the Court, and when Charles visited Scotland in state (1641) Henderson attended him as chaplain, and later on went to Oxford to mediate between the King and Parliament. In 1643 Henderson was elected moderator for the third time in the General Assembly at Edinburgh, and in that capacity presented a draught of the famous 'Solemn League and Covenant,' an instrument against prelacy which was generally accepted by the Puritans. With Baillie, Rutherford, and others, Henderson represented Scotland in the Westminster Assembly, when the 'Solemn League,' with slight modifications, passed both Houses and became law for the two kingdoms. When in 1646 the King joined the Scottish army and retired with it to Newcastle, he sent for Henderson, and discussed the systems of Church government in a number of papers. Henderson died at Edinburgh, August 19, 1646, and his death was the occasion of a national mourning in Scotland. For his life, consult Aiton (Edinburgh, 1836).

HENDERSON, ANDREW (c.1705-75). A Scottish maker and seller of books. He was born in Roxburghshire, and was educated at Aberdeen and in Edinburgh, where he afterwards was a high-school teacher, as well as a tutor in private noble families. He was in London when his first book was published, a translation of Voltaire's *Charles XII. of Sweden* (1734), but was back in his native land in time to witness the Jacobite uprising, and to describe it in *A History of the Rebellion, 1745 and 1746* (1748). He began his bookselling at Longacre, London, but continued to produce such histories as: *Frederick, King of Sweden* (1752); *William the Conqueror* (1764); memoirs: *Dr. Archibald Cameron* (1753); *Field-Marshal Leopold, Count Daun* (a French translation, 1757); and *Field-Marshal James Keith* (1758); as well as certain disputatious writing directed against the Bishop of Chester and Dr. Samuel Johnson, with a side thrust at Smollett. But his best book is said to be *The Life of William Augustus, Duke of Cumberland* (1766).

HENDERSON, CHARLES HANFORD (1861—). An American educator, born in Philadelphia, and educated at the University of Pennsylvania and in Zürich. For two years (1883-85) he was lecturer at the Franklin Institute in Philadelphia, and then, after two years of editorial work, was appointed principal of the Philadelphia Manual Training High School (1892-96). In 1898 and 1899 he directed the Pratt Institute High School in Brooklyn. His publications include *The Elements of Physics* (1900), and many essays upon educational and social subjects.

HENDERSON, CHARLES RICHMOND (1848—). An American sociologist, born in Covington, Ind. He graduated at the University of Chicago in 1870, and received the degree of S.T.B. at Union Theological Seminary in 1873. From 1873 to 1883 he was pastor at Terre Haute, and from 1883 to 1892 at Detroit. In 1892 he was elected assistant professor of sociology at Chicago University, and afterwards was advanced to the full professorship. His principal works are: *An Introduction to the Study of the Dependent, Defective, and Delinquent Classes* (1898); *Social Elements* (1898); *Social Settlements* (1899). His discussions are practical rather than theoretical; and his works are characterized by a tone of healthy optimism.

HENDERSON, DAVID BREMNER (1840—). An American statesman, born at Old Deer, Aberdeenshire, Scotland. He went to Illinois in 1846, to Iowa in 1849, graduated at Upper Iowa University (Fayette, Iowa), studied law in an office at Dubuque, and was admitted to the bar in 1865. In 1861 he enlisted as a private in the Twelfth Regiment Iowa Volunteer Infantry, was elected and commissioned first lieutenant of Company C, and served until discharged, February 26, 1863, owing to the loss of a leg at the battle of Corinth. From May, 1863, to June, 1864, he was commissioner of the board of enrollment of the Third Iowa District, and then reëntered the army as colonel of the Forty-sixth Iowa Volunteer Infantry, in which rank he served to the close of the war. From 1865 until his resignation in 1869 he was collector of internal revenue for the Third Iowa District, in 1869 began to practice law as member of a Dubuque firm, and in 1869-71 was Assistant United States District Attorney for the Northern Division of the District of Iowa. He was elected to the Federal House of Representatives in 1882, as a Republican from the Third Iowa District, was chairman of the Committee on Judiciary, and a member of the Committee on Rules in the Fifty-fourth and Fifty-fifth Congresses, and in 1899, at the organization of the Fifty-sixth Congress, was elected to succeed T. B. Reed, resigned, as Speaker of the House. He was also chairman of the Iowa delegation at three national Republican conventions. In Congress he acquired reputation for his skill in debate, and the wise conduct of his important legislative office.

HENDERSON, EBENEZER (1784-1858). A Scotch missionary and linguist. He was born of poor and humble parents in Fifeshire, November 17, 1784. He worked as a clockmaker and shoemaker, but in 1803 entered Robert Haldane's seminary in Edinburgh and studied theology. He planned in 1805 to accompany the Rev. John Paterson to India; but as this did not prove practicable, he located at Elsinore, Denmark, and devoted himself to the distribution of Bibles in the Scandinavian countries. In the course of his labors he visited Sweden and Lapland, Iceland, Denmark, and Germany. In 1818 he accompanied Dr. Paterson through Russia as far as Tiflis, and until 1825, when the Russo-Greek Church induced the Czar to interdict the Bible Society, he resided at Saint Petersburg. Returning home, he was appointed tutor of the Mission College, Gosport, and from 1830 till 1850 was professor of Oriental languages in Highbury Congregational College. He died at Mortlake, May 16, 1858. His linguistic attainments were very great; he made himself acquainted not only with the ordinary languages of scholarship, but also with Hebrew, Syriac, Ethiopian, Russian, Arabic,

Tatar, Persian, Turkish, Armenian, Manchu, Mongolian, and Coptic. The first Bible society in Denmark was organized by him (1814); he was associated with the London Religious Tract Society and the Society for the Propagation of the Gospel Among the Jews. He published an account of his travels in Iceland (1818); Russia (1826); *The Vaudois: A Tour to the Valleys of Piedmont* (1845); several volumes of Bible annotations; enlarged Charles Buck's *Theological Dictionary* (1833); and edited numerous volumes of other writers. For his life, consult Henderson (London, 1859).

HENDERSON, James Pinckney (1808-58). An American soldier and political leader. He was born in Lincoln County, N. C.; practiced law in Mississippi, went to Texas in 1836, and served as brigadier-general during the revolution of that year. He was Secretary of State of the Texan Republic in 1837-39, was a minister to England and France to secure the recognition of Texan independence, and went to Washington in 1844 to secure annexation. He was a member of the Texas Constitutional Convention in 1845, and in the following year was elected first Governor of the State after annexation. He served in the Mexican War, and was presented with a sword by Congress. In 1857 he was appointed Senator from Texas as a State-Rights Democrat.

HENDERSON, John (1747-85). An English actor of Scotch descent, native of Cheapside, London. In Bath (1772) he made his début as Hamlet, was fairly successful in other Shakespearean rôles, and came to be known as 'Bath Roscius.' In 1777 he was acting at the Haymarket, London, and for the two following years was with Sheridan at Drury Lane, making himself famous as Shylock and Falstaff, besides creating characters in plays of Shirley, Cumberland, Jephson, and Mackenzie. He was engaged at Covent Garden from 1779 until his death, and was ever remembered gratefully by Mrs. Siddons, whom he had encouraged, and by many others of the profession, though Garrick was jealous of him, and he had earned the ill will of another actor-manager by his powers of mimicry. The deficiencies of Henderson's voice and person were overbalanced by the superior qualities of his mind, and he achieved special renown as a reader and a reciter of dramatic monologues. Gainsborough, his intimate friend, painted his picture, and there are portraits of him also by Stewart and Romney. He was buried in Westminster Abbey.

HENDERSON, Peter (1822-90). A Scotch-American horticulturist, born at Pathhead, Scotland. He came to America in 1843, and engaged in horticultural pursuits. In 1862 he opened a seed store in New York City, and in 1871 undertook the seed business on a large scale under the firm name of Peter Henderson & Co. He was not only very successful as a seed-merchant, but also did much to develop improved varieties of horticultural plants. He has been deservedly called 'the father of horticulture and ornamental gardening' in the United States. He wrote much for horticultural journals, and was the author of the epoch-making book entitled *Practical Floriculture* (1867), which has passed through many editions. Some of his other works are: *Gardening for Profit* (1866); *Gardening for Pleasure* (1875); and *Garden and Farm Topics* (1884).

HENDERSON, Richard (1734-85). An American pioneer, born in Hanover County, Va. He removed to Granville County, N. C., in 1762; studied law, was admitted to the bar, and in 1769 was appointed Associate Justice of the Superior Court. After the Declaration of Independence and the organization of the State Government in North Carolina, he was reëlected judge, but was prevented from accepting that position by his participation in a scheme organized under the name of the Transylvania Land Company, by which in 1775 the Cherokee Indians were induced to transfer to the company all the land lying between the Cumberland River, the Cumberland Mountains, and the Kentucky River, and situated south of the Ohio. This territory, half as large as the present State of Kentucky, was organized by Henderson and his associates into a political community, with president, legislature, and judges; but the State of Virginia annulled the purchase from the Indians, whose chiefs had signed the Treaty of Watoga for the purposes of the transfer. Nevertheless the enterprise and success of Henderson and his friends in colonization and settlement were rewarded by the Virginia Legislature with the grant of a tract of land twelve miles square on the Ohio River, below the mouth of Greene River. After a short residence in Nashville, Tenn., where he practiced law, he returned to North Carolina, and engaged in farming on a large scale.

HENDERSON, Thomas (1798-1844). A Scotch astronomer, born at Dundee, and educated at the academy of that city. He had to go to work at fifteen, but all his spare time was spent on astronomy. From 1819 to 1831 he was secretary to the Earl of Lauderdale and to Lord Jeffrey, and during this period became known to astronomers in Edinburgh and to the Royal Society of London. In 1831 he was made royal astronomer at the Cape of Good Hope, succeeding Fellows, but resigned two years later; was appointed astronomer royal for Scotland, professor of practical astronomy at Edinburgh, and director of the Calton Hill Observatory. He died at Edinburgh. Henderson wrote contributions, on the orbits of several comets, to the *Astronomische Nachrichten;* and published five volumes of his observaions (1838-43; continued by Smyth, 1843-52). He is best known for his new method of calculating occultations (1824) and for his remarkable ability in astronomical computation.

HENDERSON, William James (1855—). An American musical critic and scholar, born at Newark, N. J. He is regarded as one of the most accomplished scholars in music in America, and is a frequent contributor to the leading magazines and reviews. He graduated from Princeton in 1876, and immediately began work as a journalist, serving in 1883 as a reporter, four years later as the musical critic of the New York *Times*, and in 1902 of the New York *Sun*. Later he received the appointment of lecturer on musical history in the New York College of Music. Besides writing the librettos to a number of light operas, he published: *What is Good Music?* (1898) and *How Music Developed* (1899), both of which are regarded as authorities. He also published *Preludes and Studies*, a story of music, *The Orchestra and*

Orchestral Music (1902), and numerous other tales and stories.

HEN'DERSONVILLE. A town and the county-seat of Henderson County, N. C., 21 miles south of Asheville; on the Southern Railway (Map: North Carolina, B 4). It has a tannery, a furniture-factory, a lumber-yard, etc., and considerable trade in agricultural products, particularly potatoes, cabbages, and apples. The town enjoys considerable popularity as a summer resort. Population, in 1890, 1216; in 1900, 1917.

HEN'DON. A town in Middlesex, England, situated on the picturesque coach route from London to Saint Alban's, six miles northwest of Saint Pancras Station, London (Map: London, C 6). Population, in 1891, 15,800; in 1901, 22,450.

HEN'DRICKS, THOMAS ANDREWS (1819-85). An American politician. He was born near Zanesville, Ohio; was early taken by his parents to Indiana; graduated at South Hanover College in 1841, and two years later was admitted to the bar. He practiced his profession with success in Indiana; was a member of the Legislature and the State Constitutional Convention of 1851; and was a member of Congress from 1851 to 1855. He was United States Senator from 1863 to 1869, and in 1868 was a candidate for the Democratic nomination for President. In the next Presidential election, the Democratic candidate, Horace Greeley, having died before the casting of the electoral votes, they were given to Hendricks. He was Governor of Indiana from 1873 to 1877. He ran for Vice-President of the United States on the ticket with Samuel J. Tilden in 1876, and was elected Vice-President in 1884 on the ticket with Grover Cleveland, but died on November 25th of the following year.

HEN'DRICKSON, GEORGE LINCOLN (1865—). An American Latinist, born at Winchester, Ill. He was educated at Beloit College, the Johns Hopkins University, and the universities of Bonn and Berlin. From 1891 to 1896 he was professor of Latin at the University of Wisconsin, and in 1897 was appointed to a similar chair at the University of Chicago. His writings include frequent contributions to the *American Journal of Philology* on subjects relating to the history of Latin literature.

HENGEST, hĕng'gĕst, or **HENGIST AND HOR'SA.** The legendary leaders of the first Germanic invaders of Britain. About 449 A.D. a band of Jutes landed at Ebbsfleet on the island of Thanet. They came from the peninsula now called Jutland, and, according to tradition, were in three vessels. Tradition has assigned to their leaders the names of Hengest and Horsa, one meaning the horse and the other the mare. It is now generally held that these names are mythical. This point of view is confirmed by the fact that Hengest is the name assigned to the hero of many different traditions. The cromlech called 'Wayland Smithy' has sometimes been designated as a monument to Hengest and Horsa. Consult Elton, *Origins of English History* (London, 1882). See ANGLO-SAXONS.

HENGSTENBERG, hĕng'sten-bĕrk, ERNST WILHELM (1802-69). The leader of the Conservative School of theologians in Germany during the first half of the nineteenth century. He was born in Westphalia, October 20, 1802, the son of a clergyman. He studied at Bonn and became tutor in Basel (1823-24). Going to Berlin in 1824 as privat-docent, he put himself at the head of a rising orthodox school, and, with most conscientious devotedness, made the scientific defense of their principles the aim of his labors in the university and through the press. He was made professor extraordinary in 1826, and full professor in 1828. As editor of the *Evangelische Kirchenzeitung*, begun in 1827, he combated rationalism even in its mildest forms, seeking to restore the orthodoxy and Church discipline of the sixteenth and seventeenth centuries. With the same view were written all his principal works: *Christologie des alten Testaments* (1829-35; 2d ed. 1854-57); *Beiträge zur Einleitung ins alte Testament* (1831-39); *Kommentar über die Psalmen* (1842-45; 2d ed. 1850); *Das Hohelied Salomonis ausgelegt* (1853); and others devoted to the defense of the old interpretation and criticism of the Scriptures against the results of modern biblical science. Hengstenberg's influence in ecclesiastical matters also was employed in carrying out the high Lutheran dogmas of the Church, of Church offices, and of the sacraments, by persecution of sectaries, by opposition to the union of Lutherans and Reformed, and by attempts to depose from their chairs Gesenius, Wegscheider, De Wette, and other rationalistic teachers in the universities. He died in Berlin, May 28, 1869. Among his later works were: *Die Weissagungen des Propheten Ezekiel* (1867-68); *Geschichte des Reiches Gottes unter dem alten Bunde* (1869-71); *Das Buch Hiob erläutert* (1870-75). Most of his exegetical and critical works have been translated. For his life, consult Bachmann and Schmalenbach (Gütersloh, 1876-92).

HEN-HARRIER. See MARSH-HAWK.

HEN-HAWK, HEN-HARRIER, or CHICKEN-HAWK. A hawk which attacks poultry. This definition includes an extensive list and variety of birds of prey, if the entire English-speaking world is considered, and the accusation is not always a fair one, as the offense is occasional rather than habitual with many of the birds against which it is charged. The term 'hen-harrier' is British, and belongs to the subfamily Circinæ, represented in the United States by the innocent marsh-hawk (q.v.). Many of the eagles and larger falcons, as well as some of the smaller ones, do now and then swoop upon domestic fowls; yet these robberies constitute only a small proportion of their food, which mainly consists of small mammals, frogs, grasshoppers, and other insects. In certain places, the smaller falcons may become a serious local nuisance to the poultry-keeper, especially in winter; but in general the harm they do is far more than compensated for by their service to agriculturists in destroying injurious rodents and insects. The miscellaneous destruction of hawks and owls is therefore unwise. The species commonly called hen-hawks include two birds, the red-tailed and the red-shouldered hawk. See BUZZARD.

RED-TAILED HAWK. The redtail (*Buteo borealis*) is one of the largest, most numerous, and most widely distributed of North American buzzard-hawks. It is from 19 to 25 inches long, and its spread of wings is from 49 to 58 inches. In maturity the upper surface is blackish-brown, variegated with whitish and dull rust-color, the last tint growing brighter on the upper surface

of the tail, which has a blackish cross-band near the end. The under surface of the body is buffy white, the belly marked with dark streaks. Young specimens show a dark zone across the lower part of the breast, and from six to ten regular dark bands across the gray tail. Western specimens vary a good deal, and were described as separate species by early writers. The majority of them leave the Northern States in winter, and migrate in large flocks. They build their nests in tall trees. Their food includes all the mammals from the size of a squirrel downward, and all sorts of birds from grouse and rails to sparrows; but this larger game is far outnumbered by the smaller gophers, mice, frogs, insects, and carrion upon which they principally subsist. Fisher declares that it has been demonstrated by careful examination of stomachs that poultry and game birds do not constitute more than 10 per cent. of the food of this bird.

RED-SHOULDERED HAWK. This species (*Buteo lineatus*) is rather less in size than the redtail, and generally more reddish in plumage, especially bright on the shoulders, while the lower parts (whitish in the young) are everywhere rusty in color, transversely barred with a darker tint. The tail is black, covered by about six bands of white. It is a rather heavy, sluggish bird, and lives throughout the year south of the Great Lakes, frequenting lowlands and marshes, except in the spring, when it retires to the woods for breeding purposes. The great tree-built nest is often begun before the end of February. This hawk's diet is exceedingly varied, and includes a larger proportion of frogs and snakes than the redtail's. It preys principally on mice, however, and almost never attacks poultry, so that its reputation as a hen-hawk is undeserved. On the contrary, its work is of the highest benefit to farmers, who should carefully preserve it. A similar species, Swainson's hawk, of the Western interior, is equally beneficial and worthy of protection because of the great numbers of gophers, locusts, and the like it kills at all seasons.

CHICKEN-HAWKS. Under this head may be mentioned a few of the smaller destructive falcons. The goshawk and gyrfalcon (qq.v.) are so rare that the harm resulting from them is small. The sharp-shinned hawk (*Accipiter velox*) is a true falcon, and inhabits all of North America, migrating annually from the northern districts to the warmer parts. It is about a foot long. Its pointed wings stretch about two feet, and they enable it to fly with extreme swiftness and power. In color it is uniformly grayish above, darker on the crown, and the tail is crossed by several blackish bands; below, the surface is white, with breast and sides barred dusky or rufous. It takes its name from the sharp front of the tarsi. Its courage and boldness are admirable, but they are unfortunately directed mainly against birds, which constitute almost all of its food. Where it settles on a farm it lives upon young chickens, since these are more easily caught than wild birds; and it stays in the neighborhood until it is killed or the supply of poultry is exhausted. It is to be noted in its favor, however, that it preys persistently upon the English sparrows. Cooper's hawk (*Accipiter Cooperi*) is nearly twice as large as the sharpshin, but closely resembles it in color. It is not found much north of the Saint Lawrence and Saskatchewan valleys, and in winter retreats south of the middle part of the United States. Like the sharpshin, it feeds mainly upon birds, and is destructive to English sparrows and poultry, with a special fondness for domestic pigeons. These two smaller falcons, and certain owls, are responsible for most of the evil reputation attaching to the hawk tribe in the minds of undiscriminating poultry-keepers.

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HENKE, hĕŋk'*e*, HEINRICH PHILIPP KONRAD (1752-1809). A German Protestant ecclesiastical historian, born at Hehlen. He was educated at Brunswick and at Helmstedt, where in 1778 he became professor of theology. He is best known as author of a valuable *Allgemeine Geschichte der christlichen Kirche* (1795-1806). Consult the biography by Wolff and Bollmann (Helmstedt, 1816).—His youngest son, ERNST LUDWIG THEODOR HENKE (1804-72), born at Helmstedt, was also a Church historian. In 1833 he became professor at Jena, and in 1843 at Marburg, where six years afterwards he was appointed supervisor of the Theological Seminary. His works include: *Georg Calixtus und seine Zeit* (1853-60); *Papst Pius VII.* (1860); and *Konrad von Marburg* (1861). For his biography, consult Mangold (Marburg, 1879).

HENLE, hĕn'*le*, FRIEDRICH GUSTAV JAKOB (1809-85). A German physiologist and anatomist, born at Fürth. He studied at Bonn and Heidelberg (1827-32), and then became assistant to Rudolphi in the anatomical museum at Berlin, and in 1834 demonstrator of anatomy under Johann Müller. Three years later he became privat-docent in Berlin, and made a specialty of microscopic anatomy and pathology. From 1840 to 1844 he was professor of anatomy and physiology at Zurich, and in the latter year went to Heidelberg as professor of anatomy. At this time he wrote *Handbuch der rationellen Pathologie* (3d ed. 1855), which put him in the first rank of the members of the rational-physiological school. His most important work was *Handbuch der systematischen Anatomie des Menschen* (3d ed. 1876-79), in connection with which he issued *Anatomischer Handatlas zum Gebrauch im Seciersaal* (3d ed. 1895-96). Henle's other works include: *Pathologische Untersuchungen* (1840); *Handbuch der allgemeinen Anatomie* (1841); *Grundriss der Anatomie des Menschen, mit Atlas* (4th ed. 1901). He also wrote yearly reviews on pathology and anatomy for Müller's *Archiv* (1838-42), and on anatomy in general in Cannstatt's *Jahresbericht* (1844-55). In 1841 he founded with Pfeufer the *Zeitschrift für rationelle Medicin*. For his life, consult Merkel (Brunswick, 1891).

HEN'LEY, JOHN (1692-1756), commonly known as ORATOR HENLEY. An eccentric English clergyman, son of Rev. Simon Henley. He was born at Melton Mowbray, Leicestershire, and educated at Saint John's College, Cambridge. While an undergraduate, he sent a witty letter to the *Spectator* (1712). After leaving the university, he became headmaster of the grammar school of his native town. He was also ordained, and held for some time a curacy there. In 1714 he published a rhetorical poem entitled *Esther, Queen of Persia*. He also compiled at this period a grammar of seven languages called *The Complete Linguist* (1719-21). Removing to London, he was appointed reader at the Church of Saint Joseph the Martyr. He found it agreeable to re-

tire, in 1724, to the rectory of Chelmondiston, in Suffolk. Again, his talents not being appreciated, he left the Church, and returned to London, where he opened, in 1726, his famous oratory in Newport Market, above the market-house. He preached on Sundays and lectured on Wednesdays. His pompous elocution and his strange service drew for a time large congregations. He struck medals of admission to his hall, bearing the device of a star rising to the meridian with the motto, *Ad summa*, and below, *Inveniam viam aut Faciam*. His pulpit was covered with velvet and adorned with gold, and over his altar was raised the inscription, 'The Primitive Eucharist.' In 1730 he became a pensioner of Walpole, editing for him the rather disreputable periodical called the *Hyp Doctor*. He was ridiculed by Pope, and he furnished the subject for two plates by Hogarth. Fifty manuscript volumes of his lectures were deposited in the British Museum.

HENLEY, Robert, Earl of Northington. See Northington.

HENLEY, Walter de. An English friar and author of the thirteenth century. He wrote in French a work called *Hosebandri*, which for two centuries was the best treatise on the subject. The book was several times translated into Latin and English, and once into Welsh. A unique copy of an English version is in the possession of the Cambridge University Library.

HENLEY, William Ernest (1849—). An English author and editor, born at Gloucester. He was educated at the Crypt Grammar School at Gloucester. While ill at a hospital in Edinburgh in 1874—which experience he afterwards embodied in *Hospital Rhymes*—he met Robert Louis Stevenson, and the two men, in many ways alike, were intimate friends for thirteen years. Together they wrote the plays, *Deacon Brodie* (1879); *Beau Austin*, an admirable comedy; *Admiral Guinea;* and *Robert Macaire;* and Stevenson contributed to several of Henley's publications. Henley edited *London* (1877-78); the *Magazine of Art* (1882-86); the *Scots Observer*, which was transferred to London as the *National Observer* (1888-93); and the *New Review* (1893-98). There has been adverse criticism of Henley for his arraignment of Balfour's *Life of Stevenson*, which he claimed did not give a true idea of his friend's character. He has also been criticised for his point of view in the essay on Burns, *The Centenary Burns* (1897), with T. F. Henderson (terminal essay by W. E. H., reprinted as *The Life, Genius, and Achievement of Robert Burns* in 1898). He is strong in his likes and dislikes, and arrogant, even aggressive, in his statement of them. But the brilliant style, the acute insight, the technique, the pungent felicitous wit, make the work a *tour de force* of criticism. His *Views and Reviews, Literature* (1900), and *Views and Reviews, Painting and Sculpture* (1901), are collected from previous publications. They show primarily his own personality, but they are never commonplace and never dull. His learning is solid, whether he touches on literature or art; and he is always suggestive. As a poet, Henley belongs to the 'fleshly school.' In subject and treatment he is essentially modern and original. Perhaps his most characteristic work is *London Voluntaries* (in *Song of the Sword*, 1898). His poetry, like his prose, is egotistical. Sometimes his imagery is grotesque, and his humor of the grimmest, but he has the gift of original and powerful expression. He edited *Lyra Heroica* (1892); *A London Garland* (1895); *English Lyrics* (1897); *The Works of Lord Byron* (1897); *The Poetry of Wilfrid Blunt* (1898, with George Wyndham); and wrote *London Types* (1898, with W. Nicholson); *A Book of Verses* (1888); *Poems* (1898); *For England's Sake* (1900); *Hawthorn and Lavender, and Other Verses* (1901); and *Shakespeare, the Edinburgh Folio* (1901).

HENLEY-ON-THAMES. A town in Oxfordshire, England, on the left bank of the Thames; 35 miles west of London. It is a favorite boating and angling resort, famous for the annual regatta held here since 1839, in which crews from the universities participate (Map: England, E 5). American colleges are frequently represented. An elegant stone bridge which spans the Thames, the old parish church, grammar school, town hall, library and reading-rooms, are prominent features. Henley dates from the Roman occupation and received a charter of incorporation from Elizabeth. Population, in 1891, 4900; in 1901, 5984. Consult Burn, *History of Henley-on-Thames* (London, 1861).

HENLEY REGATTA. The most famous open rowing contest in the world, held annually at Henley-on-Thames, during the month of July. It lasts for three days, during which the gathering of a brilliant assemblage makes the river and its banks a scene of the utmost picturesqueness. In 1829 this course was chosen for rowing contests between Oxford and Cambridge; and in June, 1839, the first regatta was held. The course is one mile 550 yards in length; owing to the narrowness of the river, all races are rowed in heats of only two boats at a time. The events, which are open to all amateurs, English and foreign, are the Grand Challenge Cup, Ladies' Plate, Thames Challenge Cup for eight-oars; Stewards', Visitors', and Wyfold Challenge Cups for four-oars; Silver Goblets (Nickalls Challenge Cup) for pairs; and the Diamond Sculls for single scullers. Toward the close of the nineteenth century the purely amateur character of the regatta was threatened by the increasing participation of crews trained by professional coaches, and competing with all the advantages of professionalism. This gave rise to considerable agitation, and a strong demand on the part of some of the English rowing clubs for the exclusion of foreign crews. The culmination of the agitation occurred in 1902, when a regulation was enacted which prohibited all competing crews and individuals from the enjoyment of a professional coach for a period of thirty days immediately preceding the race or regatta.

HENLOPEN, Cape. See Cape Henlopen.

HENNA, or **HINNA** (Ar. *ḥinnā'*, from *ḥana'a*, to be green). A name given to *Lawsonia alba*, a shrub of the natural order Lythraceæ. The species was formerly divided into *Lawsonia inermis* and *Lawsonia spinosa*, but both are now grouped under *Lawsonia alba*, the only species. They differed in little but that the one is unarmed and the other thorny, the latter being also the larger plant. Henna grows in moist situations throughout the north of Africa, Arabia, Persia, and the East Indies. It is cultivated in many places for the sake of its flowers, which

are much prized for their fragrance, particularly by the Egyptian ladies; but still more for the sake of the leaves, which abound in coloring matter, and which, being dried, powdered, and made into a paste with hot water and catechu, are very generally employed by women throughout the East to stain the nails and tips of the fingers of an orange color; also by men to dye their beards, the orange color being converted into a deep black by indigo; and for dyeing the manes and hoofs of horses, and to dye skins and leather reddish-yellow. Powdered henna-leaves form a large article of export from Egypt to Persia, and to various parts of Turkey, from which they find their way to more northern countries, and even to Germany, to be employed in dyeing furs and some kinds of leather. The use of henna for staining the nails appears to have prevailed from very ancient times. See ALKANET.

HENNE-AM-RHYN, hĕn'ne ăm rēn, OTTO (1828—). A Swiss-German historian of civilization. He was born at Saint Gall in Switzerland, and was the son of Anton Henne, a Swiss historian and poet. He studied at Bern, and after holding several positions as teacher and archivist in Switzerland, went in 1872 to Leipzig, where he was editor of the *Freimaurerzeitung*. From 1882 to 1885 he lectured in the University of Zurich, and since 1885 he has been State archivist at Saint Gall. He wrote: *Geschichte des Schweizervolks und seiner Kultur* (last ed. 1879); *Kulturgeschichte der neuern Zeit* (1870-72); *Die deutsche Volkssage* (1879); *Allgemeine Kulturgeschichte von der Urzeit bis zur Gegenwart* (1877-97); *Kulturgeschichte des Judentums* (2d ed. under the title *Kulturgeschichte des jüdischen Volks*, 1892); *Das Jenseits* (1881); *Die Kreuzzüge und die Kultur ihrer Zeit* (1883-84); *Kulturgeschichte des deutschen Volks* (last ed. 1898); *Die Kultur der Vergangenheit, Gegenwart und Zukunft* (last ed. 1892); *Die nationale Einigung der Deutschen* (1891); *Das Christentum und der Fortschritt* (1892); *Die Frau in der Kulturgeschichte* (1892); *Die Gebrechen und Sünden der Sittenpolizei* (last ed. 1897); *Geschichte des Rittertums* (1893); *Die Freimaurer* (1894); *Die Jesuiten* (3d ed. 1894); *Aria, das Reich des ewigen Friedens im 20. Jahrh. Ein Zukunftsbild* (1895); *Handbuch der Kulturgeschichte* (1900-01). His autobiography appeared in *Deutsche Denker*, vol. viii. (Danzig, 1890).

HENNEBERG, hĕn'ne-bĕrk, WILHELM (1825-90). A German agricultural chemist, born at Wasserleben. He was educated at Brunswick, Jena, Giessen, the agricultural college at Badersleben, and in England. In 1853 he founded at Celle the *Journal für Landwirtschaft;* four years later he was appointed director of the new experimental station near Göttingen, and in 1865 professor in the university. The founder of a new school of agricultural chemistry, especially in the matter of pasturage, he wrote, with Stohmann, *Beiträge zur Begründung einer rationellen Fütterung der Wiederkäuer* (1860-64), and *Neue Beiträge* (1870-71).

HENNEGAU, hĕn'ne-gou. See HAINAULT.

HENNEPIN, ĕn'păn', LOUIS (c.1640-c.1706). A Belgian missionary and explorer in America. He was born at Ath, in Hainault, and at an early age joined the Recollet branch of the Franciscan Order, becoming a successful preacher in Belgium and Northern France. In 1675 he embarked for Canada in the same ship with La Salle, the explorer, and Bishop Laval, of Quebec. The next year he was in the Indian mission of Fort Frontenac, and visited the Mohawk country. In 1678 he accompanied La Salle's expedition to Niagara and the upper lakes, and constructed a vessel in which they proceeded by the Erie, Huron, and Michigan lakes to Saint Joseph's River, which they navigated in canoes. Reaching the Illinois, they built Fort Crèvecœur. Here La Salle left them, and Hennepin and his party proceeded down the Illinois to the Mississippi. They were captured by the Sioux and carried up the Mississippi, but were soon released, and Hennepin returned to Quebec. During this journey Hennepin discovered the Falls of Saint Anthony, July 3, 1680, and one of his party penetrated as far as Lake Superior. Hennepin soon after sailed for France, where he published his *Description de la Louisiane* (1683-84), containing an account of La Salle's expedition and of the missionary's own discoveries. Hennepin refused to return to America, though ordered to do so by his superiors of the Church, and took refuge in Holland. After La Salle's death Hennepin published his *Nouvelle découverte d'un très grand pays situé dans l'Amérique.* In this he claimed to have been the first man to descend to the mouth of the Mississippi—a statement which was easily proved to be false. His works won great popularity and were translated into several languages. Hennepin died at Utrecht about the year 1706. For his life and discoveries, consult: Saint-Genois, *Les voyageurs belges du XIII. au XIX. siècle* (Brussels, 1867); Van Hulet, *Notice sur le père Louis Hennepin* (Liège, 1845); Shea, *Discovery of the Mississippi* (New York, 1852); Parkman, *La Salle and the Discovery of the Great West* (12th ed., Boston, 1887); Winsor, *Narrative and Critical History of America*, vol. iv. (Boston, 1884), contains a full account of Hennepin.

HENNEQUIN, ĕn'kăn', ALFRED (1842-87). A French dramatist, born at Liège, Belgium. He was a pupil at the school of mines in his native town, and practiced engineering, but after 1875 confined himself to play-writing. His early works include: *J'attends mon oncle* (1869), and *Les trois chapeaux* (1870). His first Parisian success was *Le procès Vauradieux* (1875). This was followed by *Les dominos roses* (with Delacour, 1876); *Bébé* (with Najac, 1877); and *Nounou* (1879); *Niniche* (1878); *Lili* (1880); *La femme à papa* (1885), the last three in collaboration with Albert Millaud, and many other gay, daring comedies.

HENNET, ĕ'nā', CHEVALIER ALBERT JOSEPH ULPIEN (1758-1828). A French economist, born at Maubeuge. When he was nineteen he became supernumerary in the Ministry of Finance under Necker, and, although a royalist at heart, acted with such prudence through both Republic and Empire that he became chief commissioner of finance, and held that post from 1813 to 1816. He is well known for his work on finance, including *Théorie du crédit public* (1816), and *Essai d'un plan des finances* (1816), which, however, are largely colored by his partisan views, and also wrote a *Cours d'astronomie* (1820), and some critical work, of which *La poétique anglaise* (1806) may be mentioned.

HENNIGES VON TREFFENFELD, hĕ'nē-gĕs fŏn trĕf'fen-fĕlt, JOACHIM (c.1625-88). A Brandenburg general. He especially distinguished himself in Alsace (1674); was the first to be ennobled by the Elector of Brandenburg; and in 1679 was promoted to the rank of general for his defeat of the Swedish Army near Tilsit. For his biography, consult: Kessel (Stendal, 1863), and Bussler (Gotha, 1897).

HEN'NINGSEN, CHARLES FREDERICK (1815-77). An English soldier of fortune and man of letters. In 1834 he took service in the Russian Army. He joined Kossuth in the Hungarian revolt, came to the United States, and fought with Walker in Nicaragua. At the outbreak of the Civil War he entered the Confederate Army as a colonel. He was promoted to be brigadier-general, and directed the manufacture of the first Minié rifles made in this country. He was the author of *Revelations of Russia* (1845); *The Past and Future of Hungary* (1852); and several other works, published chiefly in England.

HENOCH, hā'nŏĸ, EDUARD HEINRICH (1820—). A German physician, born and educated at Berlin, where he became privat-docent in 1850 and professor eight years later. Associated with Romberg at the Polyclinic, he edited that physician's *Klinische Ergebnisse* (1846). In 1872 he became director of the clinic for children's diseases in the Royal Charité, and retired in 1893. He wrote: *Klinik der Unterleibskrankheiten* (3d ed. 1863); *Beiträge zur Kinderheilkunde* (1861-68); and the well-known *Vorlesungen über Kinderkrankheiten* (10th ed. 1899).

HEN'OTHEISM (from Gk. *ἑς, heis*, one + *θεός, theos*, god). A term used to denote a tendency of the Vedic poets to attribute to a deity especially lauded at a given time the attributes of any other god or of the whole body of gods. This tendency is doubtless more apparent than real. It was but natural that in a hymn to Indra or to Agni the thought of the bard should be focused on the deity in question so that special honors and powers should be assigned him, whichever god he might be. Again, as the religion of the Vedic period was preëminently a nature-worship, it is probable that the changes of the seasons led to the apparent exaltation of certain divinities at one time of the year, and to their apparent dethronement at another time. In this way the so-called henotheism with regard to the various aspects of the sun-god (Sūrya) and of the storm-god (Indra) receives at least a partial solution. There was consequently no constant lord of the Vedic pantheon until the rise of the philosophical speculations which characterized the close of the Vedic age. It must also be borne in mind that expressions of laudation, which, taken by themselves, seem exaggerated, are almost invariably checked by the context in the Veda. The origin of henotheism is based on the syncretistic trend of the Hindu mind. It is noteworthy that it is the later deities especially who are treated henotheistically, and herein lies the key to the problem. The Vedic poets, long before the Rig Veda had been completed, rising in their religious concepts from a low stage of nature-worship and crematheism, or worship of material objects, especially useful ones, identified each and every god, and at a later age all living creatures and all things, with the All-Soul (called Atman, Brahma, etc.). Each god being therefore a phase of the supreme deity, and not a distinct divinity, might receive as the temporary representative of the All-Soul precisely the same attributes as any other god, controlled, however, by the traditional views held by the priests or the people concerning him.

The same religious phenomenon occurs elsewhere, as in the philosophical aspects of Greek religion. The term is sometimes used to denote the conception of a special god for each nation or tribe. Nowhere else, however, does henotheism become a distinctive trait of the faith as it did in India. After the close of the Rig-Vedic period it practically vanishes, since by that time the esoteric unitarianism on which it was based had permeated the entire body of the religious and philosophical thought of India. As a term henotheism is scarcely a fortunate one, and many scholars prefer to call the religious impulse syncretism instead. Consult Hopkins, "Henotheism in the Rig-Veda," in *Classical Studies in Honor of Henry Drisler* (New York, 1894).

HEN'RI, ROBERT (1865—). An American landscape and portrait painter, born in Philadelphia, Pa. He studied in his native city, and for several years was a teacher in the Philadelphia School of Design. His pictures have been received at both Salons, and his "Snow" (1899) is in the Luxembourg. While in Paris he established a studio at which several of the 'Glasgow School' received valuable instruction. His landscapes are broadly painted and vigorous. Especially noticeable are the cloud effects in such pictures as "A Sudden Shower," and "Cumulus Clouds, East River." His "Figure of a Girl" (1902) is a strong and individual example of his skill as a portraitist.

HENRI III. ET SA COUR, äN'rē' trwä à sà kōōr (Fr., Henry III. and his Court). A prose drama by the elder Dumas, produced February 11, 1829. With it he was supposed to found the Romantic School of the drama; but he denies this in the preface of the play, giving that honor to Hugo, Mérimée, Vitet, and others.

HENRIADE, äN'rē-äd', LA. An epic poem of ten cantos in Alexandrine couplets, by Voltaire, begun during his confinement in the Bastille in 1717, and first printed at Rouen in the winter of 1722-23 under the title *Poème de la Ligue*. During the author's English exile (1726-29) he published the *Henriade* by subscription (1728) with a dedication to Queen Caroline, "not only as the protectress of arts and sciences, but as the best judge of them." A number of editions followed in England, Holland, and France, where the work, in spite of its political theories and attacks on religion, was generally admired. The poem, by picturing religious wars, sought to inspire a hatred of fanaticism and intolerance. It lacks sentiment and poetic imagination, but is important on historical and philosophical grounds.

HENRICI, hĕn-rē'tsē, CHRISTIAN FRIEDRICH (1700-64). A German poet (also called 'Picander'), born at Stolpen, near Dresden, and educated at Wittenberg and Leipzig. His ability as a poet, it seems, won him first a place in the Postal Department, and then an office as an excise and tax collector. His poetry includes the *Ernstscherzhafte und satyrische Gedichte* (1727-37); the *Sammlung vermischter Gedichte* (1768); and the *Teutsche Schauspiele* (1726), which are

very obscene, but none the less valuable as a picture of contemporary life, especially at the universities. His devotional poetry includes many verses for the compositions of Johann Sebastian Bach, especially his passion music; and, among other hymns, *Wer weiss, wie nahe mir mein Ende.* Consult Flossman, *Picander* (Leipzig, 1899).

HENRICIANS, hĕn-rĭsh'anz, or **HENRICANS.** The followers of Henry of Lausanne in the twelfth century. Grieved at the corruption of the times, Henry left the Benedictine monastery of Clugny, to which he belonged, in Southern France. His consistent life and the eloquence of his discourses deeply moved the people. At first Hildebert, his bishop, favored him, but afterwards drove him from Le Mans. Joining the disciples of Peter of Bruys (see BRUYS, PIERRE DE) in Provence, he was arrested by the Archbishop of Arles, and at the second Council of Pisa (1135) was declared a heretic and placed in a cell. Subsequently released, he again went to the south of France, where he had a great influence over the lower classes. He was arrested by Pope Eugenius III., and at the Council of Rheims (1148) condemned to perpetual imprisonment. He died in prison in 1149.

HEN'RIET'TA. A town and the county-seat of Clay County, Tex., 96 miles northwest of Fort Worth; on the Little Wichita River, and on the Fort Worth and Denver City and the Missouri, Kansas and Texas railroads (Map: Texas, E 3). As the centre of an agricultural and stock-raising country, Henrietta has a considerable trade in grain and live stock; and among its industrial establishments are grain-elevators, flour-mills, cotton-gins, lumber-yards, etc. Building-stone is quarried in the vicinity. Population, in 1890, 2100; in 1900, 1614.

HENRIETTE, ăn'rē'ĕt'. The simple, unaffected *ingénue* in Molière's *Femmes Savantes,* whose pedantic mother and sister give the title to the play. She marries Clitandre in spite of all Armande's machination; and is considered the truest type of womanliness on the French stage.

HENRIOT, ăn'rē'ō', FRANÇOIS (1761-94). A French politician, born at Nanterre. He was educated as a choir-boy, and little is known of him until 1789, when he left his post in the city employ and joined the *sans-culottes,* who made him one of their commanders. He was a leader in the massacres of the Carmes and Saint Firmin (1792), and in the following year was appointed by the Commune provisional general of the army in Paris. A year later he resigned from this post, and was elected general of the National Guard three weeks afterwards, but refused to 'command the army against the people.' In 1794 his arrest was ordered on the suggestion of Tallien and Delmas; he made a bold attempt to rouse the mob in his behalf, but was taken and guillotined with Robespierre.

HENRIQUEL-DUPONT, ăn'rē'kĕl' dụ'pôn', LOUIS PIERRE (1797-1892). A French designer and engraver. He was born in Paris, June 13, 1797. After studying in the Ecole des Beaux-Arts he entered the studio of Pierre Guérin (q.v.), and after remaining there three years turned his attention to engraving under Bervic. His first production, the "Portrait of a Young Woman with Her Infant," gained the second medal at the exhibition of 1822. He produced in succession a "Portrait of M. de Pastoret;" "Strafford;" "The Interment of Christ," after Paul Delaroche; "The Abdication of Gustavus Vasa," after Hersent; "The Disciples at Emmaus," after Paul Veronese; "The Marriage of Saint Catharine," after Correggio; and other works. Ten years of his life were employed in reproducing the "Hemicycle" of Paul Delaroche (q.v.). He was considered the most eminent French engraver of the day; his work is characterized by accuracy of design and purity of style. He became member of the Academy in 1849, and professor at the Ecole des Beaux-Arts in 1853, and was elected an honorary member of the Royal Academy of London in 1869. He died in Paris, January 20, 1892.

HENRIQUEZ, ĕn-rē'kăth, FRANCISCO FERNANDEZ DE LA CUEVA. See FERNANDEZ DE LA CUEVA, HENRIQUEZ FRANCISCO.

HENRY (named in honor of Joseph *Henry*). The practical unit of induction in the measurement of self and mutual induction. (See ELECTRICITY and ELECTRICAL UNITS.) It is the induction in a circuit if the induced electro-motive force in it is one volt when produced by the variation of a current at the rate of one ampere per second. The henry is, therefore, substantially 10^9 times the C. G. S. electromagnetic unit of induction.

HENRY I. (876-936). King of Germany from 919 to 936, surnamed the Fowler. He was the son of Otho, Duke of Saxony, and was distinguished in early youth for the courage and energy with which he warred against the Slav tribes to the east of his native duchy. Otho, who died in 912, appointed Henry his successor, not only as Duke of Saxony, but as Lord of Thuringia and part of Franconia. The German King Conrad I., instigated by certain ecclesiastical advisers whom Henry's independent bearings toward the Church had deeply offended, resisted the claims of the young Duke; but the latter was ultimately left in possession of all the lands over which his father had ruled. After Conrad's death, Henry, to whom Conrad had sent the royal insignia, was chosen King by the Franconian and Saxon nobles (919), and he had little difficulty in securing the acquiescence of the rest of Germany. For some years Lotharingia or Lorraine had held an uncertain position between the kingdoms of the East and the West Franks, as Germany and France were then called; but in 925 Duke Giselbert transferred his allegiance from the French to the German King. From the time of Louis the Child, Germany had been exposed to the inroads of the Hungarians. In 924 Henry had to purchase a truce of nine years by agreeing to pay an annual tribute to the Hungarians. The King made use of this respite by preparing his subjects for a final struggle with the barbarous invaders. In the northern districts the Germans had hitherto lived for the most part in small villages or on separate settlements. Henry began building fortified cities throughout Saxony and Thuringia, and in the remaining duchies his example was followed. He also trained his vassals to meet the enemy on horseback, thus giving a strong impetus to the movement which resulted in the institution of chivalry. When his arrangements were complete he tried his new force in a contest

with the Danes and with some Slav tribes, whom he utterly defeated. In 933 the Hungarians demanded as usual the tribute which had till then been punctually paid, and when it was refused invaded Thuringia with a great army. Henry defeated them so decisively that they did not again enter Germany for some years, and were never again seen in the northern duchies. In 934 Henry fought against the Danes and compelled their King to pay tribute. In the internal affairs of the realm he acted with great precaution and judgment. The dukes by this time had become so powerful that there was some danger of their altogether overshadowing the throne. Instead of directly forcing them to submission, as was afterwards done by his son Otho, he attached them to his interests by confirming them in many of their rights, and by acting as a mediator in their disputes. Toward the close of his life his position was so secure that he resolved to go to Rome either on a pilgrimage or to claim the Imperial crown; but he died of apoplexy, July 2, 936. Consult Waitz, *Jahrbücher des deutschen Reichs unter Heinrich I.* (3d ed., Leipzig, 1885).

HENRY II. (c.973-1024). Holy Roman Emperor from 1002 to 1024. He was the son of Henry the Quarrelsome, Duke of Bavaria, and a grandson of Henry I. (q.v.). He was in Italy with Otho III. in 1001, and upon the latter's death, in January, 1002, hastened to secure possession of the Imperial power, with the aid of the Archbishop of Mainz. He was crowned at Mainz, June 3, 1002. His most determined enemy during the greater part of his reign was Boleslas Chrobry (the Brave) of Poland, who annexed Bohemia, and during the King's absence in Italy, in 1004, invaded Lusatia and Meissen. Henry hurried back, defeated Boleslas in 1005, and granted Bohemia as a fief to Jaromir, of the native House of the Premyslides. Boleslas, however, continued the war, which was not ended until 1018, when Henry was obliged to conclude peace on terms favorable to the Polish King. In the midst of this struggle he had to make war on Adalboro, his wife's brother, who had seized the Archbishopric of Treves, and was protected in his claim by another brother of the Empress, the Duke of Bavaria. Both were overcome and deprived of their dignities, although Bavaria was ultimately restored to the elder of the two brothers. Henry also put down rebellions in Flanders and Meissen, and concluded, in 1007, a treaty with Rudolph III. of Burgundy, whereby, after Rudolph's death, his territories were to be united to Germany. In 1013 Henry went for the second time to Italy, where Arduin had raised himself to the throne. The usurper was displaced, and in 1014 Henry was crowned Emperor at Rome by Benedict VIII., whom he had confirmed in the Papal See in opposition to the Antipope Gregory. At the request of Benedict the Emperor returned to Italy in 1022, in order to drive back the Greeks, who were steadily pressing northward. Henry died July 13, 1024, and was canonized by Pope Eugenius III. in 1146. His wife, Kunigunde, was also ranked among the saints. Henry founded the Bishopric of Bamberg, which was given very great privileges, and which the Pope took under his immediate protection. Consult Hirsch and Bresslau, *Jahrbücher des deutschen Reichs unter Heinrich II.* (Leipzig, 1862-75).

HENRY III. (1017-56). Holy Roman Emperor from 1039 to 1056. He belonged to the Franconian or Salic line, and was the son of Conrad II. He was crowned Duke of Bavaria in 1027, King of the Germans as successor presumptive to his father, 1028, Duke of Swabia and King of Burgundy in 1038, and became King of Germany at his father's death, in 1039. Henry possessed great natural abilities, had been educated with the utmost care, and succeeded to an exceptionally strong dominion. The four duchies of Franconia, Swabia, Bavaria, and Carinthia were at first in his own hands, and two only, Saxony and Lorraine, had semi-independent dukes. Under him the German Empire attained to very great power. Poland was a subject principality, the Bohemian Duke was compelled to become Henry's vassal in 1041, and for a time the King of Hungary acknowledged his overlordship. In Italy Drogo, the Norman, became his vassal for Apulia. In 1046 Henry made his first expedition to Italy, summoned to end the troubles caused by the three rival popes, Benedict IX., Gregory VI., and Sylvester III. All three were deposed. Henry was asked to appoint a new Pope, and during the remainder of his reign the occupants of the Papal chair were nominated by him. He was crowned Emperor at Christmas, 1046. From this time on, however, Henry was compelled constantly to face revolts in different parts of his dominions. The revolt of Godfrey in Lorraine proved exceedingly formidable, but Henry ultimately triumphed. He died on October 5, 1056. Henry was deeply devoted to the Church, and earnestly endeavored to reform the clergy. He aided the Papacy in securing the power which was to be so dangerous to his son; but during his life the popes and the Emperor worked in harmony to check the abuses in the Church. Consult: Steindorff, *Jahrbücher des deutschen Reichs unter Heinrich III.* (Leipzig, 1874-81); Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. ii. (5th ed., Leipzig, 1885).

HENRY IV. (1050-1106). Holy Roman Emperor from 1056 to 1106. He was the son of Henry III., and was born November 11, 1050. He had been crowned in 1054, and although only six years old at his father's death, was recognized at once as King of Germany, Italy, and Burgundy, his mother, Agnes of Poitou, ruling in his name. Henry III. had exercised great power over the Church and had greatly strengthened the Papacy; in Germany he had held the nobles in subjugation against their will. Now both the Church and the nobles seized the opportunity to achieve their independence. The brother of Godfrey of Lorraine (see HENRY III.) was elected Pope as Stephen IX., and Godfrey was made Imperial vicar in Italy. Agnes was not strong enough to rule effectively. She was forced to cede Lorraine to Godfrey, and to bestow upon the most powerful of the nobles the three great southern duchies of Swabia, Bavaria, and Carinthia, thus undoing the work of Conrad II. (q.v.). Her authority was not recognized in Italy. Even the bishops in Germany, who had been the chief instruments of her husband, deserted her. In 1062 Anno, Archbishop of Cologne, seized Henry by treachery and governed in his

name. Under Anno's regency the German authority was reëstablished over Hungary. The Archbishop, however, was greatly disliked by Henry, and was forced to make way for the Archbishop Adalbert of Bremen, who became the young King's tutor, and in 1065 caused him to be declared of age. Henry had been brought up very badly. He had ability, but an ungovernable temper; he was brave, but a poor general; he was surrounded by flatterers, and at first gave himself up almost entirely to pleasure. Germany soon sank into a state of feudal anarchy. The Slavs revolted and devastated the northeastern parts of the Empire, while the Danes held the Baltic coast. Henry attempted to reëstablish his authority by degrading the independent dukes in the south, by imprisoning the Duke of Saxony, and by erecting many fortresses in his duchy. The Saxons revolted in 1073, instigated in large measure by their bishops, and Henry barely escaped from their hands. The nobles in the north aided him against Saxony, and in June, 1075, he won a great victory on the Unstrut which temporarily crushed the rebellion; for the first time he seemed to be really powerful.

But the greatest danger came to a head just at this time. After the death of Henry III. the Papacy had gradually freed itself from Imperial control. In 1059 a decree had been enacted which gave the election of the Pope to the college of cardinals, and during the period of disorder in Germany the Church, under the guidance of Hildebrand, had gained steadily in power. In 1073 Hildebrand was elected Pope as Gregory VII. (q.v.), and proceeded with greater energy to carry out the policy of ecclesiastical and Papal supremacy with which he had been identified so closely under the two preceding popes. In 1075 a synod at Rome passed a decree against lay investiture, threatening secular princes who should presume to confer abbacies or bishoprics on priests with excommunication. The bishops and abbots in the Empire held great possessions and were great territorial lords. If Henry could not control their appointment, a large part of his resources and power would be taken from him and a large section of the Empire would become independent. As long as the bishops and abbots continued to hold their temporal possessions as feudal lords, it was absolutely necessary to the King to have them under his control. On the other hand, the Church was determined to appoint its own officials. When Henry therefore appointed an archbishop for Milan, Gregory sent legates to demand that he should obey the decree against lay investiture, charging him at the same time with simony and oppression of the clergy. Henry, however, was elated by his great victory over the Saxons, and in no mood to temporize, as he had done previously. He retorted by convoking a German council at Worms, January 24, 1076, which deposed the Pope. The Pope in return excommunicated Henry, decreed his deposition, and released his subjects from their oath of allegiance. All of Henry's enemies seized this opportunity to revolt, and proposed to elect a new king, and the most that Henry could obtain was a respite. He was deprived of all authority, and if not absolved within a year was to be deposed.

The Pope seemed to be entirely triumphant, and Henry doomed to degradation; but there was one weak point in Gregory's position which afforded Henry a chance of redeeming his fortunes. As a Christian priest the Pope was bound to pardon a penitent who sought absolution; when, therefore, Gregory, who had promised to take no action without the consent of the German nobles, with whom he was to hold a council, set out for Germany, Henry hurried to Italy to meet him. The Lombards, who were hostile to the Pope, welcomed the Emperor eagerly, and he soon had an army at his command. Gregory took refuge in the strong castle of Canossa, belonging to Countess Matilda of Tuscany. Henry, however, had not come to fight, but to seek absolution. For three days (January 25-27, 1077) he begged admission to Canossa as a penitent, waiting barefooted at the gate of the courtyard of the castle; and finally Gregory had to yield and to grant the desired absolution. Canossa was the deepest possible humiliation for Henry, but his act had won for him a diplomatic victory. He had prevented the meeting between Gregory and the nobles, and had placed the latter in the position of rebels, if they persisted in their hostility.

Many of them did persist, and elected an anti-king in the person of Rudolph, Duke of Swabia; but Henry now had many partisans. Civil war raged throughout Germany, and every part of the country except Saxony was divided into two parties. Gregory VII. hesitated, but finally in 1080 recognized the anti-king, and excommunicated Henry once more. Rudolph, however, was killed soon after, and his death was accepted as a judgment of God. An antipope, Clement III., was elected by the Imperial Party, and in 1084 Henry captured the city of Rome and installed the antipope, who gave him the Imperial crown; but in the same year the Emperor, who had been besieging Gregory VII. in Sant' Angelo, was driven from Rome by Robert Guiscard (q.v.). Gregory VII. died soon after in exile. The strife went on in Germany, where Henry had to contend against two other anti-kings—Hermann of Luxemburg, who died in 1087, and the Margrave of Meissen, whose death occurred in 1089. Supported by Godfrey of Bouillon (q.v.) and Frederick of Swabia, the ancestor of the Hohenstaufen, Henry was on the whole successfully asserting himself, when his eldest son, Conrad, joined the Emperor's enemies. For a time this weakened the Emperor, but he gradually won the support of the great nobles, all of whom were weary of the strife. Conrad was deposed from his position as heir to the throne, and died in 1101, and Henry, the second son of the Emperor, was declared heir. Henry's difficulties, however, were not over. The Pope, Paschal II., renewed the excommunication against Henry. His second son was induced to rebel, and the Emperor was made prisoner December, 1105, and forced to abdicate. He died soon after, August 7, 1106, while preparing to make war upon his son. As he died excommunicated, his body remained unburied for five years. During the latter part of his life especially, he was very popular with the people, who mourned his loss. Consult: Meyer von Knonau, *Jahrbücher des deutschen Reiches unter Heinrich IV. und Heinrich V.* (Leipzig, 1890-94); Floto, *Heinrich IV. und sein Zeitalter* (Stuttgart, 1855-57); Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. iii. (5th ed., Leipzig, 1890); also the authorities referred to under GREGORY VII. See INVESTITURE.

HENRY V. (1081-1125). Holy Roman Emperor from 1106 to 1125. He was the second son of Henry IV., and was appointed his father's successor in 1098 after his elder brother, Conrad, had forfeited his right to the throne by rebellion. Six years afterwards he himself rebelled against the Emperor. The Papal party, with which he allied himself, took for granted that when he mounted the throne Church and State would instantly be reconciled; but their hopes were disappointed. The main point for which Henry IV. had contended was the right of investing the bishops with ring and staff. When Henry V. succeeded him in 1106, Pope Paschal II. demanded that this right should be given up, but Henry replied that he could not resign powers that had been exercised by his predecessors, and the loss of which would imply that the ecclesiastical lands of Germany would be removed from secular control. In 1110 he entered Italy at the head of 30,000 men. Paschal proposed that the Church should give up its property and feudal privileges if Henry would renounce the right of investiture. To this the latter agreed, and a day was appointed for the coronation of Henry as Emperor. The opposition of the Roman prelates made it impossible for the Pope to proceed with the ceremony, whereupon he and his cardinals were made prisoners. Paschal then formally recognized the right of investiture, and Henry received the Imperial crown. When the Germans had recrossed the Alps, Paschal renounced the treaty he had concluded, and the Emperor was excommunicated. As many of the princes were pleased to avail themselves of this opportunity for rebelling, Germany again became the scene of confused contests like those which had plunged the country into misery during Henry IV.'s long reign. In 1116 the Emperor went a second time to Italy and drove Paschal from Rome, and after Paschal's death he caused Gregory VIII. to be elected Pope. The Papal party, however, selected Gelasius II., who renewed the sentence of excommunication against Henry. The latter returned to Germany in 1119, and at the Diet of Tribur succeeded in allaying the hostility of the more important among his enemies. Pope Calixtus II., who succeeded Gelasius in 1119, now found it necessary to offer a compromise; and the controversy between the Empire and the Papacy was for the time closed by the Concordat of Worms (1122), in which it was agreed that at every election of a prelate in Germany the Emperor should have the right of being present in person or through a representative, and that the chosen bishop or abbot, before being consecrated, should receive his lands and secular authority in fief of the Crown. In the other parts of the Empire the election was to be free and canonical, and the Emperor to confer the secular authority after the consecration. Henry died at Nimeguen, May 23, 1125. Consult: Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. iii. (5th ed., Leipzig, 1890). See INVESTITURE; WORMS, CONCORDAT OF.

HENRY VI. (1165-97). Holy Roman Emperor from 1190 to 1197. He was the son of Frederick Barbarossa, and was crowned King in 1169. He assumed control of the government on his father's departure for the Holy Land in 1189, and on the latter's death, in the following year, succeeded to the throne. He shared the intellectual culture of his time, and was distinguished for the splendor of his political schemes; but he was of a stern disposition, and in order to attain his ends was guilty of cruelty. Henry the Lion (q.v.), who had been banished to England by Frederick I., had returned to Germany in 1189, and again disturbed the country with his wars. King Henry, after restoring peace, hastened to Rome, where he was crowned Emperor in 1191. Through his wife, Constance, he had a claim to the throne of Sicily; but the Sicilian nobles made Count Tancred, an illegitimate son of Constance's brother, King. After receiving the Imperial crown, Henry advanced against Tancred. He was successful in Sicily, but before Naples his army was struck by pestilence, and he was forced to return to Germany. There he suppressed various private wars, and compelled Henry the Lion to acknowledge his supremacy. The great ransom which he received from Richard I. of England (q.v.) enabled him to fit out a large army, and with this he descended upon Italy in 1194, and without much difficulty conquered the Sicilian kingdom. Tancred was dead, but he had left a number of relatives, who were so barbarously treated that the people were seized with terror. On his return to Germany it was easy for Henry, with the prestige which he had now acquired, to enforce submission; and so great was his authority that, in 1196, he endeavored to secure the declaration that the crown be made hereditary in his family. Had he lived some years longer he would probably have succeeded, but he died suddenly at Messina, September 28, 1197. His power was greater than that wielded by any other German Emperor. Aside from his firm control over the Imperial lands, Sicily had been subdued, and Richard of England, the King of Cyprus, and Bohemond of Antioch had become his vassals. Consult Toeche, *Jahrbücher des deutschen Reichs unter Heinrich VI.* (Leipzig, 1867).

HENRY VII. (?-1313). Holy Roman Emperor from 1308 to 1313, the first of the line of Luxemburg. He was the son of Duke Henry III. of Luxemburg, and succeeded Albert I. as German King in 1308, being crowned at Aix-la-Chapelle in the following year. When he came to the throne Bohemia was subject to Henry of Carinthia, who was greatly disliked by his subjects. The King displaced him in 1310, and enriched his own family by granting Bohemia, at the request of the Bohemians themselves, to his son John, whose claims were rendered secure by his marriage with Elizabeth, the daughter of Wenceslas II. For some time no German King had sought the Imperial crown; but Henry resolved to revive the traditions which were dying out, and with a view to this result did what he could to compose the differences between the nobles and to gain their allegiance. He was welcomed in Italy with eagerness by the Ghibellines, whose great poet, Dante, saw in Henry VII. the savior that was to rescue Italy from anarchy and to bring it peace and honor. The *De Monarchia* of Dante was probably written at this time. In 1312 Henry was crowned Emperor of Rome, having previously received the iron crown of Lombardy in Milan. He was preparing to undertake an expedition for the conquest of Naples, when he died suddenly, near Siena, August 24, 1313. It was generally believed at the time that he had been poisoned by a Dominican monk, but this was not proved. Consult: Dönniges, *Acta Henrici VII.* (Berlin,

1840-41); Barthold, *Der Römerzug König Heinrichs von Lützelburg* (Königsberg, 1830-31); Pöhlmann, *Der Römerzug Kaiser Heinrichs VII.* (Nuremberg, 1875).

HENRY I. (1068-1135). King of England from 1100 to 1135. He was the fourth son of William the Conqueror, and was born, according to tradition, at Selby, in Yorkshire. Unlike his elder brothers, Robert and William Rufus, he was of a studious disposition, and received what was for the times an excellent education, being known later in history as Beauclerc. At his father's death he received £5000, but no lands. With £3000 he bought from his brother Robert, Duke of Normandy, the Avranchin and the Côtentin, and displayed great ability in the government of his territories. In 1091 William Rufus and Robert wrested his possessions from him, after besieging him for a long time in Mont Saint-Michel. For a time he wandered about, a landless man, until the men of the town of Domfront, on the river Varenne, invited him to become their lord. Henry thus obtained possession of a powerful stronghold, which he used as a base of operations in numerous raids against his brother, the Duke of Normandy, and Robert of Bellême. After 1094 he and William were allies, and in 1096 he received from the latter the counties of Coutances and Bayeux. When William Rufus was found dead in the New Forest, where the two brothers had been hunting, August 2, 1100, Henry at once rode to Winchester and seized the royal treasury, and two days later was crowned at Westminster, publishing a charter of rights which was subsequently taken as the basis of Magna Charta. To strengthen his hold on the crown, he recalled Anselm, the exiled Archbishop of Canterbury, thus gaining the support of the clergy, and by his marriage to Eadgyth, or Matilda, daughter of Malcolm Canmore, King of Scotland, and great-granddaughter of Edmund Ironside, he won the affections of his Saxon subjects. Henry successfully defended the throne against his brother Robert. In July, 1101, the Norman Duke invaded England, and Henry was forced by a conspiracy among his nobles to come to terms with his brother, ceding to Robert all his possessions in Normandy excepting Domfront, and granting him a pension. War with Robert broke out again in 1105, and on September 28, 1106, Henry defeated the Duke in a bloody battle before the walls of Tinchebray, and took him prisoner. Robert was confined in Cardiff Castle till his death, in 1134. The acquisition of Normandy added greatly to Henry's strength; but he had some trouble in keeping the duchy, as the French King, Louis VI., and the Count of Anjou took part with William, Robert's youthful son. A desultory warfare was carried on from 1109 to 1120, during which a large part of Normandy was devastated and great atrocities were committed on both sides. The death in 1120 of his son William, whom the King greatly loved, was a severe blow to Henry. To prevent the crown from falling into the possession of his nephew William, he caused his barons in 1126 to accept as his successor in England and Normandy his daughter Matilda, who in 1128 became the wife of Geoffrey Plantagenet, Count of Anjou. Henry died on December 1, 1135, near Rouen.

The reign of Henry I. was important for the progress that was made toward the amalgamation of the Saxons and the Normans in England. The feeling of English nationality was greatly stimulated by the wars carried on against the French and the rebellious nobles in Normandy. The King continued the policy of the Conqueror in relentlessly crushing down the opposition of the great nobles, and in making himself the champion of the common people against their territorial lords. In carrying out this policy the functions of the *curia regis*, or King's Court, were greatly increased, and for the first time justices as guardians of the King's peace were sent through the country. The great offices of State were conferred by preference on the members of the clergy. Yet in his struggle with Anselm and other prelates over the rights of nomination and consecration of bishops, the King knew how to keep the virtual power in his own hands without arousing the open hostility of the Church. Henry had great natural ability, especially in the line of State intrigue. He was, however, dissolute, cruel, avaricious, and given to acts of meanness. His influence on English history, nevertheless, was lasting. Consult: Freeman, *The Norman Conquest*, vols. iv. and v. (Oxford, 1867-79); id., *William Rufus* (Oxford, 1882); Norgate, *England Under the Angevin Kings* (London, 1887); Stubbs, *Constitutional History of England*, vol. i. (Oxford, 1891).

HENRY II. (1133-89). King of England from 1154 to 1189. He was the grandson of Henry I. by his daughter Matilda and her second husband, Geoffrey Plantagenet, and was born March 5, 1133, at Le Mans, in Maine. From his birth he was regarded as the successor of Henry I.; but on the death of the latter, in 1135, the English crown was seized by Stephen of Blois, and a civil war followed, in which the country was devastated and reduced to anarchy. During his minority Henry's affairs were under the care of his mother, Matilda, and her half-brother, Robert, Earl of Gloucester. In 1151 Henry received Normandy from the French King; the death of his father soon after left him master of Anjou, Maine, and Touraine; and by his marriage, in May, 1152, to Eleanor, the divorced wife of Louis VII. of France, he added to his possessions the immense territories of Guienne (Aquitaine) and Poitou, so that he was the ruler of more extensive domains in France than the French King himself. In 1153 Henry made an attempt to conquer England. After nine months of fighting it was agreed, by the Treaty of Wallingford, November, 1153, that Stephen should reign during his lifetime, and that Henry should succeed him. Stephen's death occurred the following year, and Henry was crowned December 19, 1154, together with his Queen, Eleanor. The early years of his reign were devoted to the restoration of peace, and the reduction of the powerful nobles who had taken advantage of the civil war to make themselves virtually independent of the royal authority. The judicial and financial systems were reorganized, and the Crown was freed in great measure from its dependence on the great feudatories by the institution of 'scutage' or shield money as a substitute for personal military service, due from the vassal, thus enabling the King to maintain a standing force subject to his will alone. The chief obstacle in the way of Henry's schemes for the aggrandizement of the royal power was the

clergy, whose immunity from the jurisdiction of the secular courts made them a disturbing factor in the judicial administration of the country. To aid him in reducing the Church to submission to the civil power, Henry appointed his trusted Chancellor, Thomas à Becket (q.v.) to the See of Canterbury, in June, 1162. Becket, however, to the surprise and indignation of the King, became the most fervent champion of ecclesiastical privilege and repeatedly thwarted the royal measures aimed against the Church. Henry succeeded, nevertheless, in wringing from the bishops a ratification of the ancient customs of the land as reenacted in the Constitutions of Clarendon in 1164. (See CLARENDON, CONSTITUTIONS OF.) The long struggle with Becket was terminated only by the latter's murder, in 1170. Henry did penance at his grave, allowing himself to be scourged by the monks; but though the Constitutions of Clarendon were formally repealed, the King was ultimately successful in reducing the Church to subordination in civil matters. The administration of justice in the criminal courts was regulated in 1166 by the Assize of Clarendon. See CLARENDON, ASSIZE OF.

During Henry's reign occurred the conquest of Ireland. That country was then the home of a number of tribes or clans, and Pope Adrian IV. in 1155, by a bull, is said to have given Henry the authority over the entire island, and ordered the inhabitants to obey him. In 1166 the intervention of the English was solicited by one of the Irish petty kings, Diarmait of Leinster (see MACMURROUGH), and Henry gave leave to any of his subjects to aid him. Robert Fitzstephens, Constable of Albertivi, Maurice Fitzgerald, and Richard de Clare, surnamed Strongbow, Earl of Strigul, went over with a few hundred men-at-arms, and in four years conquered the coast region from the Nore to the Liffey. Their success was so rapid that Henry became jealous, and in 1171 went over himself with an army of four thousand men to complete the conquest of the country. All Ireland except Connaught submitted for the time, but the majority of Irish tribes and chieftains continued to be independent for centuries. During this reign, also, the first ascendency of England over Scotland was gained. Henry's sons, incited by their mother, rebelled against him (1173), and their cause was espoused by the Kings of France and Scotland. The latter, William the Lion, was ravaging the north of England with an army, when he was surprised at Alnwick and taken prisoner, July 13, 1174. To obtain his liberty, he stipulated to do homage to Henry for Scotland, and to cede to him five of his strongest fortresses. In Normandy, Anjou, and Aquitaine, Henry was equally successful in suppressing the rebellion. In the course of a second rebellion of his sons (1183) Henry, the eldest son, died; Geoffrey, the second son, died three years later. Richard Cœur-de-Lion still remained hostile to his father, and with the aid of King Philip Augustus of France drove Henry from Maine and Anjou. Deserted by all his troops, Henry was compelled to come to terms with Richard. On July 4, 1189, peace was concluded at Colombières. One of the stipulations was for an indemnity for all the followers of Richard. The sight of the name of his favorite son John in the list, acting upon a constitution weakened by many cares, threw the King into a fever, of which he died, July 6, 1189, at Chinon.

Henry was a man of restless energy, subject to sudden outbursts of a mad temper, but a born ruler, nevertheless, who gave to his subjects justice and peace. During his reign the barons were overawed, and hundreds of their castles were destroyed. Law made very great progress; circuit courts were established, and Henry facilitated the making of appeals to his own courts, in order to bring the people into direct dependence upon the King. The earliest writer on English law, Ranulf de Glanville, was Henry's chief judiciary. In intellect and character he resembled his grandfather, Henry I. He had three illegitimate children; his mistress, the Fair Rosamond (q.v.), may have been the mother of the first of the two that are remembered: William Longsword, Earl of Salisbury, and Geoffrey, who became Archbishop of York, and who was faithful to him when his four legitimate sons took up arms against him. Henry was a great builder of palaces and roads; of the latter, the great embankment, 30 miles in length, erected to prevent floods from the river Loire, still remains in use. He was a lover of learning and an assiduous reader. His great work for England consisted in uniting the conquerors and conquered into one race, and in laying the foundation for the present Greater Britain by the conquest of Ireland. Consult: Norgate, *England Under the Angevin Kings* (London, 1887); Stubbs, *Constitutional History of England* (Oxford, 1891); id., *The Early Plantagenets* (London, 1876); Green, *History of the English People* (London, 1874); Mrs. J. R. Green, *Henry the Second* (London, 1888).

HENRY III. (1207-72). King of England from 1216 to 1272. He was the eldest son of King John and of Isabella of Angoulême, and was born at Winchester, October 1, 1207. He succeeded his father in 1216, under the regency of William Marshall, Earl of Pembroke. The French Dauphin, who had invaded England during the lifetime of King John, in response to an invitation by a party among the nobles, was defeated in 1217, and the confirmation of Magna Charta in the same year established Henry securely on the throne. The Regent died in 1219, and the chief powers of government were exercised by Stephen Langton, Archbishop of Canterbury, and the Justiciar Hubert de Burgh. The dismissal of Hubert in 1232 was followed by the rule of foreign favorites, which stirred up great dissatisfaction in the nation. Henry was constantly beset with hosts of his Poitevin relations and men from the country of his Queen, Eleanor of Provence, whom he married on January 14, 1236. His weakness was shown also in his failure to make a stand against the exorbitant exactions of the clergy and the Pope. Schemes for foreign conquest loaded the nation with a heavy debt and increased the general discontent. In 1258 the barons in Parliament, headed by his brother-in-law, Simon de Montfort, Earl of Leicester, rose against him, and forced him to transfer his power temporarily to a commission of barons and to enact a number of reforms. He agreed to these demands by the Provisions of Oxford (q.v.). The barons, however, failed to make any use of that power in reforming the State, and the King utilized the opportunity to regain the power which he alleged, with truth, had been taken from him by compulsion, though his action had worn the appear-

ance of free will. The question of the validity of these provisions was submitted by both parties to Saint Louis of France, who in the Mise of Amiens (q.v.) annulled the provisions (1264). Leicester and his party refused to be bound by the decision, and took up arms against the King. They defeated him and took him prisoner in the battle of Lewes, on May 14, 1264. The battle was followed by an agreement known as the 'Mise of Lewes' (q.v.), more humiliating to the King than the Provisions of Oxford. Leicester, being virtual ruler of the country, summoned a Parliament in 1265, to which, for the first time in English history, representatives from both boroughs and shires were called. Knights of the shire had been summoned to Parliament as early as 1254. Leicester's supremacy did not last long. Within a year the powerful Earl of Gloucester deserted his party, and with Prince Edward, the gifted son of the King, who had been taken prisoner at Lewes and succeeded in making his escape, led an overwhelming army against Leicester, who was defeated and slain at Evesham, on August 4, 1265. During the remainder of Henry's reign affairs were under the control of Prince Edward. The King died on November 16, 1272, and was succeeded by his son. The weakness of Henry and his father had allowed the development of the power of the barons, and in the struggle between the two the modern system of Parliamentary Government arose, marked by the concession of representation to the shires and the boroughs. Statute law dates from the time of Henry III., the Provisions of Merton, passed in the twentieth year of Henry's reign, being the first enactment on the English statute book. Consult: Stubbs, *Constitutional History of England* (Oxford, 1891); Prothero, *Simon de Montfort* (London, 1877); Pauli, *Simon de Montfort* (Tübingen, 1867); Green, *History of the English People* (London, 1874).

HENRY IV. (1367-1413). King of England from 1399 to 1413. He was the eldest son of John of Gaunt, fourth son of Edward III., and Blanche, the daughter of Henry, Duke of Lancaster, and was born April 3, 1367, at his father's castle of Bolingbroke in Lincolnshire. He is frequently called Henry of Bolingbroke from the name of his birthplace, but to his contemporaries he was more generally known as Henry of Lancaster. About 1380 he married Mary Bohun, one of the heiresses of the Earl of Hereford. He was distinguished for his martial attainments, and became a great favorite with the people of London. From 1387 to 1390 he was one of the leaders of the party opposed to Richard II. (q.v.), being one of the five lords appellants who in 1387 led an army against London and forced Richard to dismiss his unpopular favorites. In 1390-91 he was engaged on a crusading expedition in Lithuania with the Teutonic Knights. In 1392 he started on a second expedition to Lithuania, but soon changed his purpose and made a pilgrimage to Jerusalem. After his return he joined the King's Party, and was made Duke of Hereford in 1397. In 1398, as a result of the hostility between Henry and the Duke of Norfolk, the former was banished from England for six years, while his rival was exiled for life. Henry's banishment served to increase his popularity with the people of London, who chose to regard him as a martyr. In 1399 his father died, and Richard, in spite of his promise, confiscated the estates which should have descended to Henry. The latter, profiting by the King's absence in Ireland, landed in England in July, 1399. He was eagerly welcomed by all the discontented, and met with no effectual opposition. Richard on his return from Ireland was deserted by his followers, and soon fell into Henry's hands. The King agreed to abdicate, his resignation was accepted by Parliament on September 30, 1399, and Henry was chosen King, inaugurating the line of Lancaster. As he was not the nearest heir in line of descent, and as he did not claim England by right of conquest, he owed his title to Parliament, and he is sometimes called the first constitutional monarch. The first half of his reign was filled with wars. At his accession he showed himself lenient to all his former enemies, merely taking from them the dignities which they had won at his expense. An attempt at rebellion in January, 1400, by the lords whom he had degraded was easily put down. Most of the rebels were put to death, and Richard II. died soon after, possibly murdered. In the same year the Welsh revolted under Owen Glendower (q.v.). The Scots, who also began war, were defeated at Homildon Hill (q.v.) in 1402. The French gave aid both to the Scotch and Welsh and harried the English coast, but accomplished little, on account of their internal dissensions. In 1403 the Percy family, dissatisfied with the rewards bestowed upon them by the new King, rose in rebellion, but were overthrown in the battle of Shrewsbury, in which Harry Percy, the famous Hotspur, fell. In 1405 James I., heir to the Scotch throne, was captured while on his way to France, and this brought peace with Scotland. After this date the wars were less dangerous, but Henry suffered from an illness which gradually sapped his strength. Another rebellion was put down in 1408, and at the same time a number of successes were gained over the Welsh. Henry died March 20, 1413. He was brave, naturally merciful, devout, and able, but subject to fits of passion. He recognized the authority of Parliament and acted as a constitutional monarch. His reign was stained by enactments against the Lollards, and by persecutions. He was a patron of Gower, Chaucer, and Christine de Pisan. He had four sons and two daughters by his first wife. In 1403 he married Joan of Brittany as a matter of diplomacy, but he gained nothing by this marriage. For the best modern authorities on his reign, consult: Stubbs, *Constitutional History of England* (Oxford, 1891); Pauli, *Geschichte von England* (Leipzig, 1864-75); Wylie, *History of Henry IV.* (4 vols., London, 1884-98).

HENRY V. (1387-1422). King of England from 1413 to 1422. He was the eldest son of Henry IV. and of Mary Bohun, and was born August 9, 1387, at Monmouth. In 1399, on the accession of his father to the throne, he became Earl of Chester, Duke of Cornwall, Prince of Wales, Duke of Aquitaine, and Duke of Lancaster. In his youth he had acquired great military distinction in operations against Hotspur and Glendower (q.v.), and in 1410 and 1411 he governed in the name of his father, who was ill. In 1412 he fell into disfavor with his father, and was deprived of his power. At his father's death, March 20, 1413, he became King. He liberated the young Earl of March from the confinement in which Henry IV. had placed him,

and restored the son of Hotspur to the lands and honors which his father had lost by rebellion. He followed in the footsteps of his father in persecuting the Lollards with fire and halter, the celebrated leader of the Lollards, Sir John Oldcastle (q.v.), being put to death in 1417. The great event of his reign was the attempted conquest of France, in which he virtually succeeded. In his first campaign he besieged and took the town of Harfleur, and gained the battle of Agincourt (q.v.), October 25, 1415, against enormous odds. Two years after he again invaded France, and made Normandy once more subject to the English Crown. Rouen was captured in January, 1419, after a long siege, an incapable King and civil discord in France aiding him greatly. On May 21, 1420, a treaty was concluded at Troyes between Henry and the French King, Charles VI., by which Henry obtained the regency of France, the eldest daughter of the French King for his wife, and the succession to the French crown on the death of the King. He was married to Catharine of France on June 2, 1420. He had hardly returned to England when the defeat at Beaugé of his brother, the Duke of Clarence, whom he had left as Governor of Normandy, rekindled the hopes of the French, who supported the Dauphin Charles in his repudiation of the Treaty of Troyes, to which he had not agreed. Henry returned to France for a third campaign, and his wonted success in arms was following him when he was seized with illness, and died on August 31, 1422, at Vincennes, at the age of thirty-five years, leaving an infant son, Henry VI., to succeed him. His private life was exemplary; as a King he was noted for his strict justice; in war he was one of the ablest generals of his time. Consult: Pauli, *Geschichte von England* (Leipzig, 1864-75); Stubbs, *Constitutional History of England* (Oxford, 1891); Wylie, *History of Henry IV.* (London, 1884-98); Church, *Henry V.* (London and New York, 1889).

HENRY VI. (1421-71). King of England from 1422 to 1461. He was the only child of Henry V. and Catharine of France, and was born at Windsor, December 6, 1421. He was not quite nine months old at his father's death, when he became King of England, and a few weeks later, on the death of Charles VI. of France, he was also proclaimed King of that country. His claim to France was disputed by Charles VII.; but the latter was too indolent to make any serious attempt to conquer the kingdom. The Duke of Bedford, brother of Henry V., who was Regent of France, was successful in holding the country for Henry VI. until 1429. Then Joan of Arc (q.v.), by her heroism, aroused the valor of the French nation, defeated the English at Orléans, and led Charles VII. to Rheims to be crowned. The Maid of Orléans fell into the hands of the English the following year and was burned in 1431, and a few months later Bedford was able to have Henry crowned at Paris. He had already received the English Crown at Westminster, on November 6, 1429. But France gradually passed out of the control of the English, as the French united against foreign rule. On Bedford's death, in 1435, the Duke of Burgundy broke off his alliance with the English and joined Charles VII. From this time the English lost ground steadily, and by the end of 1451 Calais was the only English possession in France. During Henry's minority there was no opposition to the King in England; but his marriage with Margaret of Anjou, in 1445, was unpopular, as the bride brought no dowry and one of the conditions of the marriage was the surrender of some English territory in France. Henry's own weakness, the lack of success in France, and economic troubles at home aroused bitter opposition, for Henry was virtuous and amiable, but unequal to the task of ruling. When he was thirty-two years old his weak intellect gave way, and he became insane. At times he recovered his reason, but was always subject to a relapse into insanity.

As the wars ceased in France, disorderly bands of soldiers returned home and sought service with the powerful nobles, who maintained great armies of followers, in defiance of the law. The King was too weak to enforce order in his kingdom, and many illegal usurpations of property by the great nobles went unpunished. The system of inclosing lands for pasturage threw many agricultural laborers out of employment. The result was a rising on the part of the people. In 1450 the Duke of Suffolk, who had negotiated the marriage with Margaret, and was the King's favorite Minister, was impeached by the Commons and condemned to banishment, but was murdered on his way to the Continent. Not content with the fall of Suffolk, the men of Kent, led by Jack Cade (q.v.), rose against his appointees, who still held the chief offices. They demanded a redress of grievances, and that the Duke of York should be made the head of the Government. The latter was a descendant of Lionel, the third son of Edward III., and consequently by hereditary right his title to the crown was superior to that of Henry VI., who was descended from Edward's fourth son. From this time York was supported by the discontented people and generally opposed by the nobles. During two periods while the King was temporarily insane York was made Protector, but each time the King recovered his reason York was in danger of destruction. In 1455 the battle of Saint Albans was fought between the King's favorite, Somerset, and the Duke of York, in which Henry was taken prisoner. This is generally called the first battle in the War of the Roses (q.v.). After some desultory strife Henry VI. was again captured by the Yorkists in the battle of Northampton, in 1460, and York asserted his claim to the throne. The lords arranged a compromise that Henry should keep the crown, but that York should be acknowledged as his successor. This arrangement only led to a long war, because Margaret was enraged that her son should be deprived of the succession to the crown. She sought aid in the north, raised an army of 18,000 wild warriors, and won the battle of Wakefield, in 1460, where York was slain. But the depredations and cruelties of her rough followers alarmed the people in the south, who rallied to Edward, Earl of March, the son of York. The latter, by his victory at Towton (March, 1461), gained the throne, and was crowned as Edward IV. on June 29, 1461. Margaret and Henry escaped, and there were several engagements before 1465, when Henry was taken prisoner. Margaret was implacable, and finally obtained the aid of the Earl of Warwick (see WARWICK, RICHARD NEVILLE, EARL OF), who in 1470

drove Edward out of England. Henry, although an imbecile, was reinstated as King; but Edward returned in the same year. Henry was captured and died in 1471. There is little doubt that he was murdered by order of Edward. Consult: Gairdner, *Paston Letters* (London, 1872-75); Stubbs, *Constitutional History of England* (Oxford, 1891); Pauli, *Geschichte von England* (Leipzig, 1864-75); Green, *History of the English People* (several editions).

HENRY VII. (1457-1509). King of England from 1485 to 1509. He was born January 28, 1457, at Pembroke Castle, the son of Edmund Tudor, Earl of Richmond, and Margaret, granddaughter of John of Gaunt, founder of the Lancastrian House, from whom Henry derived his title to the crown. His grandfather was Owen Tudor, a Welsh knight, who married Catharine, widow of Henry V. In 1471, on the death of Henry VI., and Edward, Prince of Wales, Henry became the head of the Lancastrian House. During the reigns of Edward IV. and Richard III., the last Yorkist kings, he took refuge in Brittany, until the crimes of Richard III., who murdered his own nephews, 'the Princes of the Tower' (q.v.), alienated the Yorkist nobility and drove them to accept Henry as Richard's only possible rival. Henry landed at Milford Haven in 1485, and in the battle of Bosworth, August 22d, Richard was defeated and slain. The marriage of Henry with Elizabeth, the Yorkist heiress, cemented the union of the two parties; but Henry was crowned before the marriage and claimed the title of his own right, the first of the Tudor kings.

The numerous disturbances of Henry's reign were due on the whole rather to the instigation of remnants of the Yorkist faction and its foreign supporters than to the disaffection of his subjects at home. The rising of Lovell (1486), the invasions of the impostors Simnel (1487) and Perkin (1495 and 1496-97), found little favor among the English people, and were easily suppressed, but they had important consequences. In order to prevent the Scottish King from taking further part in these intrigues, a marriage was arranged between Margaret, Henry's eldest daughter, and James IV. of Scotland, which led to the accession of a new ruling house in England one hundred years later. In order to guard himself from further invasions from Ireland, a stronghold of the Yorkist party, whence danger usually threatened, Henry was forced to resume the fateful policy of English control which had been abandoned during the Wars of the Roses. In 1494 it was provided that English laws then in force should apply to Ireland. The celebrated Poynings's Law (q.v.) of the same year provides for the supremacy of the English Council over Irish legislation. Foreign affairs occupied much of Henry's attention, since the enemies of France, especially Maximilian of Austria and Ferdinand the Catholic, were anxious for Henry's coöperation; but he was too wily to be led into wars from which they would profit more than he. The negotiations led, however, to the marriage, in 1501, of his eldest son, Arthur, to Catharine, the daughter of Ferdinand and Isabella, and after Arthur's death in 1502 to that prince's brother, Henry VIII., in 1509.

During Henry's reign the royal power rapidly increased. Livery and maintenance (q.v.) were suppressed. The Star Chamber (q.v.) offered an effective means of curbing the turbulent nobles. Henry was avaricious and the wealthy groaned at the heavy taxes; but Parliament was compliant to his will. His power was not based entirely upon force, for he had no standing army, but on the support of the middle classes, to whom his reign brought security and prosperity after the disorders of the Wars of the Roses. He died at Richmond, April 21, 1509. Among the events of the reign of Henry VII. was the discovery of the North American continent by John Cabot.

The best biographical accounts are Gairdner, *Henry VII.* (London, 1889), in "Twelve English Statesmen Series," and two lectures by Bishop Stubbs in *Lectures* (Oxford, 1887). Five volumes of sources have been printed in the "Rolls Series," under various titles. The admirable French *Histoire générale*, by Lavisse and Rambaud, vol. iv. (Paris, 1894), has a chapter on Henry by M. Bémont, somewhat biographical in character, with a bibliography. Bacon's *Henry VII.* is still of interest. Consult: Lingard, *History of England*, vol. iv. (London, 1854); Green, *History of the English People*, vol. ii. (New York, 1879); Green, *Short History of the English People*, p. 300 (London and New York, 1894); Hallam, *Constitutional History of England*, vol. i. (London, 1855); Traill (editor), *Social England*, vol. ii. (London and New York, 1894), with bibliography.

HENRY VIII. (1491-1547). King of England from 1509 to 1547. He was the second son of Henry VII. and Elizabeth of York, and was born at Greenwich, June 28, 1491. He was intended for the Church until, at the age of eleven, he became heir apparent to the English crown on the death of his brother Arthur, in 1502. In the following year he was betrothed to Catharine of Aragon, Arthur's widow, a Papal dispensation having been obtained from Julius II. on account of their relationship. The marriage was to have taken place on the completion of Henry's fourteenth year; but Henry VII. was playing a wily game of diplomacy with Ferdinand, Catharine's father, and postponed the wedding on various pretexts in order to extort concessions. He even caused his son to protest that the whole arrangement was against his will. On April 21, 1509, Henry succeeded to the crown, at the age of eighteen. On June 11th he married Catharine, and they were crowned together on June 24th. Although she was six years his senior, their marriage was for many years a happy one. For some time after his accession Henry gave himself up to festivities and sports. He was described in 1519 by Giustiniani, the Venetian Ambassador, as the handsomest and best-dressed prince in Europe. "He is very accomplished, a good musician, composes well, is a most capital horseman, a fine jouster, speaks good French, Latin, and Spanish, is very religious, hears three masses daily when he hunts, and sometimes five on other days. . . . He is very fond of hunting, and never takes his diversion without tiring eight or ten horses, which he causes to be stationed beforehand along the line of country he means to take, and when one is tired he mounts another, and before he gets home they are all exhausted." On account of his handsome person, his hearty, generous manners, his fondness for the services of the Church, and his appreciation of the new learning, Henry

was a favorite with all classes of the English people. He chose his ministers with rare sagacity, and, in spite of his gayety, knew what was going on in his administration. He had a violent temper, and no monarch ever held his servants under firmer control. Until 1529 affairs were in the hands of Wolsey (q.v.), whom Henry had raised from a humble station to be Archbishop of York (1514) and Chancellor (1515), and caused to be appointed cardinal (1515) and legate *a latere* (1518). Wolsey had thus in his hands almost supreme power over Church and State, and he rivaled the King in outward splendor; yet no one was in doubt as to who was the real master. Wolsey's precarious tenure depended upon his ability to fulfill, and if possible to anticipate, his young master's wishes.

During approximately the first half of Henry's reign, before the matter of the King's divorce became urgent, his attention was occupied with foreign affairs. After 1519 Europe was divided into two hostile camps by the rivalry between Charles V. and Francis I. Henry could be depended upon in the long run to take the side of Charles, not only on account of his relationship, having married Charles's aunt, and the close commercial relations between England and Charles's possessions in the Low Countries, but because Henry dreamed of renewing the Hundred Years' War and rivaling the deeds of Edward III. and Henry V. For these reasons, Henry always opposed Francis when it came to actual warfare, though he frequently changed sides in the diplomatic struggle. Even before the accession of Charles V. and Francis I., the relations of their predecessors had been much the same, and in 1511 Henry had been drawn into the Holy League between the Papacy, Spain, Austria, and Venice against France. Early in 1512 Henry had sent an abortive expedition to regain Guienne. In the following year he took part in person in the triumphant campaign in Northern France. The French were defeated at Guinegate, August 16th, in what is known as 'the Battle of the Spurs,' from the rapidity of the French flight; Thérouanne surrendered August 24th, and Tournay September 25th. James IV. of Scotland, taking advantage of Henry's employment elsewhere, invaded England, and was defeated and slain at Flodden, September 9, 1513. Henry fully intended to renew the campaign the next year; but when he learned that both Ferdinand of Spain and Maximilian of Germany had deserted him, he secretly made peace, which was cemented by the marriage of his sister Mary with Louis XII. From this time until the outbreak of the first war between Francis and Charles (1521), Wolsey was free to carry out with tolerable success his favorite policy of mediation between the two rivals. There were many interviews, among others the famous 'Field of the Cloth of Gold' (1520), and much treachery on all sides; but in the end Wolsey's peace policy had to give way before Henry's warlike spirit. There were campaigns against France in 1522 and 1523; but they had no other result than an increased taxation at home, for which Wolsey was popularly held accountable. In 1525 Francis was not only defeated at Pavia, but taken prisoner, and Henry thought that the time had come to recover the crown of France. With this purpose in view, he demanded an immediate loan from his subjects in proportion to their incomes, but at so extortionate a rate that riots broke out and the loan had to be recalled. Henry, as was his wont, meanly threw the odium upon Wolsey, who was in no wise responsible. The failure of the loan made peace with France necessary, which was signed in 1525. In the following year Francis regained his freedom upon agreeing to Charles's extortionate demands; but he held himself not bound by forced concessions, and war broke out anew (1527-29), in which he found an ally in Pope Clement VII. Henry took no direct part in this war, but he was anxious to join the French and Papal side, for the reason that he was meditating the divorce of Catharine of Aragon, to which the consent of the Pope was necessary.

For some years Henry had been growing tired of Catharine, and his indifference increased after the appearance at Court in 1522 of the young and sprightly Irish beauty, Anne Boleyn. In addition, Catharine's only surviving child was her daughter Mary, and since no queen had ever sat upon the throne of England, it might reasonably be doubted whether the succession was safe without a male heir. Henry's professed motive, however, was conscientious scruples concerning the validity of his marriage with his brother Arthur's wife, notwithstanding the Pope's dispensation, and in 1527 he asked Clement VII. not merely to grant him a divorce, but to declare that the dispensation of Julius II. was invalid, and that the marriage with Catharine had been void from the beginning. Apart from other considerations, Clement VII. could hardly be expected to impair his own authority by such a ruling; nor was the time propitious for such a request, for in the year in which it was made the Imperial troops had sacked Rome, and Clement VII. was at the mercy of Charles V. The most that Henry could obtain was a legatine court, composed of Wolsey and Campeggio; but the Pope's sole purpose in granting it was delay. Campeggio could neither induce Henry to change his mind nor Catharine to yield, and in 1529 Clement revoked the case to Rome, where Henry knew that it would be useless to press the matter further, especially as Charles and Clement were now in alliance. The result was the fall of Wolsey, and the beginning of momentous changes in the relations between the State and Church in England. Henry probably little realized the importance of the steps which he took in order to satisfy his lust. He certainly did not intend to introduce Protestantism, for which he had an aversion. He was no mean theologian, and in 1521 he had written a book against Luther entitled *Assertio Septem Sacramentorum*, which won for him, by the irony of fate, the Papal title 'defender of the faith,' which English sovereigns have borne to the present day. In 1530 Henry was occupied with Cranmer's suggestion that the favorable opinion of the learned doctors of the universities as to the nullity of the marriage would leave him free to marry again without the Pope's consent. Bribery and cajolery were freely used with considerable success; but in 1531 Henry proceeded to more vigorous measures. Upon the suggestion of Thomas Cromwell, an adventurer, who rose to influence soon after Wolsey's fall, he conceived the plan of seizing the Papal authority and revenue in England, thereby not only securing the divorce, but vastly increasing the

resources and power of the Crown. Henry accused the clergy of having violated the Statute of Præmunire (q.v.) in accepting Wolsey's legatine authority, although they would have met with swift punishment if they had presumed to act otherwise, and although Henry himself had called in the legate Campeggio a short time before. Large numbers of the laity were also equally involved; but this was merely a violent and unscrupulous method of securing the clergy at home before proceeding against the authority of the Pope. Henry's complete success and the very moderate resistance of the clergy show how times had changed since the days of Henry II. and Thomas of Canterbury. The Pope had never fully regained his authority after the movement of Wicliff; and the English clergy were not only wealthy and therefore timid, but since Wolsey as Royal Chancellor and Papal legate had practically united supreme power in State and Church, they had grown compliant to the royal will. The Convocation of Canterbury offered a gift of £100,000 (equal to at least £2,000,000 at the present day) to be freed from the penalties of præmunire, which involved the confiscation of all their property. Henry demanded in addition that he be recognized as the supreme head of the Church of England, which after some resistance they accepted with the vague qualification, "so far as is permitted by the law of Christ." The Convocation of York soon after bought its pardon on the same condition and the payment of £18,000. Henry found support in these measures in Parliament, whose elections he practically controlled, and whose members were either lawyers or country squires, with little affection for the Church. In 1532 the clergy submitted its entire body of canons to the King's examination, and renounced the right to make new canons without royal permission, thus putting an end forever to the freedom of the English Church. In 1533 Henry made retreat impossible by secretly marrying Anne Boleyn without a divorce. In the same year he made Cranmer, an able but compliant and vacillating churchman, Archbishop of Canterbury, who on May 23d decided that Henry's marriage with Catharine was void, and on May 28th that his secret marriage with Anne was lawful. About a year after, Clement decided in favor of Catharine, but not until Henry, foreseeing the result, had all but severed the connection between the English Church and Rome. In 1534 Parliament changed the provisional Act of Annates of 1532 into an unconditional one, giving the King the annates or first fruits which were formerly paid to the Pope. It also provided for the appointment of bishops without reference to Papal authority, and abolished appeals to Rome. Henceforth the Pope was merely 'the Bishop of Rome,' with no more authority in England than any other foreign bishop.

The new royal supremacy found its first expression in three acts which, taken together, assumed an intolerably tyrannical character. The first act of succession of 1533 not only fixed the inheritance to the crown in the issue of Anne Boleyn, and declared that the marriage with Catharine was invalid from the beginning, but required all subjects to take oath affirming their full acceptance of the contents of the act, which no Catholic could conscientiously do; and it further declared that any one who refused should be guilty of high treason. The act of supremacy and the treason act of the following year confirmed the royal title 'supreme head of the Church of England,' and declared that any one who should deprive the King of his title should be guilty of high treason. The King thus tried not only to rule over men's actions, but over their consciences. Numerous victims met a traitor's death for refusing to swear that Catharine's marriage was unlawful, though otherwise they were willing to accept the new succession. With incredible callousness, Henry sent to the block Sir Thomas More, his former friend and boon companion, one of the ornaments of the age, and Fisher, whom the Pope shortly before had made cardinal. Many friars were burned merely for refusing to take the oath on conscientious grounds. Some of them had spoken against the King's second marriage, but others had not. In 1536 Anne was executed, on charges of which we have no proof. Ten days later Henry married Jane Seymour, and a new act of succession made it treasonable to affirm what it was formerly treasonable to deny.

The resistance of the friars no doubt helped to call the attention of Cromwell, who had been made vicar-general in ecclesiastical matters in 1535, to the rich booty to be acquired through the dissolution of the monasteries, whose laxness of discipline made them vulnerable to attack. He ventured at first to despoil only the lesser houses. A royal visitation of the year 1535 made the convenient discovery that monasteries "where the congregation of such religious persons is under the number of twelve persons" were the seats of "manifest sin, vicious, carnal, and abominable living," while those with more than twelve persons were not. Parliament thereupon (1536) dissolved the smaller houses and gave their property to the King. The Catholic rising in the northern and more conservative districts in 1536, known as the 'Pilgrimage of Grace,' involved some of the remaining abbots of that region, and this was a signal for the dissolution of the greater monasteries. Those who were implicated in the revolt were executed for treason, and the others were gradually frightened into surrendering their authority and property into the hands of the King, "of their own free and voluntary minds, good wills and assents, without constraint, coercion, or compulsion of any manner of person or persons," as the Parliamentary act of 1539 puts it. Henry used the enormous spoils of the monasteries partly for religious objects, partly for military purposes; but much was granted to royal favorites, and many prominent families in England at the present day derive their fortunes from this source. One of the unexpected consequences of the dissolution was the formation of a considerable party keenly interested in maintaining the religious innovations.

It was not, however, Henry's first intention to introduce religious innovations, other than the royal supremacy. If More and Fisher were beheaded for denying the royal supremacy, John Frith was burned for denying the doctrine of transubstantiation. Yet preachers with Protestant tendencies were appearing and criticising the old order of things with great asperity. To prevent these disturbances, the Ten Articles were promulgated in 1536 by royal order, containing a creed which in the main held to the old order, yet

passed over in silence or tried to explain some of the controverted points. In the same year the Bible was translated with royal sanction, though Henry apparently took no great interest in it. The new movement was sure to grow. Its intellectual leader was Cranmer, who was himself under the influence of Ridley. Cranmer and Ridley were slowly changing their views in the direction of Protestantism. Cromwell also favored Protestantism, for political reasons. In 1538 there was much smashing of images and spoliation of tombs, until Henry took alarm. In 1539 he issued, with the consent of Parliament, the reactionary Six Articles, affirming the principal controverted Catholic dogmas. Englishmen found it as dangerous to be too Protestant as too Catholic, and the discreet conformed to Henry's somewhat shifting views. In 1544 Cranmer wrote his celebrated Litany, and ordered certain parts of the service to be said in English; but further changes were cut short by Henry's death.

In the meantime Cromwell had come to grief through his arrangement of the marriage of Henry to Anne of Cleves, in order to form a connection with the Protestant princes of Germany. When Anne reached England she was found to be far from handsome, and Henry's resentment was great. This is supposed to be the real reason for Cromwell's disgrace and execution, July 28, 1540, though Henry may have grown tired of Cromwell as he grew tired of every one else. On the day of Cromwell's execution Henry married Catharine Howard, Anne having been divorced shortly before; but she was soon found to have been unfaithful both before and after her marriage, and was beheaded. In 1543 Henry married his sixth wife, Catharine Parr, who survived him.

In Henry's last years his attention was again occupied with foreign enterprises. He tried to establish his authority in Ireland by winning over the native chiefs, stripping the Irish monasteries for their benefit. From 1542 to 1546 he was at war with Scotland and France. The Scots were defeated at Solway Moss in 1542, and James V. died soon after. Henry took Boulogne in 1544, and made peace two years later. He died January 28, 1547. By act of Parliament, in 1544, the succession had been given to his three children, Edward, Mary, and Elizabeth, the offspring respectively of Jane Seymour, Catharine of Aragon, and Anne Boleyn, who succeeded in this order and died without issue.

Consult: *Calendar of State Papers, Foreign and Domestic, of the Reign of Henry VIII.*, edited by Brewer and Gairdner (14 vols., London, 1862-95); *State Papers During the Reign of Henry VIII.* (11 vols., London, 1832-52); *Parliamentary History* (36 vols., London, 1806-20); Giustiniani's Venetian dispatches, published in translation by Rawdon Brown under the title *Four Years at the Court of Henry VIII.;* Pocock, Nicholas, *Records of the Reformation and the Divorce* (2 vols., Oxford, 1870); *Original Letters Relative to the English Reformation*, edited by Robinson for the Parker Society (2 vols., Cambridge, 1846); Ellis, *Original Letters* (first series, 3 vols., London, 1824; second series, 4 vols., London, 1827; third series, 4 vols., London, 1846); Brewer, *History of the Reign of Henry VIII. from His Accession to the Death of Wolsey* (2 vols., London, 1884); Dixon, *History of the Church of England from the Abolition of the Roman Jurisdiction* (4 vols., London, 1884-91); Lingard, *History of England* (10 vols., London, 1854-55), vols. iv., v.; Froude, *History of England from the Fall of Wolsey to the Death of Elizabeth*, vols. i.-iv. (12 vols., New York, 1870); id., *The Divorce of Catherine of Aragon* (New York, 1891); Green, *History of the English People* (4 vols., New York, 1879), and his *Short History* (London and New York, 1894). Two convenient collections of the principal documents are: Gee and Hardy, *Documents Illustrative of English Church History* (London and New York, 1896), and Adams and Stephens, *Select Documents of English Constitutional History* (New York, 1901).

HENRY I. (c.1008-60). King of France from 1031 to 1060. He was the son of Robert I., and a grandson of Hugh Capet. The first years of his reign were disturbed by a rebellion headed by his mother, Constance of Toulouse, who, however, submitted in 1033. In the disorders which followed the death of Robert the Devil, Duke of Normandy, in 1035, Henry assisted William the Bastard, the illegitimate son and successor of Robert, in establishing his authority over the rebellious Norman nobles, participating in the battle of Val-ès-dunes in 1047. Subsequently Henry grew jealous of the power of the Norman Duke. Leaguing himself with the Count of Anjou, and calling his brother Eudes into the field, he invaded Normandy from Evreux in 1054. When, however, Eudes had been defeated at Mortemer, Henry drew back in haste and left the Normans to themselves. In 1055 he caused his eldest son, Philip, to be crowned as joint King. Henry died in 1060. He was an active prince, who spent a large part of his time in the field, upholding the royal authority against the feudal nobles. His first wife, Mathilda, niece of Henry III. of Germany, died childless; his second wife, Anne, daughter of Jaroslaff, Prince of Novgorod and Kiev, bore him three sons—Philip, his successor; Robert, who died in childhood; and Hugh, Count of Vermandois. Consult Soehnée, *Etude sur la vie et le règne de Henri I.* (Paris, 1891).

HENRY II. (1519-59). King of France from 1547 to 1559. He was born March 31, 1519, being the second of three sons of Francis I. by his first wife, Claude. From 1526 to 1529 Prince Henry was a hostage in Spain, together with his brother, the Dauphin Francis. In 1533 he married Catharine de' Medici and in 1536 the death of the Dauphin Francis made him the heir apparent to the throne. The same year he became the lover of the celebrated Diane of Poitiers, a woman several years his senior, but of attractive mind and strong will. In 1547 Henry succeeded his father, Francis I., and at once submitted himself to the influence of his mistress and of Anne de Montmorency, Constable of France, though the Guises also enjoyed a large share of the royal favor. A revolt in Guienne, where the people had risen against the *gabeleurs*, or collectors of the salt duty, was speedily put down by Montmorency. In 1550 Boulogne, which had been taken by the English during the wars of Henry VIII., was recovered by the French, and in a second war, which began in 1557, the English lost Calais and Guines, their last possessions in France (1558). Though a strong Catholic

and a persecutor of the Huguenots, Henry made treaties of alliance with the German Protestants, led an army of 38,000 men to aid Maurice of Saxony against the Emperor, and made himself master of the bishoprics of Toul and Verdun, while Montmorency seized Metz by treachery (1552). After the abdication of Charles V. (1555-56) Henry embraced the opportunity of attacking the Netherlands and Italy before Philip II. could consolidate his newly acquired possessions; but the results of this step were disastrous to France at every point. In Italy, the attack on Naples, made by Guise at the head of 20,000 men, utterly failed; while in the Low Countries the French under Montmorency sustained a total defeat, August 10, 1557, at Saint Quentin, and were forced to abandon the town to the Spaniards. This was followed by the defeat of De Thermes at Gravelines in 1558, which with other causes led to the Treaty of Cateau-Cambrésis, April 2-3, 1559. On June 29th Henry II. was mortally wounded in a tournament by Count Montgomery, the captain of his Scottish Guards, and died July 10, 1559. He is represented by historians as a bold and handsome man, but cold and indolent. His Queen, Catharine de' Medici, bore him ten children, of whom three lived to be kings of France. He was succeeded by his eldest son, who became Francis II. Consult: The contemporary memoirs of Monthieu, Tavannes, Vieilleville, Villars, and Brantôme; also, Barre-Duparcq, *Histoire de Henri II.* (Paris, 1887); Ranke, *Civil Wars and Monarchy in France in the Sixteenth and Seventeenth Centuries* (trans. London, 1852-61). See, also, FRANCE; and consult the authorities referred to there.

HENRY III. (1551-89). King of France from 1574 to 1589. He was the third son of Henry II. and Catharine de' Medici, and was the last of the House of Valois. He was born at Fontainebleau, September 19, 1551, and in his youth bore the title of Duke of Anjou. At the age of sixteen he was made a lieutenant-general, and placed in nominal command of the armies of France, though the real direction of operations was in the hands of Marshal de Tavannes. Henry had a part in the victories over the Huguenots at Jarnac and Moncontour in 1569, and was active in abetting the massacre of Saint Bartholomew. He was elected King of Poland in 1573, but upon receiving news of the death of his brother, Charles IX., in the following year, he fled from Cracow to make certain his succession in France. As King he continued the war against the Huguenots; but the union of the party of his brother, the Duke of Alençon, with the Huguenots wrung from the alarmed King the Peace of Beaulieu (or of Monsieur) in 1576, confirmed by the Edict of Poitiers or Bergerac in 1577. This peace granted so many privileges to the Huguenots that it exasperated the Catholic Party and led to the formation of the Holy League, the avowed object of which was to maintain the supremacy of Catholicism, and the secret purpose to secure the reversion of the throne to the Guises. Meanwhile the King forfeited all respect by the indulgence of his vicious propensities. His life was marked by alternate outbursts of licentiousness and moods of gloomy fanaticism. The affection he lavished upon his effeminate favorites, or *mignons*, as they were called, aroused the disgust of the nation. A renewed war with the Huguenots (1579-80) was concluded by the Peace of Fleix, a renewal of the terms of that of Bergerac. The strength of the League grew rapidly, aided by the popularity of the Duke of Guise with the Catholic masses. By the death of the Duke of Anjou (formerly of Alençon), Henry of Navarre became heir to the throne (1584); but the Catholics would not accept him, and Henry III., after an attempt to come to an understanding with his cousin of Navarre, issued the Edict of Nemours (1585), repealing all privileges granted the Huguenots. The so-called 'War of the Three Henrys' then broke out. In 1587 the Huguenots under Henry of Navarre triumphed at Coutras. King Henry found that Henry of Guise, through his commanding position, was becoming master of the kingdom. On May 12, 1588, the so-called Day of the Barricades, the inhabitants of Paris rose against the royal forces, and were quelled only by the interposition of Guise. The King fled to Blois, convoked the Estates, and summoned Guise to a private audience. Guise was assassinated in the King's cabinet by the guards known as the 'Forty-five' (December 23, 1588); and his brother, the Cardinal of Lorraine, was put to death on the following day. This double assassination aroused the hatred of Catholic France. The doctors of the Sorbonne declared the people to be relieved of the duty of obedience to the King, and the heads of the League dissolved the Parliament. Henry was distracted by the difficulties of his position, and threw himself under the protection of Henry of Navarre. The two kings advanced at the head of an army of 40,000 Huguenots on Paris, which would probably have had to capitulate had not Henry III. been assassinated, August 1, 1589, by a fanatical young Dominican, named Jacques Clément. The murderer was slain on the spot by the royal guard, and the King died on the following day, after having declared Henry of Navarre his successor.

Consult: The *Memoirs* of Tavannes, Vieilleville, Castelnau, Brantôme, and De Thou; also Freer, *Henry III., His Court and Times* (3 vols., London, 1858); Jackson, *The Last of the Valois and the Accession of Henry of Navarre* (2 vols., London, 1888); Ranke, *Civil Wars and Monarchy in France in the Sixteenth and Seventeenth Centuries* (2 vols., Eng. trans., London, 1852); E. Armstrong, *The French Wars of Religion, 1559-98* (London, 1892); De Noailles, *Henri de Valois et la Pologne* (3 vols., Paris, 1867); De la Barre-Duparcq, *Histoire de Henri III.* (Paris, 1882); Robiquet, *Paris et la Ligue sous Henri III.* (Paris, 1886); Nolhac and Salerti, *Il viaggio in Italia di Enrico III., re di Francia* (Turin, 1890). See FRANCE; HUGUENOTS.

HENRY IV. (1553-1610). King of France from 1589 to 1610, sometimes called the Great. He was born in the Castle of Pau, Béarn, December 14, 1553, being the third son of Antoine de Bourbon and Jeanne d'Albret, daughter and heiress of Henry II., King of Navarre and Béarn, and allied through his father with the French royal family. In 1555 his mother became Queen of Navarre, and gave her husband the title of King. Henry himself was known as Prince of Viane. His father's death, in 1562, placed him under the sole control of his mother who was a zealous Calvinist, and was careful to select learned men holding her own tenets for his instructors. Upon the outbreak of the third Civil War in France

the young prince and his intrepid mother joined the Huguenots at La Rochelle, and after the death of the Prince of Condé at Jarnac (March 13, 1569), Henry was proclaimed by the voice of the army chief of the Protestant cause. On account of his extreme youth, however, the actual command was vested in Coligny (q.v.). Notwithstanding the defeats which the Huguenots had experienced in this campaign, the Peace of Saint Germain-en-Laye (August 8, 1570) was apparently of great advantage to them, and was speedily followed by a contract of marriage between Henry of Navarre and Margaret of Valois, the sister of Charles IX. Jeanne d'Albret died suddenly a few months later (June 9, 1572), and the prospective bridegroom became King of Navarre, under the title of Henry III. After much opposition on the part of both Catholics and Protestants, the marriage with Margaret of Valois was celebrated with great pomp, August 18, 1572, followed within a week by the massacre of Saint Bartholomew. It had been originally intended that Henry should share the fate of his friends and co-religionists, but his life was spared on condition of his professing himself a Catholic. For more than three years he remained at the French Court, virtually a prisoner, and continually plotting and seeking to escape; but at length, in February, 1576, he contrived to elude the vigilance of his guardians, and made his way to the camp of the Huguenots in Gascony, where he repudiated his enforced conversion and resumed the command of the army. In the Peace of Beaulieu, concluded May 6, 1576, the Huguenots obtained several distinct advantages.

The death of the Duke of Anjou (late Alençon) in 1584 made Henry presumptive heir to the crown. Some years previous to this the Catholic League had been formed, the secret purpose of which was the support of the Guise pretensions to the throne. The War of the Three Henrys (Henry III. of France, Henry of Navarre, and Henry of Guise) was terminated by the Protestant victory of Coutras, October 20, 1587. In 1588 Henry III. of France, hating and fearing the powerful Guises, who had virtually made themselves his masters, caused the Duke of Guise and the Cardinal de Lorraine to be murdered, and in the following year came to an understanding with Henry of Navarre. The two now proceeded to lay siege to Paris, August, 1589. The assassination of Henry III. by Clément made Henry of Navarre, as the nearest lineal male descendant of the royal house of France, rightful King of France, the House of Bourbon succeeding to that of Valois. As a Protestant, he had been excommunicated by Sixtus V. in 1585, and declared incapable of succeeding to the French crown. His religion, moreover, made him obnoxious to the greater part of the nation, and he found in addition that the dukes of Lorraine and Savoy, and Philip II. of Spain, were prepared, each on his own account, to dispute his claims. He withdrew, therefore, to Normandy until he could collect more troops and obtain reënforcements from England and Germany. His nearly hopeless cause, however, gradually gained strength through the weakness and internal dissensions of the Leaguers, who proclaimed the aged Cardinal de Bourbon King, with the Duke of Mayenne Lieutenant-General of the Kingdom, and thus complicated the interests of their party. After a success at Arques (September, 1589), Henry reappeared before Paris. He won a splendid victory over Mayenne at Ivry (March 14, 1590), but Spanish intervention defeated his plans, and it is probable that he would never have been generally acknowledged had he not, by the advice of his friend and Minister, De Rosny, afterwards Duke of Sully (q.v.), formally professed himself a member of the Church of Rome, in 1593. "Paris," the light-hearted but astute monarch is reported to have said, "is well worth a mass." His public recantation of Protestantism, before the Archbishop of Bourges, July 25, 1593, filled the Catholics with joy, and was followed by the speedy surrender of the most important cities of the kingdom, including Paris, which opened its gates to him in March, 1594. The war with the League was not, however, terminated till 1596. In 1598 peace was concluded between Spain and France by the Treaty of Vervins, which restored to the latter many important places in Picardy and was otherwise favorable to the French King. On April, 13, 1598, Henry signed the Edict of Nantes, which secured the Protestants perfect liberty of conscience and the administration of impartial justice.

Henry was now left at liberty to direct his attention to the internal improvement of the kingdom, which had been thoroughly disorganized through the long continuance of civil war. The narrow-minded policy of the preceding reigns had left the provinces greatly at the mercy of the civil governors and large landed proprietors, who arrogated almost sovereign power to themselves in raising taxes and exacting compulsory services. Such abuses Henry completely stopped. By building canals and roads, and opening all parts of his kingdom to commerce, he established new sources of wealth and prosperity for his subjects. The mainspring of these improvements was, however, the reorganization of the finances under Sully, who, in the course of ten years, reduced the national debt from 330,000,000 to 50,000,000 livres. In 1601 the districts of Bresse, Bugey, and Valromey were acquired from Savoy and added to France. For ten years France enjoyed prosperity previously unheard of. In foreign politics Henry devoted his entire energy to the formation of a powerful coalition against the House of Austria, the ancient enemy of France, against whom, since the Treaty of Cateau-Cambrésis in 1559, the distracted country had been too weak to contend. The disputed succession to the duchies of Jülich and Cleves (qq.v.) afforded an opportunity for the opening of hostilities, and the King, who had entered into an alliance with the Protestant Union of Germany, was about to take personal command of the French army, when he was struck down by the dagger of Ravaillac, a religious fanatic, at Paris, May 14, 1610. Nineteen times before attempts had been made on his life, most of which it was thought could be traced to the agency of the Papal and Imperial courts, and hence the people in their grief and consternation laid Ravaillac's crime to the charge of the same influences. The most horrible vengeance was wreaked on the murderer. Henry was succeeded on the throne by Louis XIII., his son by his second wife, Maria de' Medici (q.v.). Time has strengthened the high estimate which the people of France formed of their favorite King, for although his faults were numerous, they were eclipsed by his surpassing qualities. An inordinate passion for women was

his greatest failing. He was without doubt the most imposing figure in France of his day, and has taken his place in history as the greatest of Bourbon kings.

BIBLIOGRAPHY. For the history of Henry IV., consult the memoirs of the time, particularly those of the Duke de Sully (Amsterdam, 1725); also Poirson, *Histoire de Henri IV.* (3d ed., Paris, 1865); Jung, *Henri IV. écrivain* (ib., 1885); Guadet, *Henri IV., sa vie, son œuvre et ses écrits* (ib., 1879); Lescure, *Vie de Henri IV.* (ib., 1876); Barre-Duparcq, *Histoire de Henri IV.* (ib., 1884); Rambault, *Henri IV. et son œuvre* (ib., 1884); Zeller, *Henri IV. et Marie de Médici* (ib., 1877); Lacombe, *Henri IV. et sa politique* (ib., 1878). In English the following works may be consulted: Gurney, "Henry IV.," in *Chapters from French History* (London, 1870); Baird, *The Huguenots and Henry of Navarre* (New York, 1886); Jackson, *The First of the Bourbons* (London, 1890); Willert, *Henry of Navarre and the Huguenots in France* (New York, 1893).

HENRY V. OF FRANCE. See CHAMBORD, DUKE OF.

HENRY IV. An historical play by William Shakespeare, in two parts, produced in 1597 and 1598, printed in 1598 and 1600. The sources are Holinshed's *Chronicles* and a popular old play (produced in 1588), *The Famous Victories of Henry V.* In it the royal hero, who had appeared as a spirited youth in *Richard II.*, is represented as a care-worn monarch, who has passed down his boyish fire to his son, Prince Hal. The plot deals with Hotspur's rebellion and the sobering of the Prince's character through the tempering process of his nation's trial. See HOTSPUR; and also FALSTAFF.

HENRY V. An historical drama by William Shakespeare, a continuation of Henry IV., and derived from the same sources. It deals with the adventures of Prince Hal after he ascended the throne, especially with his invasion of France, and tells of the death of Henry's former boon companion, Falstaff. It was performed in 1599, and was printed in 1600, imperfectly, by Thomas Creede.

HENRY VI. An historical drama in three parts, produced in 1592-94, and printed in 1594-95, in which Shakespeare's genius can be traced, working over the cruder stuff of possibly Marlowe, Peele, Lodge, Kyd, and Greene or some unknown dramatists. It deals with the early years of Henry VI.'s reign, his misfortunes during the Wars of the Roses, and his tragic death. The first part was produced in 1592, and called forth Greene's charge of plagiarism in his *Groat's Worth of Wit.* The second part, founded on an old play, *The First Part of the Contention Between the Two Famous Houses of Yorke and Lancaster*, and the third part, founded on *The True Tragedie of Richard, Duke of Yorke*, were evidently elaborated and adapted by Shakespeare from works by unknown writers.

HENRY VIII. An historical drama, produced in 1613, begun by William Shakespeare and completed by Fletcher and Massinger. It is founded on Holinshed's *Chronicles* and Fox's *Christian Martyrs*, and was first printed in the folio of 1623. Only Act I., Scene 1; Act II., Scenes 3 and 4; Act III., Scene 2; Act IV., Scene 1, can be ascribed to Shakespeare; the rest was written by Fletcher, with possibly some help from Massinger.

HENRY, ALEXANDER (1739-1824). An American fur-trader, born in New Brunswick, N. J. He was with General Amherst in the expedition against the French in Canada (1760). After the peace he went to Michillimackinac to engage in the fur trade, and was one of the few survivors when the English garrison of the fort was massacred by the Indians at the time of Pontiac's uprising (1763). Henry remained for a year a captive among the Ojibways at Sault Ste. Marie, whence he came with an Indian contingent to join General Bradstreet's army on the lakes and by the desertion of his battalion regained his liberty. He resumed the fur trade, voyaging between Montreal and the Rocky Mountains, and from 1770 to 1774 made an unsuccessful attempt to float a company for working the copper-mines on Lake Superior. His book, *Travels and Adventures in Canada and the Indian Territory Between the Years 1760 and 1776* (1809), is quoted at length in Parkman, *Conspiracy of Pontiac* (London, 1868).

HENRY, CALEB SPRAGUE (1804-84). An American Protestant Episcopal clergyman and author. He was born in Rutland, Mass., graduated at Dartmouth in 1825, and studied theology at Andover and New Haven. In 1828 he became a Congregational minister at Greenfield, Mass., and in 1833 removed to Hartford, Conn. In 1834 he started the *American Advocate of Peace*, the organ of the American Peace Society. He then entered the ministry of the Protestant Episcopal Church, and was professor of moral and intellectual philosophy in Bristol College, Pennsylvania (1835-38). In 1837, with the aid of Rev. Francis L. Hawks, he established the New York *Review*. He was professor of history and philosophy in the New York University from 1839 to 1852. Later he held other pastorates, but was chiefly engaged in literary work. He translated Guizot's *History of Civilization*, and other works from the French, and was the author of several works, including *Compendium of Christian Antiquities* (1837), and *Satan as a Moral Philosopher* (1877).

HENRY, CAPE. See CAPE HENRY.

HENRY, ẼN'RÉ', CHARLES (1859—). A French librarian and editor. He was born at Bollwiller, Haut-Rhin, and was educated in Paris, where, in 1881, he became assistant and afterwards librarian in the Sorbonne. As a specialist in the history of mathematics he was sent to Italy to seek some manuscripts of that nature which the Government wished to publish. He edited several works upon kindred subjects, as well as memoirs, letters, and other volumes, and wrote critiques upon the musical theories of Rameau and Wronski. C. Huet's correspondence he published under the title *Un érudit, homme du monde, homme d'église, homme de cour* (1880), and he issued also *Problèmes de géométrie pratique* (1884); and *Lettres inédites de Mlle. de Lespinasse à Condorcet et à D'Alembert* (1887).

HENRY, EDWARD LAMSON (1841—). An American historical and genre painter. He was born in Charleston, S. C., January 12, 1841, and studied at the Philadelphia Academy with Peter Weber, and from 1860 to 1863 with Suisse and Courbet in Paris. He returned to the United States during the Civil War, and sketched on

the James River. In 1869 he was elected a member of the National Academy, and established a studio in New York. He is also a member of the American Water-Color Society. In 1871, 1875, and 1882 he revisited Europe, sketching in France and England. He received a medal at the New Orleans Exposition in 1884 and at the World's Fair, Chicago, in 1893, and honorable mention at the Paris Exhibition, 1889. His specialty is genre figures, quaintly depicted. The composition is usually well balanced, with elaborate details; the outlines are often hard, and the color crude. One of his largest paintings is the "Initial Excursion of the First Railway Ever Constructed in New York State," Corcoran Gallery, Washington, containing fifty figures. His principal works are: "Old Clock on the Stairs" (1868); "City Point—Grant's Headquarters" (1869), Union League Club, New York; "Battle of Germantown," owned by William Astor; "Declaration of Independence," owned by J. W. Drexel; "Reception to Lafayette," "In Sight of Home," "Waiting for an Answer."

HENRY, ăN'rē', Etienne Ossian (1798-1873). A French chemist, son of Noël Etienne Henry (1769-1832), born in Paris, and trained by his father, who was director of the Central Pharmacy of the Parisian hospitals and professor in the School of Pharmacy. In 1824 he became director of the chemical laboratory of the Academy of Medicine. He discovered sinapin and studied mineral waters, milk of various animals, nicotine, and tannin. His works include: *Traité pratique d'analyse chimique des eaux minérales*, with his father (2d ed. 1858); *Mémoire sur l'analyse organique*, with Plisson (1830); *Analyse chimique des eaux de Paris*, with Boutron-Charland (1848); and, with Ratier, a translation of the *Codex Medicamentarius* (1827).

HEN'RY, Joseph (1799-1878). An American physicist, born at Albany, N. Y. He was educated at the Albany Academy, where in 1826 he became professor of mathematics. Henry enjoyed the reputation of being one of the greatest of experimenters, and did more toward the development of the science of electricity than any other American since the time of Franklin. At the Albany Academy he developed the electromagnet, which had been invented a few years previously by Sturgeon of England. By insulating the wire with silk and constructing the apparatus according to certain original ideas, he obtained electromagnets of far greater power and efficiency than those of other experimenters, and also transmitted the current from the battery through a considerable length of wire to the magnet. In 1831 Henry sent a current through a mile of fine copper wire, and caused the armature of the electromagnet to be attracted and strike a bell, thus producing an audible signal. This is the first electromagnet telegraph, and Henry is to be regarded as the inventor of the principle now universally applied in modern practice. In further experiments at Princeton where Henry was appointed professor in 1832 he devised an arrangement of electromagnets and batteries, where the current transmitted to a considerable distance energized a magnet and attracted an armature which opened a 'local' circuit with its battery and caused a powerful electromagnet to perform work by allowing a weight to fall. This experiment contains the principle of the telegraph relay which made possible telegraphy over considerable distances. The apparatus was set up between Henry's residence and laboratory at Princeton, and the earth was used as a return conductor for the first time. Henry was also the first to employ magnetic attraction and repulsion to produce motion, and constructed a simple magnetic engine which had the first automatic pole-changer or commutator ever applied to the galvanic battery.

In the discovery of magnetic induction Henry was anticipated by Faraday (q.v.), but he was the first to notice the similar phenomenon of self-induction. He also investigated the oscillations of electric discharges and other electrical phenomena. In 1846 he was chosen secretary of the Smithsonian Institution at Washington, a position that he held until his death. In 1849 he was elected president of the American Association for the Advancement of Science, and in 1858 he was chosen president of the National Academy of Sciences, of which body he was an original member. Upon the establishment of the Lighthouse Board in 1852 Professor Henry was appointed a member, and in 1871 became its head. He carried on in this capacity a number of important tests for the Government which resulted in the improvement of fog-signals and the various lights and lighthouses. He was also interested in meteorology, and in his reports, as secretary, he urged the Government to collect and distribute meteorological information. He suggested the use of the telegraph for this purpose, and for a number of years this important work was under the direction of the Smithsonian Institution. Terrestrial magnetism was also a subject of interest to Henry, and he not only participated in investigations on his own account, but urged upon the Government the importance of having such observations made. In acoustics, Professor Henry also carried on important researches, his attention being directed to this subject largely through his experiments with fog-signals. Henry enjoyed no small amount of European reputation, and in his trips abroad was enthusiastically received by English and Continental scientists.

Henry was involved in a controversy with S. F. B. Morse (q.v.) as regards the invention of the telegraph, but it is safe to state that the former is to be regarded as the originator of the principle, while Morse invented the instrument first used for this purpose. Henry's collected writings are to be found in the *Smithsonian Miscellaneous Collection*, vol. xxx. (Washington, 1887). In volumes xx. and xxi. of the same series are to be found excellent biographical and memorial notices. Consult also Dickerson, *Joseph Henry and the Magnetic Telegraph* (New York, 1885).

HENRY, Matthew (1662-1714). An English Nonconformist divine and Bible commentator. He was born in Flintshire, near Chester, October 18, 1662. Having qualified himself for the ministry, in 1687 he was settled as pastor of a congregation of Dissenters at Chester, where he continued for twenty-five years. In May, 1712, he removed to a charge at Hackney, near London. He died June 22, 1714. His principal work is an *Exposition of the Old and New Testament*, which was commenced in November, 1704, and five volumes appeared in London prior to 1710. He lived to finish it only to the Acts of the Apostles, and the remainder was finished by thirteen Nonconformist ministers, whose names are given

in some of the editions. For many years this was the standard commentary on the Bible. It has been often reprinted; e.g. by Burder and Hughes, with additional matter from Henry's manuscripts (6 vols., London, 1811). Besides his commentary, Henry published numerous volumes, as well as sermons and tracts. His miscellaneous works were republished in London in 1830. For his life, consult: Williams (London, 1865); *Diaries and Letters of Philip Henry* (his father), edited by Lee (ib., 1883).

HENRY, PATRICK (1736-99). An American orator and statesman, born in Hanover County, Va., May 29, 1736. His father was a native of Scotland, and a cousin of Robertson, the celebrated historian. Patrick was unpromising as a scholar, and when he was fifteen years old he was placed to work with a country tradesman. After a year's apprenticeship he was set up in business with his brother William, but before the end of a year the undertaking had to be abandoned. He was slovenly in dress, and showed no aptitude for business of any kind. At the time that he married the daughter of a farmer, a Miss Shelton, his business had collapsed, and he was wretchedly poor. He next tried farming for two years, but had neither perseverance nor knowledge, and after one more of many failures he opened a store and failed within the next three years. When no customers appeared he would close his store and go fishing. But at intervals he read such books as he could find, and managed to gain a fair idea of Latin and Greek. Having utterly failed in farming and in trade, he made an attempt at the law, and after a period of reading said to have extended over only one month, had the boldness to ask for license to practice. This was granted in 1760, on the condition that he would extend his studies before undertaking to practice. In 1763 he leaped into immediate prominence in his profession. He was then engaged in the place of a more experienced advocate, who refused to continue the defense in a celebrated case known as the 'Parson's Cause,' and by an unexpectedly brilliant speech aroused such intense excitement that the audience seized him and bore him in triumph on their shoulders. (See PARSON'S CAUSE.) Thereafter his practice was enormous and his prosperity assured. But he was not satisfied with his legal profession. In 1765 he became a member of the House of Burgesses. At the critical period of the Stamp Act excitement he was comparatively unknown to the Assembly, and the rich planters were scandalized at his presumption in offering to the House the brief resolutions which set forth that the burgesses and the Governor had the exclusive right and power to lay taxes and imposts upon the people of the Colony, and that not alone the Stamp Act, but all acts of Parliament which encroached upon the rights of the Colonies, were unconstitutional and therefore void. A storm of opposition from the conservative members naturally followed, and the resolutions were denounced as extreme, impolitic, and dangerous. In the debate he startled even the radicals by his historic outburst: "Cæsar had his Brutus, Charles the First his Cromwell, and George the Third—" [here he was interrupted by the presiding officer and members with cries of "Treason! treason!"]—"may profit by their example," calmly said the orator, completing the sentence, adding, "If this be treason, make the most of it." The resolutions were adopted by a very small majority. He was now a power in the Colony, replaced the vacillating planters in the leadership, and became the authorized representative of the people against the aristocratic element. In opposition to Parliamentary imposts and in preparing the articles of association to discourage the use of British merchandise, Henry was one of the leaders. He continued his legal business, and, though deficient in legal education, was wonderfully successful before juries. At this time he took an active part in the movement for securing the rights of the Dissenters, which finally culminated in the Religious Freedom Act of 1785, by which the Church of England was disestablished in Virginia. Patrick Henry, with Jefferson and others, was ready to precipitate an open rupture with England. He was especially active in the House of Burgesses, and in May, 1774, took a leading part in those acts of the House with reference to the Boston Port Bill which led to its immediate dissolution by Lord Dunmore. Upon the following day (May 27th) was held the historic meeting of the former burgesses in the Raleigh Tavern, as a result of which came the first Revolutionary convention of Virginia (August, 1774), of which Henry was a member, and by which he was chosen a delegate to the first Continental Congress. In that famous assembly he was hailed as the champion of constitutional liberty, and his wonderful eloquence was at once recognized. He served on the Committee on Trade and Manufactures, on the committee to prepare an address to the King, and on that appointed to draft a statement of the rights of the colonists. Returning thence to Virginia, his prominence was still further enhanced by his work in the Provincial Convention of March, 1775, where he introduced resolutions to organize the militia and put the Colony in an attitude of defense, which met with great opposition. He replied by a speech in which, according to one version, occur the words: "There is no retreat but in submission and slavery. Our chains are already forged. Their clanking may be heard on the plains of Boston. The next gale that sweeps from the north will bring the clash of resounding arms. Our brethren are already in the field. Why stand we here idle? What is it that gentlemen wish? What would they have? Is life so dear or peace so sweet as to be purchased at the price of chains and slavery? Forbid it, Almighty God! I know not what course others may take, but as for me, give me liberty or give me death!" Without an opposing voice the resolutions were adopted, and a committee, with Henry as chairman, was appointed to prepare a plan for the defense of the province. Soon thereafter the royal Governor, Dunmore, caused to be removed on shipboard much of the province's supply of powder. The people took up arms, and being told that the powder would be returned, they at once disbanded. Henry, however, seized the favorable moment, gathered a force of militia, and marched upon Williamsburg to demand the powder or compensation. An agent of Dunmore's met him and paid him £300 for the powder. Henry was denounced for stirring up sedition; but it was too late to talk of loyalty; the province was aroused, and in June Dunmore took refuge on a man-of-war. A convention assembled at Richmond and appointed a committee of public safety with most

extensive powers. Two regiments were enlisted, and Henry was appointed commander of all the forces to be raised. The first collision was at Great Bridge, where the Virginia militia gained a triumph over trained British troops, and drove Dunmore back to his ship. Henry should naturally have been the leader of the troops, but the active command was given to Col. William Woodford. Henry was disappointed and resigned. In the convention of May, 1776, when the delegates to the Continental Congress were instructed to demand the independence of the Colonies, he took an active part and was chosen by that convention one of the committee which prepared the first Constitution of the Commonwealth of Virginia. In that year he was chosen by the convention, which then exercised the power of election later exercised by the Assembly, to be Governor of Virginia, and was reëlected until 1779, when he became ineligible; and more than once during his occupancy of the office the Legislature conferred upon him, in times of crisis, practically dictatorial powers. He returned to the Legislature, in which he served until 1784, and was then once more chosen Governor, serving until 1786, when he finally resigned. In 1788 he was a member of the convention which ratified for Virginia the Federal Constitution, which instrument he vigorously opposed, chiefly on the ground that it failed properly to protect the rights of States and individuals against the extreme centralization of power in the Federal Government. In 1794 he declined a seat in the United States Senate, and in 1795 Washington offered him the position of Secretary of State, but he declined. He also declined the office of Chief Justice of the United States Supreme Court, and Adams's offer of a special mission to France, as well as an election as Governor in 1796. He was elected to the House of Delegates in 1799, but did not live to take his seat, dying on June 6th of that year. Consult: Tyler, *Patrick Henry* (Boston, 1887), in the "American Statesmen Series;" Wirt, *Sketches of the Life and Character of Patrick Henry* (2d ed., Philadelphia, 1818); and William Wirt Henry, *Patrick Henry, Life, Correspondence, and Speeches* (3 vols., New York, 1891).

HENRY, ăn'rē', Paul Pierre (1848—). A French astronomer, born at Nancy. He was an assistant at the Paris Observatory (1864) and adjunct astronomer (1876). With his brother, Prosper Mathieu Henry (1849—), who was made titular astronomer in 1893, he did much for the perfection of astronomical photography, in their labor of completing the *Atlas écliptique* of Chacornac. The older brother discovered the Comet III. and the planetoids 126, 141, 152, 159, 164, 177, and 227, and Prosper discovered the planetoids 125, 127, 148, 154, 162, 169, and 186.

HEN'RY, Philip (1631-96). An English Nonconformist clergyman, born in London. He graduated at Oxford in 1652 and was ordained in 1657. His career as a preacher was repeatedly interrupted by the religious persecutions of his time, and it was not until the Act of Toleration was passed in 1687 that he was allowed to pursue his calling unmolested. The remaining years of his life were spent in unceasing labor. His *Diaries and Letters*, published in 1882, gives a detailed account of the Nonconformist life of his period.

HENRY, Robert (1718-90). A Scottish historian, minister of the Established Church. He was born in Saint Ninian's Parish, Stirlingshire; was educated at Edinburgh University, and after a term of school-teaching entered the Church, his first charge being at Carlisle. For the last twenty-two years of his life he was in Edinburgh churches—New and Old Grey Friars—and found opportunity to compile his *History of England on a New Plan* (6 vols., 1771-93), of which the last volume was published after his death. Henry's 'new plan' of grouping social progress in periods is no longer new, and has been followed out with greater accuracy since his time.

HENRY, ăn'rē' Victor (1850—). A French philologist, born at Colmar. He studied both law and philology, but finally devoted himself exclusively to the latter, and was appointed professor of grammar and comparative linguistics at the University of Lille. In 1889 he was transferred to a similar position in the faculty of letters at Paris. His writings, which are numerous, cover a wide range of linguistics. Among them special mention may be made of his *Esquisse d'une grammaire de la langue innok* (1878); *Esquisse d'une grammaire raisonnée de la langue aléoute* (1879); *La distribution géographique des langues* (1880); *Etudes afghanes* (1882); *Esquisses morphologiques* (1882-90); *Précis de grammaire comparée du grec et du latin* (Paris, 1888, translated into English by R. T. Elliot, 1890); *Précis de grammaire comparée de l'anglais et de l'allemand* (1893); *Manuel pour étudier le sanscrit védique* (1890); and *Le livre septième de l'Atharva-Véda* (1892).

HENRY, William (1774-1836). An English chemist. He studied chemistry and medicine at the University of Edinburgh, and received the degree of doctor of medicine from that university in 1807. Henry devoted himself mainly to investigations in chemistry and medicine. He was the author of several papers in the *Philosophical Transactions* (chiefly on the chemistry of gases); and his *Elements of Experimental Chemistry*, originally published (1801) under the title of *An Epitome of Chemistry*, passed through numerous editions. He is remembered chiefly as the discoverer of the important general law, according to which the amount of any gas absorbed by any liquid is proportional to the pressure exercised upon the gas, provided no chemical combination takes place between the gas and the liquid.

HENRY, William Wirt (1831-1900). An American lawyer and historical writer. He was born at Red Hill, Charlotte Co., Va.; was educated at the University of Virginia, and was elected to the State Legislature, where he attended four sessions. In addition to the practice of his profession, he was deeply interested in historical studies, and became president of the American Historical Association and of the Virginia Historical Society. He is the author of the *Life, Correspondence, and Speeches of Patrick Henry* (3 vols., 1890-91), besides historical addresses and essays.

HENRY AND EM'MA. A poem in dialogue, published in the collected edition of Prior's works in 1709. It is founded on the old English ballad *The Nut-Brown Maid*, and is among the three more ambitious but less read of his attempts. It contains the line: "Fine by degrees, and beautifully less."

HENRY ES'MOND. A novel by Thackeray, published in 1852, and one of the finest historical romances in English. The scene is laid in England in the reign of Queen Anne. The hero is a young colonel in the army, at first deeply in love with the beautiful daughter of his guardian, but finally married to her mother, the widowed Lady Castlewood. See ESMOND, BEATRICE; and CASTLEWOOD, LORD and LADY.

HENRY OF BLOIS, blwä (c.1102-71). An English prelate, son of Stephen, Count of Blois, and brother of Theobald, Count of Blois and Champagne, and of King Stephen. He was brought up at Clugny; came to England in 1126, and, three years later, received the see of Winchester. After the death of Henry I. he did all in his power to gain the crown for Stephen, and at the coronation pledged his word that the liberty of the Church would be kept intact. Henry failed in his candidacy for the see of Canterbury (1136-38), but in 1139 he was appointed Papal legate. As such he opposed the imprisonment of the Bishops of Salisbury and Ely, and, at the Council of Winchester, charged Stephen with sacrilege. In the quarrel between the King and Matilda, he gradually went over to the side of the latter and swore allegiance to her in 1141. But he quarreled with her soon after, and was rescued from her besieging army by the forces of Stephen. In 1143, Pope Innocent II. having died, the commission of Henry expired, Theobald was appointed as his successor, and Henry's power at Rome was over. Five years later he was suspended because of his advice to Stephen that Theobald should not be allowed to attend a Papal council at Rheims. Toward the close of the civil war all Henry's energies were bent on the hastening of peace. He assisted at the coronation of Henry II., but was afterwards under the King's displeasure because of his leaving England without the royal consent (1155). Henry did not fall in with Thomas Becket's policy, and defended the King in 1166 and 1167. He died soon after the death of the Archbishop, for which he bitterly condemned the King.

HENRY OF LAUSANNE, lō'zăn'. See HENRICIANS.

HENRY OF HUNTINGDON (c.1084-1155). An English historian, the son of Nicholas, a churchman, and, possibly, archdeacon of Huntingdon. He spent his early years at Lincoln in the home of Bishop Robert Bloet, where Albinus of Angers was his teacher. In 1109 or 1110 he was made Archdeacon of Huntingdon. In 1139 he went to Rome and met Robert de Monte, who made him acquainted with the *Historia Britonum* by Geoffrey of Monmouth. This and a request of Alexander, Bishop of Lincoln, prompted him to write his *Historia Anglorum*, which, in the last edition, came down to 1154. This work is a mere compilation, with occasional touches of pure imagination, for the period to 1127, where the author's personal knowledge begins. The following works are also ascribed to Henry: *Epigrammata Libri VIII.*, of which two books are extant, and one is printed in Wright's *Anglo-Latin Satirical Poets and Epigrammatists of the Twelfth Century* (in the *Rolls Series*, 1872); *De Amore; De Herbis; De Aromatibus;* and *De Lege Domini.* The history is reprinted from Savile, *Scriptores post Bedam* (1596); in Migne, *Patrologia*, vol. cxcv. (1854), and translated by Forester (1853). For his biography, consult Liebermann (Göttingen, 1878).

HENRY II. OF TRASTAMARE, trä'stä-mä'rā (?-1379). King of Castile, 1366-67 and 1369-79. He was the oldest son of King Alfonso XI. of Castile by his mistress, Leonora de Guzman. Alfonso gave him the County of Trastamare; but when, in 1350, Peter the Cruel, Henry's half-brother, ascended the throne, Doña Leonora was imprisoned and soon after murdered, while her sons had to flee for their lives. Peter the Cruel continued in his career of assassination until, in 1356, the nobles began a revolt under the leadership of Don Juan de Albuquerque and the illegitimate children of Alfonso. The rebellion was soon suppressed; Henry escaped, while most of the others were executed. In 1360 the Peace of Bretigny between England and France set free bands of marauders who united under the name of Free Companies. Charles V., King of France, in order to rid his country of them, sent them, in 1363, under the leadership of the great general Du Bertrand Guesclin against Peter the Cruel, who was aided by the English under the Black Prince. In 1366 Henry of Trastamare entered Castile, and was crowned as Henry II., and Peter fled to the Black Prince at Bordeaux. By the Treaty of Libourne (April 3, 1366) the English agreed to use their utmost efforts to restore Peter in return for the Lordship of Biscay. They fulfilled their promise, and the Black Prince won the decisive battle of Najera on April 3, 1367, and Henry again became a fugitive. But the departure of the English left Peter defenseless, and in 1369 Henry returned, and was welcomed by Madrid and other cities as far south as Cordova. Peter tried to bribe Du Guesclin to help him to escape, but the latter betrayed him to Henry, who put him to death. The crown was now claimed by Ferdinand of Portugal, and somewhat later by John of Gaunt, who, in 1371, had married Constance, a daughter of Peter the Cruel. But Henry was able to overcome, with French assistance, all attacks, and developed into a good and liberal ruler. Consult Burke, *History of Spain*, vol. i. (London, 1895).

HEN'RYSON, ROBERT (c.1430-c.1500). A Scottish poet. He seems to have been educated abroad, as his name does not appear in the registers of the University of Saint Andrews, the only one existing in Scotland in his youth. When he was admitted, in 1462, to the newly founded University of Glasgow, he was called 'the venerable Master Robert Henrysone, Licentiate in Arts and Bachelor in Decrees.' He probably took orders, and was schoolmaster and notary public at Dunfermline. Henryson, who had the finest poetic talents of all the followers of Chaucer, wrote a sequel to *Troilus and Cressida* entitled the *Testament of Cressida.* He resumes the story where Chaucer leaves off, and completes it by inflicting a suitable punishment on the false Cressida. This continuation displays so much skill that it was included in the earlier editions of Chaucer, as if it had been the work of that poet himself. Another poem, "Robene and Makyne," though short, is remarkable as the first known specimen of pastoral poetry in the Scottish language. Henryson wrote several beautiful lyrics, and made a metrical translation of Æsop, adding morals of his own suitable to his time. In these fables he displays admirable sense

and humor. Consult: the selections in Ward, *English Poets* (London, 1880-83), and *Poems and Fables of Henryson*, edited by Laing (Edinburgh, 1865).

HENRY THE DEACON. See HENRICIANS.

HENRY THE LION (1129-95). Duke of Saxony and Bavaria. He was the son of Duke Henry the Proud. When only ten years of age he lost his father, who had engaged in a war with the Emperor Conrad III. of the House of Hohenstaufen, and who had been stripped of his Bavarian possessions. For seven years the young prince's mother, Gertrude, and his grandmother, Richenza, ruled his paternal dominions in Saxony. In 1146 Henry assumed the reins of government, and at the Diet of Frankfort, in the following year, he demanded of the Emperor Conrad the restoration of the Duchy of Bavaria, which had been wrested from his father. This was refused, and Henry, in concert with his uncle Welf (Guelph), had recourse to arms; but his efforts were crushed by the energetic measures of Conrad. After the death of this Emperor, however, Bavaria was given up to him by his cousin, the Emperor Frederick Barbarossa, who formed with him a close friendship (1156). Henry's possessions now extended (not continuously, however) from the North Sea and the Baltic to the shores of the Adriatic (including some territories in Italy), and he was by far the most powerful prince in the Empire, rivaling in influence the Emperor himself. In 1166 a league comprising the Archbishops of Bremen and Magdeburg, the Bishops of Halberstadt and Hildesheim, the Margrave of Brandenburg, and the Landgrave of Thuringia, was formed against him. He triumphed only after two years of hard fighting. About this time he separated from his first wife, and married Matilda, daughter of Henry II. of England, soon after which event he undertook an expedition to Palestine (1172). Henry broke his alliance with the Emperor by refusing to join in the Italian expedition of 1176, causing Frederick's defeat at Legnano. (See ITALY.) The wrath of the Emperor was kindled, and the numerous enemies of Henry the Lion again combined against him; he was summoned to appear at three different diets, and, refusing, was put under the ban of the Empire in 1180. By 1181 his fortunes were at so low an ebb that he was forced to ask mercy of the Emperor at Erfurt; but all that he could get was permission to retain his hereditary territories of Brunswick and Lüneberg, and even this was on the condition of his going into exile for three years. Henry, in consequence, went with his family to England; but returned to Brunswick in 1185, where he lived quietly. On the departure of Frederick for Palestine in 1189 Henry again was obliged to withdraw to England, but he soon returned, and engaged once more in wars with the petty princes of the North, achieving little, however. A little later he took up arms against the Emperor Henry VI., but was finally reconciled with the Hohenstaufen. He died at Brunswick, August 6, 1195. Consult: Prutz, *Heinrich der Löwe* (Leipzig, 1865); Philippson, *Geschichte Heinrichs des Löwen* (ib., 1867-68).

HENRY THE MINSTREL, or BLIND HARRY. A Scottish poet, who flourished about 1490. Scarcely anything is known of him beyond what is told by John Major in his Latin *History of Scotland* (1521). "When I was a child," he says, "Henry, a man blind from his birth, who lived by telling tales before princes and peers, wrote a book of William Wallace, weaving the common stories (which I, for one, only partly believe) into vernacular poetry, in which he was skilled." In 1490-92 Blind Harry is found at the Court of King James IV., receiving occasional gratuities of 5, 9, and 18 shillings. The poem attributed to him, *The Life of that Noble Champion of Scotland, Sir William Wallace, Knight*, was completed before the end of 1488, when it was copied by John Ramsay. This copy, the oldest manuscript of the work now known to exist, does not ascribe it to Blind Harry, nor is his name given to it in the earlier printed editions. The poem, which contains 11,861 lines, composed in the heroic couplet, is altogether a wonderful performance, for the blind minstrel must have carried it all in his memory. The style is simple and vigorous, and at times eloquent. The author makes repeated appeals to two Latin lives of Wallace, one by his schoolfellow, John Blair, another by Sir Thomas Gray, parson of Liberton. While the poem undoubtedly has a basis in fact, it is to be regarded mainly as a fiction woven out of popular traditions and written in the spirit of the metrical romances, with which the author was well acquainted. The poem was probably printed earlier, but the first extant edition is dated 1570. Immensely popular in Scotland for two hundred years, the poem fell into neglect, owing to the fact that its language naturally ceased to be understood. Its place was supplied in 1722 by the poor modernized version of William Hamilton, of Gilbertfield. Consult: Moir, *A Critical Study of Blind Harry* (Aberdeen, 1888), and a critical edition of the original poem, edited by Moir for the Scottish Text Society (Edinburgh, 1885-87).

HENRY THE NAVIGATOR (1394-1460). A Portuguese prince, celebrated as a munificent patron of voyagers and explorers. He was the fourth son of John I., King of Portugal, and was born at Oporto, March 4, 1394. He first distinguished himself at the conquest of Ceuta, in 1415. As early as 1420 he took up his residence at the town of Sagres, not far from Cape Saint Vincent, and while prosecuting the war against the Moors of Africa exerted himself in every way to decipher the mystery of the great continent upon which the Portuguese had but recently set foot. Under his inspiration Portuguese sailors reached parts of the ocean which the navigators of the time had long supposed to be inaccessible. The grand ambition of Henry was the discovery of unknown regions of the world. At Sagres he founded an observatory, to which he attached a school for the instruction of youthful scions of the nobility in the sciences necessary to navigation. Subsequently he dispatched some of his pupils on voyages of discovery along the western coast of Africa. Creeping down the coast by short and steady stages, these expeditions during Prince Henry's lifetime succeeded in unraveling the unknown shore line of Africa to within fifteen degrees of the equator. The Madeira Islands had been reached in 1419; in 1434 Cape Bojador was discovered; in 1441 Cape Blanco was reached; in 1445 Cape Verde, in Senegambia, was doubled: and in 1455 Cadamosto reached the mouth of the Gambia. Prince Henry died

at Sagres, November 13, 1460; but the impulse which he had imparted to the maritime enterprise of the Portuguese continued for more than fifty years after his death, and resulted in the circumnavigation of Africa, and in the upbuilding of a Portuguese empire in India and in Brazil. The science of navigation, which before his time can hardly be said to have constituted a science at all, is indebted to Prince Henry for many important improvements. Consult: Major, *Life of Prince Henry of Portugal* (London, 1868); id., *Discoveries of Prince Henry the Navigator* (ib., 1877). See AFRICA, section on History and Exploration.

HENSCHEL, hĕn'shel, GEORG (1850—). A German-English composer and vocalist, born at Breslau. He was of Polish descent on his father's side, and both his father and mother were noted for their knowledge of music. His first teacher was Schaeffer, and he subsequently studied under Moscheles and Wenzel for the pianoforte, Götz for singing, and Reinecke for theory and composition. He was enrolled as a student in the Liepzig Conservatory from 1867 to 1870, after which he studied in Berlin—composition under Kiel, singing under Schulze, and the violin under Schiever. For the next few years he steadily made a reputation for himself as a vocalist of high rank, singing in the *Messiah* (in French) at Brussels in 1873. Other important engagements followed rapidly, notably in Gluck's *Iphigénie en Tauride*, succeeded in 1874 by an engagement as a soloist at the Lower Rhine Musical Festival held at Cologne. His first concert in England was early in 1877, and his success was so complete that London became his permanent home, and in 1890 he was legally naturalized. He was speedily in request as a teacher of singing, his first English pupil being a daughter of Queen Victoria, the Princess Louise. About this time he first met Miss Lilian Bailey (1860-1901), a young American soprano who made her English début at a Philharmonic Society concert in London in 1879. She became a pupil of his, and two years later (1881) they were married at Boston, Mass. From 1881 to 1884 he was conductor of the Boston Symphony Orchestra, returning to London in 1885. From 1886 to 1888 he was professor of singing at the Royal College of Singing, London. After his marriage his appearances in the principal cities of America were in company with his wife. Both artists became famous for their work in Lieder, although they were equally at home in opera and oratorio. His compositions are many, consisting mainly of vocal works and studies, together with a serious opera, *Nubia* (1899), a comic opera, *A Sea Change* (1899), and several works for string and full orchestra. His most important work is the *Stabat Mater* (1899). He had a very high reputation as a teacher of singing, three-fourths of his pupils generally being Americans. His wife died in London.

HENSEL, hĕn'sel, LUISE (1798-1876). A German devotional poet, sister of Wilhelm Hensel the painter. She was born at Linum, and after the death of her father moved with her mother to Berlin (1810), where, seven years afterwards she met Clemens Brentano, who influenced her greatly. Though she had been a Protestant, she became a Catholic (1818), as Brentano was of that Church. In 1819 she was companion to Princess Salm, and in 1821 became teacher in the family of the Countess Dowager of Stolberg. From 1833 to 1837 she lived in Berlin again; then at Neuberg, Cologne, and Paderborn. In her first book, *Gedichte* (edited by Kletke, 1858), she collaborated with her sister Wilhelmine. Her evening hymn, "Müde bin ich, geh' zur Ruh," is one of the finest of German devotional lyrics. Her completed works were edited by Schlüter (last ed. 1892). Consult Binder, *Luise Hensel* (Freiburg, 1885).—WILHELMINE HENSEL (1802-93), sister of Luise, besides the poems published with Luise, wrote another volume, *Gedichte* (1882).

HENSEL, WILHELM (1794-1861). A German historical and portrait painter, born at Trebbin, Brandenburg. He studied at first architecture in Berlin, then became a pupil of Director Frisch at the Academy, and in 1813-15 took part in the War of Liberation, during which he visited Paris twice and became deeply interested in its art treasures. Although successful afterwards in Berlin as a poet, he yielded to his greater inclination for art, and in 1825 went to Rome, where he copied Raphael's "Transfiguration" and other masterpieces. After his return in 1828 he was made Court painter, and in 1831 professor at, and a member of, the Berlin Academy. He painted mostly biblical subjects, such as "Christ Before Pilate" (1834, Garnisonskirche, Berlin), "Christ and the Woman of Samaria" (Royal Palace, Berlin), "Miriam Leading the Procession of Virgins After Crossing the Red Sea" (1836), etc.; but also historical genre scenes, such as "Vittoria Caldoni Bidding Farewell to Her Friends" (1830), and a great number of portraits —he is credited with more than four hundred— among them those of historical personages ("Emperor Wenceslas," Römersaal, Frankfort) and many contemporaneous celebrities, notably Felix Mendelssohn, whose sister Hensel had married in Rome. He is said to have left also about a thousand portraits in silver point, and did creditable work as an illustrator and etcher, his best-known drawings being those for Tieck's *Genoveva* and *Phantasus*.

HENSELT, hĕn'sĕlt, ADOLF VON (1814-89). A distinguished German pianist, born at Schwabach, Bavaria. The progress he had made in his art, together with the evidences he had given of his genius, led King Ludwig I. to grant him an annuity, which made it possible for him to take up study with Hummel at Weimar and Sechter at Vienna. In 1837 he made his formal début as a concert virtuoso, and scored a remarkable triumph in the several large cities of Germany in which he appeared. The following year he went to Saint Petersburg, where his fame had already preceded him, and where he ultimately reaped his richest rewards. Soon after his arrival there he was appointed Court pianist to the Empress and music-teacher to the Imperial family, an appointment which was followed by that of inspector of musical instruction at the Imperial Educational Institution for Girls. He was not a prolific composer, but all his compositions are marked with his individuality, and depend largely for their interpretation on the style of playing in which Henselt excelled. As a performer he was remarkable for his sympathetic and poetical interpretation, as well as his mastership of legato execution, and what has

since come to be known as singing-touch. His compositions include the well-known F minor pianoforte concerto; *Poème d'Amour*, op. 3; *Ballade*, op. 31; and several other successful pieces, as well as some extremely difficult extension studies for the practice of a legato execution of extended chords and arpeggios. He died at Warmbrunn, Silesia.

HENSEN, hĕn'sen, VICTOR (1835—). A German physiologist, born in Schleswig. He studied medicine at Würzburg, at Berlin, and at Kiel, where he became docent and later professor of physiology. His earlier studies, under the influence of Bernard, were in embryology, and in the physiology and anatomy of the organs of sense; but afterwards he devoted himself to marine biology, became a member of the Commission for Scientific Research in German Waters, and contributed largely to the development of German fisheries. His works include: *Physiologie des Gehörs* and *Physiologie der Zeugung*, both in Hermann's *Handbuch der Physiologie* (1880-81); *Reisebeschreibung der Planktonexpedition* (1892); and *Die Planktonexpedition und Haeckels Darwinismus* (1891).

HEN'SHAW, HENRY WETHERBEE (1850—). An American ornithologist and ethnologist, born at Cambridgeport, Mass. His delicate health drove him from Harvard to bird-collecting in the Southern States. In 1872 he went to Utah, officially employed in the same quest, and he afterwards accepted a Government position at Washington, to write reports upon naturalists' observations, but was transferred in 1879 to the ethnological department. His publications include *Animal Carvings from Mounds of the Mississippi Valley* (1886), and other papers on similar subjects.

HENSLOWE, hĕnz'lō, PHILIP (?-1616). An English theatrical manager. In the neighborhood of Southwark, where he lived, he owned much property, including the Boar's Head and other inns, and managed and partly or entirely owned several playhouses. He rebuilt the new Rose Theatre, managed Newington Butts, the Swan, and, in company with Edward Alleyn, the actor, built the largest London theatre, the Fortune, in Cripplegate (1600). He also carried on a general brokerage business. He bought plays of the authors and sold them to various acting companies. A diary which he kept of these transactions is a most important document. This and other valuable papers are preserved in the library of Dulwich College. The *Diary*, with some forged entries, was published in 1845 by J. P. Collier for the Shakespeare Society. Consult *Catalogue of MSS. of Dulwich College*, edited by G. F. Warner (London, 1881).

HEN'SON, JOSIAH (1787-1883). An American clergyman and lecturer, born a slave in Port Tobacco, Md. His early career is remarkable for the hardships he was forced to endure. He escaped into Canada in 1828, and became a Methodist preacher at Dresden. Mrs. Harriet Beecher Stowe met him, and drew from the story of his life her character of Uncle Tom. Henson lectured throughout the United States, and made three trips to England during the last years of his life. While upon his final tour in 1876 he was entertained at Windsor Castle by Queen Victoria.

HENSTEIN, hĕn'stīn, JOHANNES VON (1822-80). A German botanist, born at Potsdam. He studied horticulture in Potsdam and Berlin, and was made a lecturer in the University of Berlin in 1855. In 1861 he was appointed custodian of the Royal Herbarium, Berlin, and from 1865 was professor of botany and director of the botanical garden at the University of Bonn. His botanical studies were varied, but have to do chiefly with plant physiology and morphology. His publications include: *Untersuchungen über den Bau und die Entwicklung der Baumrinde* (1853); *Versuche über die Leitung des Saftes durch die Rinde* (1860); *Uebersicht des natürlichen Pflanzensystems* (1867); and *Einige Züge aus der Biologie des Protoplasmus* (1880).

HENSZLMANN, hĕn's'l-mân, EMERICH (1813-88). An Hungarian art critic and archæologist, born at Kaschau, and educated at Pest and Vienna. After studying medicine, he devoted himself to archæology and æsthetics, and traveled extensively. He took part in the Revolution of 1848, serving in a department of the Ministry of Foreign Affairs. He was imprisoned for eight months; then left Hungary and lived in London and Paris until 1862, when he returned to his home. He was a member of the Lower House of the Hungarian Diet (1869-72), and professor of the history of art at Budapest (1873-88). A member of the Hungarian Academy and of the National Kisfaludy Society, he wrote: *Théorie des proportions appliquées dans l'architecture* (1860); *Die nordfranzösische Abtei und Kathedralkirche* (1865); *Die Grabungen des Erzbischofs von Kaloasa* (1873); and, in Hungarian, on the relation between Greek tragedy and Christian drama (1846), on mediæval architecture (1866), and on the remains of Gothic architecture in Hungary (1880).

HEN'TY, GEORGE ALFRED (1832-1902). An English author. He was born at Trumpington, Cambridgeshire, and was educated at the Westminster School and at Caius College, Cambridge. He served in the purveyor's department of the British Army during the early part of the Crimean War, and after returning home invalided was promoted to be purveyor and given service in the Italian Legion. After the close of the war he commanded for a time the Belfast and Portsmouth districts, and in 1866 became war correspondent of the London *Standard*. In the service of his paper he accompanied the contestants of the Austro-Italian, Turco-Servian, and Franco-Prussian wars; took part in the Abyssinian expedition of 1868 and the Ashanti expedition of 1873; participated in Garibaldi's Tyrolean campaigns; was present at the opening of the Suez Canal in 1869; attended the Prince of Wales during his travels through India; and made an extended tour of the mining regions of the United States. He is known as the most prolific and popular of contemporary writers for boys, his books being chiefly historical novels. The best known of his novels are: *All But Lost* (1869); *Gabriel Allen* (1888); *Dorothy's Double; A Woman of the Commune;* and *Colonel Thorndyke's Secret* (1898). Among the most recent of his books for boys are: *In the Irish Brigade* (1900); *Out with Garibaldi* (1900); *With Buller in Natal* (1900); *At the Point of the Bayonet* (1901); *Malcolm the Water-Boy* (1901); *To Herat and Cabul* (1901); *With Roberts to Pretoria* (1901); *The Treasure of the*

Incas (1902); *With the British Legion* (1902); *With Kitchener in the Soudan* (1902).

HENTZ, Nicolas (1750-1820). A French politician, born at Sierck, where he became justice. Elected to the Convention in 1792, he voted for the death of the King, and became a trusted agent of the Revolution. In 1794, when he returned to Paris from a long series of important missions, in which he had had unlimited powers, he was accused of cruelty in La Vendée, and was found guilty; but, benefiting by the amnesty of October, he left public life. The law against the regicides passed in 1816 forced him to leave the country. He escaped to the United States, and died on an island in Lake Erie.

HENZÉ, ăn'zā', Gustav (1815—). A French agriculturist, born in Paris. He was educated at the Agricultural Institute of Grignon, and was appointed director of the Grand-Jouan Institute in 1840. Six years afterwards he was administrator of the school at Nozay, then professor of agriculture at Grignon, and was appointed to the same chair at the opening of the Institute in Paris, and in 1880 was made also inspector-general of agriculture. Between 1843 and 1849 he wrote voluminously upon professional subjects, such as fodder, fertilizers, milk, pastures, and the *Influence of the Crusades upon the Agriculture of the Middle Ages* (1855).

HENZEN, hĕn'tsen, Johann Heinrich Wilhelm (1816-87). A German philologist and authority on Latin inscriptions. He was born at Bremen, studied at Bonn, Berlin, and, after travels through France, England, Italy, and Greece, at Rome, where from 1842 to the end of his life he was closely associated with the German Archæological Institute. With Mommsen and De Rossi he edited for the Berlin Academy that great work *Corpus Inscriptionum Latinarum*, in which he personally edited the *Fasti Consulares* to 766 A. U. C. and the inscriptions of the city of Rome after Cæsar. His other works, besides many contributions to philological journals, to the *Bulletino* and the *Annali* of the archæological institutes and *Ephemeris Epigraphica*, were a supplementary volume to Orelli's *Inscriptionum Latinarum Collectio* (1856), and *Acta Fratrum Arvalium quæ Supersunt* (1874).

HENZEN, Wilhelm (1850—). A German dramatist, born in Bremen, and educated at Leipzig, where, save for two years (1874-75) at Munich, he lived after the success of his first play, *Die Kypseliden* (1874). Henzen was connected with the Stadttheater as dramaturgist from 1882 to 1885, and in 1893 became director of the National Association of Dramatic Authors and Composers. Besides the dramas: *Lügen des Herzens* (1876); *Ossian* (1877); *Zweideutigkeiten* (1878); *Studiosus Lessing* (1880); *Bettina de Monk* (1881); *Luther* (1883); *Ulrich von Hutten* (1884); *Schiller und Lotte* (1891); *Tod des Tiberius* (1895); and *Kaiser, König und Bürger* (1890), and others, he wrote the valuable study, *Ueber die Träume in der altnordischen Sagalitteratur* (1885-89).

HENZI, or **HENTZI,** hĕn'tsē, Samuel (1701-49). A Swiss patriot, born at Bümplitz (Canton of Bern). After a very comprehensive training he held subordinate posts under the Government of the Canton of Bern; in 1741 was appointed a captain in the military service of the Duke of Modena; and in 1744 with others addressed to the Council of Bern a petition for a revision of the Constitution. For this he was sentenced to ten years' banishment, commuted by pardon in 1743. While an assistant librarian at Bern he entered into a conspiracy which had for its object the subversion of the Constitution, but which he supposed intended merely a second petition to the cantonal authorities. The undertaking was, however, discovered, and Henzi was executed on July 17, 1749, with two associates. Lessing planned a tragedy based on the fate of Henzi. Consult Bäbler, *Samuel Henzi's Leben und Schriften* (Aarau, 1880).

HEPAR (Lat., from Gk. ἧπαρ, liver). A name given by the older chemists to brown or liver-colored compounds of sulphur. *Hepar antimonii*, called also 'liver of antimony,' is a mixture of antimony trioxide, potassium sulphide, potassium carbonate, and antimony trisulphide, which has been used in veterinary medicine. *Hepar sulphuris*, called also 'liver of sulphur,' is a mixture of potassium hyposulphite, potassium sulphide, and potassium pentasulphide, with some potassium carbonate, which has also been used in medicine.

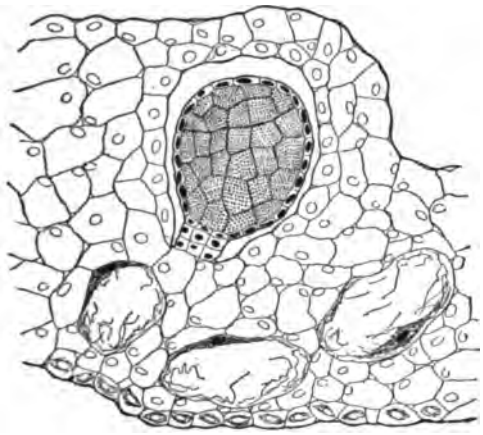
HEPATICA, Liverleaf (Neo-Lat., from Lat. *hepaticus*, Gk. ἡπατικός, *hēpatikos*, relating to the liver, from ἧπαρ, *hēpar*, liver). A plant of the genus Anemone, which belongs to the natural order Ranunculaceæ. The best-known species, *Anemone Hepatica*, has showy white, pink, or blue flowers that in earliest spring emerge from a hairy bud which is surrounded by the sombre-

HEPATICA.

tinted leaves of the previous year. It is the most beautiful of the early spring flowers of Eastern America, and one which by reason of its habitat and mode of blooming furnishes many texts for nature-study in elementary schools. The same species is found throughout Northern Europe, where it is cultivated and often produces double flowers. The root has powerful astringent properties. Another species, *Anemone angulosa*, native in Transylvania, is cultivated for the sake of its beautiful pale-blue flowers.

HEPATICÆ (Neo-Lat. nom. pl., from Lat. *hepaticus*, pertaining to the liver). The technical name of the group of plants popularly known as liverworts. The Hepaticæ form one of the two primary subdivisions of bryophytes; the other one includes the mosses. Liverworts grow in a variety of conditions; some float on the water; many live in damp places, and many on the bark of trees, but in general they are moisture-loving plants. The prostrate body consists of what is

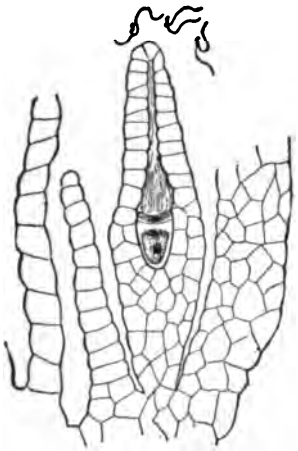
called a 'thallus' (q.v.). By virtue of this position the body is 'dorsiventral,' since the two surfaces are unlike. The upper (dorsal) surface, exposed to the light, develops structures accordingly; while the under (ventral) surface



IMBEDDED ANTHERIDIUM OF ANTHOCEROS.

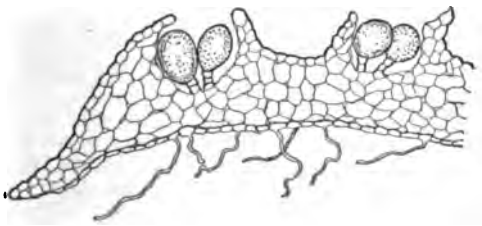
is against the substratum and develops root-like processes as hold-fasts and absorbing organs.

There are three well-defined groups of liver-



ARCHEGONIUM OF PORELLA.
With three sperms approaching the neck.

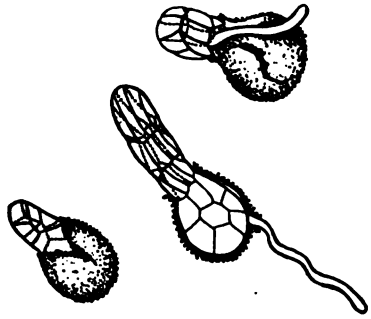
worts, each of which represents a special line of development. In the *Marchantiales*, the thallus body remains simple in form, like a flat green



SECTION OF THALLUS OF ANTHOCEROS.
Showing antheridia in pits.

disk, but becomes thick and rather complex in structure. This thickish body not only produces root-like processes (rhizoids) from its under surface, but develops reproductive structures from its upper surface. In many cases there is a budding form of reproduction; little cups (cupules) appear often in great numbers in which small disk-like bodies (gemmæ) are formed. When these gemmæ are scattered they again produce new plants. Upon the upper surface also the sex organs are carried, and in Marchantia itself they are borne upon the summit of a conspicuous erect branch. As a rule the two sex organs (antheridia and archegonia) are borne upon different plants.

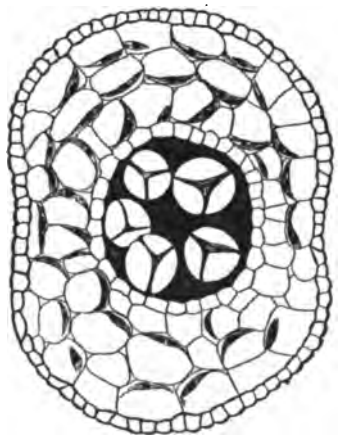
The *Jungermanniales* include many more species than either of the others. These forms often



GERMINATION OF SPORES OF CONOCEPHALUS.

grow in very dry situations, as on rocks, tree-trunks, etc., and are often mistaken for delicate mosses. Their resemblance to mosses suggests one of the chief features. The prostrate thallus body remains simple in structure, but becomes very much modified in form, being organized into a central stem-like axis which bears two rows of small foliage leaves. As a consequence the Jungermanniales are usually spoken of as the 'leafy liverworts.'

The *Anthocerotales* comprise comparatively few forms, but these are of great interest since they are supposed to represent forms which have given rise to the mosses and perhaps to the ferns

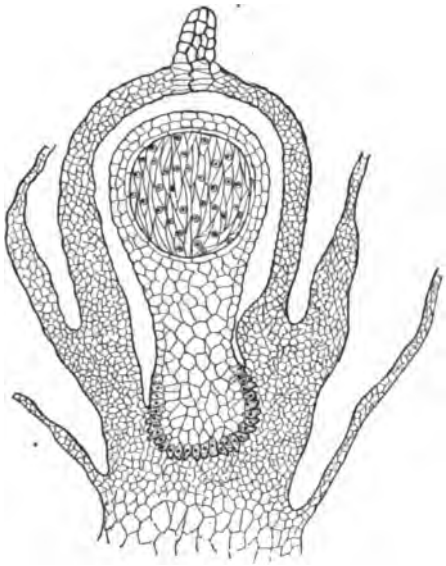


CROSS-SECTION OF SPOROGONIUM OF ANTHOCEROS.
Showing spores within, and surrounded by heavy green tissue.

also. The thallus body is very simple, both in structure and in form, but the chief interest is in connection with the spore-case, which is elon-

gated like a slender pea-pod, grows continuously in length, is green, and splits into two valves.

The liverworts are thought to have been derived from certain green algæ, and among them there is the first clear example of alternation of generations (q.v.). The thallus body is the sexual generation (gametophyte, q.v.), since it bears the sex organs. The fertilized egg produced by these sex organs develops a very different body, namely the spore-case, which is the sexless generation (sporophyte, q.v.). The spores upon germination produce the thallus body or gametophyte again, and so the alternation continues. The structure of the sex organs is also of interest, since they are very different from those of the algæ from which the group has come. The male organ (antheridium, q.v.), a many-celled body, consists of a wall of sterile cells within which very numerous sperm-producing cells occur. These sperms, which are of definite structure, have just two motile cilia.



VERTICAL SECTION OF SPOROGONIUM OF PORELLA, still within the calyptra, and showing the globular spore region.

The female organ (archegonium, q.v.), which is very characteristic, is a flask-shaped body, within the bulbous base of which a single large egg is formed. How this archegonium of the liverworts has been derived from the far simpler female organs of algæ is one of the important botanical problems. In any event, it continues to be the characteristic female organ through mosses, ferns, and gymnosperms. (See CHLOROPHYCEÆ.) Fossil liverworts, allied to the modern genus Marchantia, are found rarely in the Eocene shales and in the Oligocene amber of Europe. See LIVERWORTS.

HEP'ATI'TIS (Neo-Lat., from Gk. *ἧπαρ, hēpar*, liver). Inflammation of the liver. See LIVER, DISEASES OF.

HEP'BURN, JAMES. See BOTHWELL, JAMES HEPBURN, EARL OF.

HEPBURN, JAMES CURTIS (1815—). An American medical missionary and scholar; born at Milton, Pa. He was educated at the College of New Jersey (now Princeton University), where he graduated in 1832. He studied medicine in the Medical Department of the University of Pennsylvania, and received his degree of M.D. in 1836. In 1840 he offered his services as a medical missionary to the Presbyterian Board of Foreign Missions, and in the following year he sailed with his wife for Siam. His destination was afterwards changed to China, five new ports having been opened there by the treaty of 1842. He arrived at Amoy, one of the newly opened ports, in 1843, and labored in that field until 1846, when, on account of impaired health, he resigned and returned to New York City. Here he was a successful practitioner until the opening of Japan in 1859, when he again volunteered for service. In that year he went to Yokohama and engaged in such medical and evangelistic work as could then be carried on in view of the hostile attitude of the Government to Christianity. He mastered the language, and in 1867 brought out his Japanese-English and English-Japanese Dictionary, a work of great learning which has remained the standard dictionary until the present day. In 1873 an abridged edition was published in New York. Dr. Hepburn took a leading part in the translation of the Scriptures into Japanese. His medical work included the training of many young Japanese as physicians. In 1892 he published a valuable *Dictionary of the Bible* in Japanese, and in the same year retired, and made his home in East Orange, N. J.

HEPBURN, Sir JOHN (c.1598-1636). A Scotch soldier of fortune, born at Athelstaneford, and probably educated at Saint Leonard's College, Saint Andrews. He fought under Gray in Bohemia (1620); and under Mansfeldt in Holland (1622). Subsequently he served in the army of Gustavus Adolphus, and entered the French Army in 1633. After two years of brilliant fighting in Lorraine, and at the sieges of Hagenau and Saverne, he was killed. He was a Catholic and a prime favorite with Richelieu.

HEPHÆSTION, hē-fēs'tĭ-ŏn (Lat., from Gk. *Ἡφαιστίων, Hephaistiōn*) (c.357-324 B.C.). A Macedonian courtier, known as the friend of Alexander the Great. The two are said to have been companions in childhood; but further than this we do not hear of Hephæstion till B.C. 334, when Alexander visited Troy. Hephæstion is there said to have performed the same service at the grave of Patroclus as Alexander performed at that of Achilles. After that time the two were close friends. In his campaigns Alexander often gave Hephæstion important commissions, and he rewarded him with a golden crown and the hand of Drypetis, daughter of Darius and sister to his own wife, Statira. When, in B.C. 324, Hephæstion died at Ecbatana, the grief of Alexander was extravagant. He sent to inquire of Jupiter Ammon how he should honor his dead friend, and was told to offer sacrifice to him as a hero. The funeral was one of the grandest recorded in history. A funeral pyre was erected at Babylon at a cost of over 10,000 talents, and temples were built in honor of Hephæstion in many places.

HEPHÆSTION. An Alexandrian grammarian of the second century A.D., tutor to the Emperor Verus. He was the author of a work on prosody in forty-eight books, of which he himself made several abridgments. The manual on metres entitled *Ἐγχειρίδιον περὶ μέτρων* (*En-*

cheiridion peri metrōn), which is still extant, is supposed to have been his final abridgment. Though it gives merely a bare sketch of prosody, without any theoretical explanation of the facts, it is of great value; it is the only treatise on Greek prosody preserved complete from antiquity, and contains quotations from many lost poets. An incomplete treatise on the different forms of poetry and composition is appended to it. The manual has been edited by Gaisford (Oxford, 1810) and by Westphal in his *Scriptores Metrici Græci*. (Leipzig, 1866).

HEPHÆSTUS, hē-fēs'tŭs. See VULCAN.

HEP'TAGON (from Gk. *ἑπτάγωνος*, *heptagōnos*, seven-cornered, from *ἑπτά*, *hepta*, seven + *γωνία*, *gōnia*, angle). A plane geometric figure of seven sides. It has especial interest because the regular heptagon cannot be constructed by elementary geometry. See POLYGON.

HEPTAM'ERON (Gk. *ἑπταήμερον*, *heptaēmeron*, from *ἑπτά*, *hepta*, seven + *ἡμέρα*, *hēmera*, day). The name of a collection of tales made by several writers at the Court of Marguerite de Valois (q.v.). Le Maçon, at the Queen's behest, translated Boccaccio's *Decameron* in 1445. The *Decameron* inspired the form and other elements of the *Heptameron*. The ten story-tellers of Boccaccio fled from pest-stricken Florence to a beautiful villa, where ten stories are told every day for ten days. In the *Heptameron* five elegant men and women, being caught by a storm at the foot of the Pyrenees, determine to while away the time by having each of the company tell a story every day for ten days. But Marguerite left only seven days and two stories of the eighth day. The *Joyeux Deviz* of Bonaventure des Pēriers continues the tradition of the old French *fabliaux* and farces, whereas the *Heptameron*, as has been shown, is Italian in genesis and in tone. The body of the work is, like the old *fabliaux*, cynical and often licentious; but the *Heptameron* shows more feeling for natural beauty, and there is an occasional touch of altruistic devotion and even of lyric passion. Thus the *Heptameron* introduces into French fiction an element of emotional psychology. It makes of a story designed to amuse an instrument of observation and a method of description of human passion. It transfers the interest, rarely and tentatively, yet really, from act to motive—bearing witness to the keener psychology that resulted from the Protestant training in controversial dialectics, universal in the Court circle of Marguerite, to whom the editing at least of the *Heptameron* is to be attributed. The *Heptameron* was first published in 1558. There are many later editions of textual accuracy, and there is a partial and unfaithful English version.

HEPTAN'OMIS. A name given by the Greeks to the interior of Egypt from 30° to 27° N., which comprised nearly all the greatest Egyptian cities and monuments.

HEP'TARCHY (from Gk. *ἑπτά*, *hepta*, seven + *ἀρχή*, *archē*, kingdom, from *ἄρχειν*, *archein*, to rule). The name formerly given to the kingdoms established by the Angles and Saxons in England. It was believed that there were seven kingdoms, which were contemporaneous and well established, but all that can be safely asserted is that England before the beginning of the ninth century was peopled by various tribes, which were constantly at war with each other, and that sometimes one tribe was conquered, and sometimes another. At no time was there a counterpoise of power among seven of them, so that they could be said to have a separate, much less an independent, existence. Still, seven names do survive. Occasionally the King who was most powerful for the time being was styled Bretwalda, but in most instances the power of this supposed ruler, beyond the limits of his own territory, must have been very small. The hegemony among the Saxon States generally rested with one of the three great frontier kingdoms, Northumbria, Mercia, and Wessex. The supremacy of Northumbria was established by Edwin (q.v.), who fell in battle against Penda, King of Mercia, in 633. Under Egbert (802-39) Wessex rose to be supreme, and virtually swallowed up the others. The following are the seven kingdoms commonly said to have formed the heptarchy: Kent, Sussex, Wessex, Essex, Northumbria, East Anglia, and Mercia. Consult: Ramsay, *The Foundations of England*, vol. i. (London, 1898); Green, *The Making of England* (London and New York, 1881). See ANGLO-SAXONS; also the articles under the seven names mentioned.

HEP'TASOPHS, IMPROVED ORDER OF. A fraternal association in the United States, organized in 1878, as an offshoot from the Order of Heptasophs (q.v.), from which it differed by the adoption of death benefits as one of its features. The ritual, governing principles, conditions of membership, and methods of business are identical with the original order. At the close of 1902 the order had 722 conclaves, representing a membership of 52,825; had paid during the last fiscal year $944,615 in death benefits, and claimed to have disbursed since its organization the sum of $6,970,010.

HEPTASOPHS, ORDER OF. A benevolent fraternal order in the United States, founded in New Orleans in April, 1852, by Alexander Leonard Saunders and several prominent Free Masons. It was originally called the order of "Seven Wise Men," but the title was later changed to the Greek form. The ritual is very elaborate, and much significance is attached to the number seven, the membership in each chapter being either seven or a multiple of that number. After 1872 the adoption of a death benefit system was agitated, but aroused great opposition, leading in 1878 to the secession of the Zeta Conclave of Baltimore, which organized the Improved Order of Heptasophs. (See HEPTASOPHS, IMPROVED ORDER OF.) In 1880 the order finally adopted the benefit feature. Membership is confined exclusively to white male persons, and a belief in the existence of a Supreme Being is required. In 1891 the membership in 18 States was about 4000.

HEPTATEUCH, hĕp'tȧ-tūk (from Gk. *ἑπτά*, *hepta*, seven + *τεῦχος*, *teuchos*, tool, book). A word formed on the analogy of Pentateuch, meaning the first seven books of the Bible. It is applied particularly to an abridgment and translation of these books, with the Book of Job, into Anglo-Saxon, made by Ælfric the Grammarian (q.v.) in the tenth century. There are copies of it in the British Museum and the Bodleian Library. It was first printed in 1698 by Edward Thwaites.

HEPWORTH, George Hughes (1833-1902). An American clergyman and journalist. He was born in Boston, graduated at Harvard Divinity School in 1855, and entered the Unitarian ministry at Nantucket, Mass. He was pastor of the Church of the Unity, Boston, from 1858 to 1870, meantime serving as a chaplain in the Union Army on the staff of General Banks. In 1870 he took charge of the Church of the Messiah in New York, but resigned within two years, renouncing the Unitarian faith, and soon afterwards established in the same city the Church of the Disciples. He resigned this charge in 1878, and went abroad for rest. He preached at the Belleville Avenue Congregational Church in Newark, N. J., from 1882 until 1885, when he became connected editorially with the New York *Herald* and *Evening Telegram*. He had charge of a famine relief fund for Ireland in 1880, and later investigated the condition of the Armenian Christians. Among his writings are: *Whip, Hoe, and Sword* (1864); *Rocks and Shoals* (1870); *Hiram Golf's Religion* (1892); *Brown Studies* (1895); *The Farmer and the Lord* (1896); and *Through Armenia on Horseback* (1898).

HE'RA. See Juno.

HERACLEA, hĕr'â-klē'a (Lat., from Gk. *Ἡράκλεια, Hērakleia,* from *Ἡρακλῆς, Hēraklēs,* Hercules). The name of a number of Greek towns, in both Europe and Asia. Of these the most important were: (1) Heraclea in Lucania, near the Gulf of Tarentum, not far from the modern Policoro. It was founded in B.C. 432 by Tarentines and Thurians, and the inhabitants of the earlier colony Siris, which continued to exist only as its port. In a fertile territory it seems to have enjoyed great prosperity, but in dependence upon Tarentum. In B.C. 280 the first great battle between Pyrrhus (q.v.) and the Romans was fought near by, and two years later the Romans concluded with Heraclea a treaty of alliance on very favorable terms. It was still a flourishing place in the time of Cicero, but later fell into decay, and is now a heap of ruins. Near the ancient site were found in 1732 and later two bronze tablets, the *Tabulæ Heracleenses,* containing on one side a long Greek inscription of the fourth century B.C. relating to certain sacred lands of Dionysus and Athena, whose boundaries had been disturbed in a recent war, and on the other a much more important Latin document, the *Lex Iulia Municipalis* (B.C. 45), which is one of the chief authorities for the municipal law of Italy. These inscriptions have often been published, but may best be found in Kaibel, *Inscriptiones Græcæ Siciliæ et Italiæ,* 645 (Berlin, 1890), and *Corpus Inscriptorum Latinarum,* i. (Berlin, 1863).

(2) Heraclea Minoa, on the south coast of Sicily, east of Agrigentum. The city seems to have been originally a Phœnician trading station, Rus Melkart, but was later occupied by Selinus, and about B.C. 510 by Spartans under the leadership of Euryleon. The name Minoa was due to a legend attributing the founding of the city to Minos of Crete. It was afterwards destroyed by the Carthaginians, though a small settlement continued to exist under Carthaginian rule, and after B.C. 314 rose to renewed importance, and was one of the chief Carthaginian naval stations during the First Punic War. The site, on Cape Bianco, is now wholly deserted, and but few traces of the ancient city are visible.

(3) Heraclea Pontica, a Megarian colony on the south coast of the Black Sea, the modern *Eregli* (q.v.). It seems to have been founded about the middle of the sixth century B.C., and after a period of party strife, passed under the rule of a moderate oligarchy, which soon made it master of the neighboring territory including some of the lesser Greek colonies. Even when the aristocracy was supplanted by a tyrant, the prosperity of the city continued to increase; but after the overthrow of the Persian Empire by Alexander the growth of the Bithynian power and the wars with the Galatians lessened its influence. It was plundered by the Romans in the Mithradatic war, and from that time gradually declined. It was the birthplace of the philosopher Heraclides Ponticus (q.v.).

HER'ACLE'ON (Lat., from Gk. *Ἡρακλέων, Hērakleōn*). A Gnostic Christian, who flourished in Italy during the third quarter of the second century. Clement of Alexandria calls him the most distinguished follower of Valentinus (q.v.). His writings survive only in fragments, and each quotation is accompanied by unfriendly comments by his orthodox opponent. He wrote a Gospel commentary, entitled *Hypomnemata,* which dealt especially with Saint John. Origen preserves considerable fragments of this work in his own commentary on the same Gospel. Clement also quotes from Heracleon, but we are not certain that it is from this work. Hippolytus says that Heracleon and other Western Valentinians taught that Christ's body was of animal substance, while the Oriental School regarded it as spiritual. But we know little about the details of their systems. Heracleon's influence was sufficient to perpetuate his name among his followers, who are called Heracleonites. Consult Brooke, *The Fragments of Heracleon* (Cambridge, 1901). See Gnosticism.

HER'ACLE'ONAS (Lat., from Gk. *Ἡρακλεωνας, Hērakleiōnas*) (c. 614-?). An Emperor of Byzantium, son of the Emperor Heraclius. He fought with his father in Syria, and was appointed Cæsar in 638 or 639. When his father died (641) his mother, Martina, asked that he be permitted to rule with his invalid stepbrother, Constantine III. But Constantine died after a reign of less than five months and Heracleonas became sole Emperor. The Senate suspected that Martina had had this in view and had possibly hurried the death of her stepson; a revolution broke out; Heracleonas was dethroned, his nose cut off, his mother's tongue torn out, and the two were exiled to Constantinople. Constans II., son of Constantine, succeeded to the throne.

HERAC'LEONITES. See Heracleon.

HERAC'LEOP'OLIS (Lat., from Gk. *Ἡρακλέους πόλις, Hērakleous polis,* city of Hercules). A city of ancient Egypt on the right bank of the Bahr Yûsuf (Joseph's Canal), about 10 miles west of the Nile. It was called by the Egyptians *Henen-suten,* whence its Coptic name *Hnês,* and its modern Arabic name *Aḥnas* and *Henassîye.* Heracleopolis was the seat of worship of the ram-headed god Hershef, whom the Greeks identified with Heracles. Of the temples and other buildings, for which the place was renowned in ancient times, scarcely anything remains. An extensive necropolis lies upon the opposite bank of

the Bahr Yûsuf. Consult Naville, *Ahnas el Medineh*, Egyptian Exploration Fund, vol. xi. (London, 1891).

HER'ACLES. See HERCULES.

HERACLEUM, hĕr'â-klē'ŭm. See COW-PARSNIP.

HER'ACLI'AN (A.D. ?-413). A Roman general. At the instance of the Emperor Honorius, he put Stilicho to death (A.D. 408), and received the Government of Africa as his reward. After supporting the Emperor during the invasion of Alaric and the usurpation of Attalus, whom Alaric had made Emperor, Heraclian revolted and invaded Italy. His enterprise failed, however, and on his return to Carthage he was put to death by order of Honorius.

HERACLIDÆ, hĕr'â-klī'dē (Lat., from Gk. *Ἡρακλεῖδαι*, *Hērakleidai*, descendants of Hercules, from *Ἡρακλῆς*, *Hēraklēs*, Hercules). (1) The name is applied specifically to those legendary descendants who were said to have led the Dorians in the conquest of the Peloponnesus. The legend told of an unsuccessful attempt by Hyllus, son of Heracles, to recover the inheritance from which Eurystheus had driven him, and then, 100 years later, of the successful invasion, led by his great-grandsons Temenus, Cresphontes, and Aristodemus, sons of Aristomachus. They defeated Tisamenus, son of Orestes and grandson of Agamemnon, and gained possession of the Peloponnesus. Argos fell to Temenus; Lacedæmon to Procles and Eurystheus, the sons of Aristodemus; Messenia to Cresphontes; Elis to the Ætolian Oxylus; Arcadia alone remained undisturbed. This story of the return of the Heraclidæ seems to owe its development to the epic, rather than to popular tradition, and is an attempt to explain the change from the conditions of the Homeric poems to those of the period after the Dorian conquest. The poems of Tyrtæus show its general acceptance in Sparta about B.C. 650. It is the later legendary account of the Dorian conquest, which from its nature must in reality have been a much more obstinate and protracted struggle. Consult the histories of Greece by Thirlwall, Grote (older views), Holm, and Busolt, and especially Meyer, *Geschichte des Altertums*, ii. (Stuttgart, 1893).

(2) A tragedy by Euripides, brought out about B.C. 420. It tells of the persecution of the sons of the dead Heracles by Eurystheus and their reception and protection by Athens. The children of Heracles, under the leadership of Iolaus, come to Marathon, and the Athenians gain a victory over the Argives through the voluntary sacrifice of Macaria, daughter of Heracles. Eurystheus is taken prisoner and surrendered to Alcmene, who demands his death. The play was meant to represent to Sparta how unnatural her contemplated alliance with Argos during the Peloponnesian War would be, and was directed against the Argive party in Athens.

HER'ACLI'DES PONTICUS (Lat., from Gk. *Ἡρακλείδης*, *Hēracleidēs*, and *Pontus*). A Greek philosopher of the fourth century B.C., born at Heraclea in Pontus. At Athens he became a disciple of Plato, whom he represented during the latter's absence in Sicily. Later, however, he attached himself to Aristotle. His numerous writings covered many fields, including philosophy, grammar, music, physics, rhetoric, political and literary history, and geography. Critical and philosophical ability were apparently not possessed by him in a high degree, for his philosophical works were early neglected. His biographical and grammatical treatises, however, enjoyed a long popularity. Diogenes Laërtius praises his style, while Cicero blames him for his fondness for marvelous tales. The extracts, *On Constitutions*, which bear the name of Heraclides, are only a poor compilation from Aristotle's *Politics*, and should be attributed to Heraclides Lembos (second century A.D.). This work was edited by Schneidewin (Göttingen, 1847), and by Kaibel and Wilamowitz, as an appendix to their edition of Aristotle's *Constitution of Athens* (Berlin, 1898). The fragments of Heraclides's writings were collected by Müller, *Fragmenta Historicorum Græcorum*, vol. ii. (Paris, 1848). Consult: Voss, *De Heraclidis Pontici Vita et Scriptis* (Leipzig, 1896); and Schmidt, *De Heraclidæ Pontici et Dicæarchi Messenii Dialogis Deperditis* (Breslau, 1867).

HER'ACLI'TUS (Lat., from Gk. *Ἡράκλειτος*, *Hērakleitos*). A Greek philosopher who flourished about B.C. 500, born at Ephesus in Asia Minor. From the obscurity of his writings he was nicknamed 'The Dark' (*ὁ σκοτεινός*). Only one work, that *On Nature*, can be attributed to him. Of this, numerous fragments are preserved by later writers. Heraclitus's philosophy was a development of the Ionic doctrine under the influence of Xenophanes. The principle of all things according to him was fire, a self-determined ether, which by condensation and rarefaction creates the phenomena of the sensible world. To the 'being' of his predecessors he added the principle of 'becoming.' He held that all things are in constant flux, and that the appearance of stability is due to the uniformity of motion. His philosophy had a strong influence on later thinkers; Zeno recalled it, and Stoicism was based on its teaching. The fragments of his work are to be found in Mullach, *Fragmenta Philosophorum Græcorum*, vol. i. (Paris, 1860); Ritter and Preller, *Historia Philosophiæ Græcæ* (7th ed., Gotha, 1888). Consult: Zeller, *Philosophie der Griechen* (5th ed., vol. i., Leipzig, 1892); Patrick, *The Fragments of the Work of Heraclitus* (Baltimore, 1889).

HERACLIUS, hĕr-â-klī'ŭs (c.575-641). Byzantine Emperor from 610 to 641. He was a native of Cappadocia and belonged to a distinguished family, his father having been Exarch of Africa. In 610, when the tyranny of the Emperor Phocas had become unbearable, and the mother and bride to be of Heraclius himself were imprisoned, he equipped a fleet in Africa, and appeared before Constantinople. The citizens rose in rebellion, Phocas was beheaded, and Heraclius became Emperor in his stead. The condition of the Byzantine Empire at this time was deplorable. Years elapsed before Heraclius could put forth any vigorous efforts for its reorganization. In 619 the Avars plundered the country to the gates of Constantinople and carried off an immense number of captives. In the East, the conquests of the Persians threatened the very existence of the Empire. Jerusalem was stormed by the generals of Khosru in 615 and Egypt was overrun in the following year. The stopping of the export of corn from Egypt to Constantinople caused a severe famine in the capital. The Emperor, however, was meanwhile disciplining and

equipping an army for the invasion of Persia, and in 622 he took the field. In the plain of Issus he routed a Persian army and forced his way through the passes of the Taurus and Anti-Taurus, into the ancient Pontus, where his soldiers wintered. In 624 he crossed Armenia, conquered several of the Perso-Caucasian countries, and reached the Caspian Sea. There he formed an alliance with the Khazars, and with their assistance attacked Media, and carried his arms as far south as Ispahan. Before going into winter quarters, he defeated the main body of the Persians, commanded by Khosru himself. In 625 Heraclius descended from the Caucasus into Mesopotamia, and thence proceeded into Cilicia, where he routed the Persians once more with immense slaughter. During the next two years (626-628) Heraclius carried the war into the heart of the Persian Empire, and in December, 627, cut to pieces the forces of Rhazates, the Persian general, near the junction of the Little Zab and the Tigris. An immense booty fell into the hands of the victors. Khosru fled into the interior of Persia, and was soon afterwards put to death by his son Siroes, who concluded a peace with Heraclius, by which the Persians gave up all their former conquests (628). Not the least of the trophies Heraclius brought back to Constantinople was the alleged wood of the true cross, which the Persians had carried off from Jerusalem in 615. The fame of Heraclius was now at its height, but the rise of the Mohammedan power in Arabia brought a new and terrible enemy against the old Empire, where religious dissensions still created bitter factions, whose strife weakened the State. Heraclius seems to have exhausted his splendid energies and ambition in the remarkable Persian campaigns, and now spent his time in his palace at Constantinople, partly in sensual pleasures, and partly in theological disputations. In his efforts to mediate between the orthodox party and the monophysites (q.v.) Heraclius sought to impose the monothelite doctrine on the Empire, arousing thereby great disturbances in the capital. (See MONOTHELITES.) Before the close of his life, Syria, Palestine, Mesopotamia, and Egypt were in the hands of the caliphs. He died February 11, 641. Consult: Bury, *A History of the Later Roman Empire from Arcadius to Irene*, vol. ii. (London, 1889); Finlay, *History of Greece* (London, 1877); Gibbon, *Decline and Fall of the Roman Empire*, ed. Bury (London, 1896-1900); Drapeyron, *L'empereur Heraclius et l'empire byzantin au VIIème siècle* (Paris, 1869), with bibliographical notes. There is also a contemporary account by Sepeos, an Armenian bishop, that was published in Constantinople in 1850. See BYZANTINE EMPIRE.

HÉRACLIUS, ā'rā'klē-us'. A minor tragedy by Corneille (1647). The play is exceedingly complicated in plot, and contains few passages of great excellence.

HERÆUM (Lat., from Gk. Ἡραῖον, *Hēraion*), THE ARGIVE. The oldest and most noted sanctuary of Argolis, and the chief seat in Greece of the worship of Hera, situated on a spur of Mount Eubœa, between Argos and Mycenæ. The original temple was burned in B.C. 423, and a new one built with great magnificence by the architect Eupolemos of Argos. Of the second building, Pausanias gives a detailed description. It contained two images of the goddess—one of wood, brought from Tiryns, and a statue of gold and ivory by Polyclitus. A few remains of the sculptures are preserved at Athens. The site of the Heræum has been excavated by the American School of Classical Studies (1891-95).

HERALD (from OF. *heralt, heraut*, Fr. *héraut*, from ML. *heraldus, haraldus*, herald, from OHG. *hari, heri*, Ger. *Heer*, AS. *here*, army + OHG. *-walto*, AS. *-weald*, power, from OHG. *waltan*, Ger. *walten*, AS. *wealdan*, Eng. *wield*). In England, an officer whose duty consists in the regulation of armorial bearings, the marshaling of processions, and the superintendence of certain public ceremonies. In the Middle Ages heralds were highly honored, and enjoyed important privileges; their functions included, in addition to those mentioned, the bearing of messages, whether of courtesy or defiance, between royal or knightly personages; the superintending and registering of trials by battle, tournaments, jousts, and all chivalric exercises; the computation of the slain after battle; and the recording of the valiant acts of the fallen or surviving combatants. The person of a herald, while in the exercise of his duties, was inviolable. The word *heraldus* was used in Germany as early as 1152; the first use in an English document occurs in 1337. The heralds became very influential in the latter half of the fourteenth century. The Heralds' College (q.v.) was incorporated in 1483. Three orders of officials, kings-at-arms, heralds, and pursuivants, are still appointed. There are now in England four kings-at-arms, named by their offices Garter, Clarencieux, Norroy, and Bath; six heralds—Somerset, Chester, Windsor, Richmond, Lancaster, and York; and four pursuivants—Rouge Dragon, Portcullis, Blue Mantle, and Rouge Croix. In Scotland there are at present three heralds and three pursuivants, the principal heraldic officer being Lyon King-at-Arms. Ireland has one king-at-arms, Ulster; two heralds, Cork and Dublin; and two pursuivants, of whom the senior bears the title of Athlone, and the other is called the pursuivant of Saint Patrick. The official costume of a herald consists of a satin tabard or surcoat embroidered with the royal arms, and a collar of SS. See HERALDS' COLLEGE; KING-AT-ARMS; PURSUIVANT.

HERALDRY. Properly, the knowledge of the multifarious duties devolving on a herald (see HERALD); in the more restricted sense, in which it will be considered here, it is the science of armorial bearings.

HISTORY. Though there are many instances in remote times of nations and individuals distinguishing themselves by particular emblems or ensigns, nothing that can properly be called armorial bearings existed before the middle of the twelfth century. The shield of the French knights in the First Crusade presented a plain face of polished metal, and there were only a very few heraldic devices in use in the Second Crusade in 1147. The Anglo-Norman poet Wace, who wrote in the latter half of the twelfth century, mentions devices or cognizances as being in use among the Normans, at the conquest of England, and Wace is corroborated by the Bayeux tapestry of the twelfth century, where there are figures of animals on the shields of the invaders, while the Saxon shields have only borders or crosses. The rude devices on these shields

have nothing approaching to an armorial form or disposition, and in some cases the same device is represented on different shields. Heraldry developed during the Crusades, where it was necessary for a knight to have some mark by which he might be known; it may have been influenced by the Saracen custom of wearing richly embroidered devices. Some armorial insignia were depicted on the shields used in the Third Crusade, which took place in 1189 and the following years; and in the same half-century originated the fleurs-de-lis of France and the lions of England. The transmission of arms from father to son seems to have been fully recognized in the thirteenth century, and in the practice then introduced of embroidering the family insignia on the surcoat, worn over the hauberk or coat of mail, originated the expression *coat of arms*. Arms were similarly embroidered on the jupon, cyclas, and tabard, which succeeded the surcoat, a practice which survived till the time of Henry VIII., when the tabard came to be entirely disused except by heralds, who still continue to wear on their tabards the royal arms.

It was by slow degrees that the usage of arms grew up into the systematized form which it assumes in the works of the established writers on heraldry. The principal existing data for tracing its progress are English rolls of arms yet extant of the times of Henry III., Edward I., and Edward III. The earliest formal treatises date no further back than the end of the fourteenth century, before which time the whole historical part of the subject had been obscured by a tissue of gratuitous fiction, which has misled most subsequent writers up to a very recent period. The writers on the subject represented the heraldry of the tenth and eleventh centuries as equally sharply defined with that of the fifteenth and sixteenth. The arms of William the Conqueror and his sons are described with all their differences; arms are ascribed to the Saxon Kings of England, to Charlemagne, to biblical characters, and even to half-mythical persons and heroes of classical times.

In the infancy of heraldry, every knight assumed what arms he pleased, without consulting sovereign or king-at-arms. Animals, plants, imaginary monsters, things artificial, and objects familiar to pilgrims, were all fixed on. Thus the scallop-shell, the emblem of Saint James and most generally in heraldry called a 'clam,' was frequently borne by Crusaders. Often the object chosen was one whose name bore sufficient resemblance in sound to suggest the name or title of the bearer of it. Devices and mottoes were sometimes chosen on account of their allusive associations: e.g. a broken spear for Brakespeare, or *Festina lente* for the Onslows. This is called Canting Heraldry by the English, *Armes parlantes* by the French. The charge fixed on was used with great latitude, singly or repeated, in any way which the bearer chose, or the form of his shield suggested. But as coats of arms became more numerous, confusion often arose from different knights adopting the same symbol; and this confusion was increased by a practice which crept in of sovereigns or feudal chiefs allowing their arms, or part of them, to be borne as a mark of honor by their favorite followers in battle. Hence different coats of arms came in many instances so closely to resemble each other that it was imperative, for distinction's sake, that the fancy of the bearer should be restrained, and regulations laid down regarding the number and position of the charges, and the attitudes of the animals represented. This necessity led, in the course of time, to the systematizing of heraldry, a process which the rolls alluded to show us was going on gradually throughout the thirteenth and fourteenth centuries. By the time that heraldry was consolidated into a science, its true origin had been lost sight of, and the credulity and fertility of imagination of the heralds led them to invest the most common charges with mystical meanings, and to trace their original adoption to the desire of commemorating the adventures or achievements of the founders of the families who bore them. It was only when heraldry began to assume the dignity of a science that augmentations of a commemorative character were granted. After the science became thoroughly systematized, augmentations and new coats were often granted with a reference to the supposed symbolical meanings of the charges.

In England, the assumption of arms by private persons was first restrained by a proclamation of Henry V., prohibiting their assumption by any one who had not borne arms at Agincourt, except in virtue of inheritance or a grant from the Crown. To enforce the observance of this rule, heralds' visitations or processions through the counties were instituted, and continued from time to time till the reign of William and Mary.

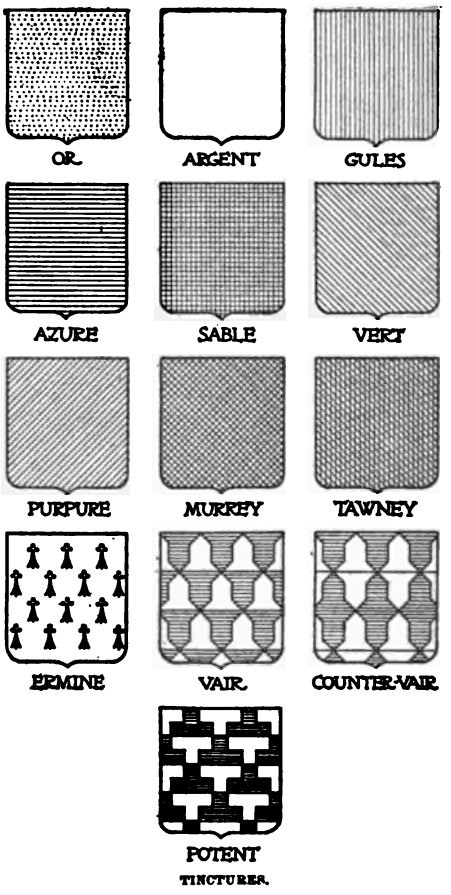
Jurisdiction in questions of arms is executed by the Heralds' College (q.v.) in England, the Lyon Court in Scotland, and the College of Arms in Ireland. No one within the United Kingdom is entitled to bear arms without an hereditary claim by descent or a grant from the competent authority; and the wrongful assumption of arms is an act for which the assumer may be subjected to penalties. The use of arms, whether rightfully or wrongfully, subjects the bearer of them to an annual tax. It is illegal to use without authority not only a coat of arms, but even a crest. Any figure or device placed on an heraldic wreath is considered a crest in questions with the Heralds' College or Lyon Court.

CLASSIFICATION. Besides individuals, communities and States are entitled to the use of arms, and heralds have classified arms, in respect of the right to bear them, under the following ten heads: (1) Arms of dominion; the arms borne by sovereigns as annexed to their territories. (2) Arms of pretension, which sovereigns have borne, who, though not in possession, claim a right to the territories to which the arms belong. Thus, England bore the arms of France from the time of Edward III. till 1801. (3) Arms of community; the arms of bishops' sees, abbeys, universities, towns, and corporations. (4) Arms of assumption; arms which one has a right to assume with the approbation of the sovereign. Thus, it is said, the arms of a prisoner of war may be borne by his captor, and transmitted by him to his heirs. (5) Arms of patronage, added by governors of provinces, lords of the manor, patrons of benefices, etc., to their family arms, as a token of superiority, right, or jurisdiction. (6) Arms of succession, borne quartered with the family arms by those who inherit fiefs or manors, either by will, entail, or donation. Thus, the Dukes of Athole, as having been lords of the Isle of Man, quarter the arms of that island, and the Duke of Argyle

quarters the arms of the lordship of Lorne. (7) Arms of alliance, taken up by the issue of heiresses, to show their maternal descent. (8) Arms of adoption, borne by a stranger in blood, to fulfill the will of a testator. The last of a family may adopt a stranger to bear his name and arms and possess his estate. Arms of adoption can only be borne with permission of a sovereign or king-at-arms. (9) Arms of concession; augmentations granted by a sovereign of part of his royal arms, as a mark of distinction, a usage which, we have already observed, obtained in the earliest days of heraldry; and hence the prevalence among armorial bearings of the lion, the fleur-de-lis, and the eagle, the bearings of the sovereigns of England and Scotland, of France, and of Germany. (10) Paternal or hereditary arms, transmitted by the first possessor to his descendants.

THE ESCUTCHEON. A coat of arms is composed of charges depicted on an escutcheon representing the old knightly shield. The shields in use in England and France in the eleventh and twelfth centuries were in shape not unlike a kite, a form which seems to have been borrowed from the Sicilians; but when they became the recipients of armorial bearings, they were gradually flattened and shortened. From the time of Henry III. the escutcheon has been most frequently represented on seals as approaching a triangular form, with the point downward, the chief exceptions being that the shield of a lady is lozenge-shaped, and of a knight banneret square. To facilitate description, the surface or field of the escutcheon has been divided into nine points, technically distinguished by the following names: A, the dexter chief point; B, the middle chief; C, the sinister chief; D, the honor or collar point; E, the fess point; F, the nombril or navel point; G, the dexter base point; H, the middle base; and I, the sinister base point. It will be observed that the dexter and sinister sides of the shield are so called from their position in relation, not to the eye of the spectator, but of the supposed bearer of the shield.

TINCTURES. Coats of arms are distinguished from one another, not only by the charges or objects borne on them, but by the color of these charges, and of the field on which they are placed. The field may be of one color or of more than one, divided by a partition line or lines varying in form. The first thing, then, to be mentioned in blazoning a shield—that is, describing it in technical language—is the color, or, as it is heraldically called, *tincture* of the field. (See Illustration, TINCTURES.) Tinctures are either of metal, color strictly so called, or fur. The metals used in heraldry are two—gold, termed *or*, and silver, *argent*—represented in painting by yellow and white. The colors are five—red, blue, black, green, and purple, known as *gules*, *azure*, *sable*, *vert*, and *purpure*. Two other colors have been used occasionally: *tawny* or *tenné* and *murrey* or *sanguiné*. But these are now discarded in most countries. Metals and colors are indicated in uncolored heraldic engravings by points and hatched lines, an invention ascribed to Silvestro di Petrasancta, an Italian herald of the seventeenth century. *Or* is represented by small dots; for *argent*, the field is left plain. *Gules* is denoted by perpendicular and *azure* by horizontal lines; *sable*, by lines perpendicular and horizontal crossing each other; *vert*, by diagonal lines from dexter chief to sinister base; *purpure* by diagonal lines from sinister chief to dexter base; *murrey*, by a combination of vert and purpure; *tawney*, by a combination of vert and gules. The *furs* were originally but two,



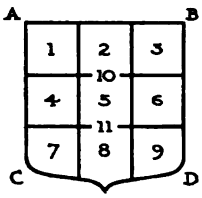
TINCTURES.

ermine and *vair*. The former is represented by black spots or tails on a white ground. *Vair*, said to have been taken from the fur of a squirrel, bluish-gray on the back, and white on the belly, is expressed by blue and white shields, or bells in horizontal rows, the bases of the white resting on the bases of the blue. If the vair is of any other colors than white and blue, they must be specified. Various modifications of these furs were afterwards introduced, among them: *ermines*, or ermine with the field sable and the spots argent; *erminitis*, with a red hair on each side of the black spot; *erminois*, with the field gold and the spots black; *pean*, with the field sable, and the spots *or*; *counter-vair*, or vair with the bells of one tincture placed base to base; *potent*, with figures like the heads of crutches; and counter-potent, with the heads of crutches alternately erect and reversed.

It is an established rule of heraldry that metal should not be placed on metal, nor color on color; a rule more rigidly adhered to in English than in foreign heraldry. Among early arms there is one remarkable transgression of it in the arms of the Kingdom of Jerusalem, founded by the Cru-

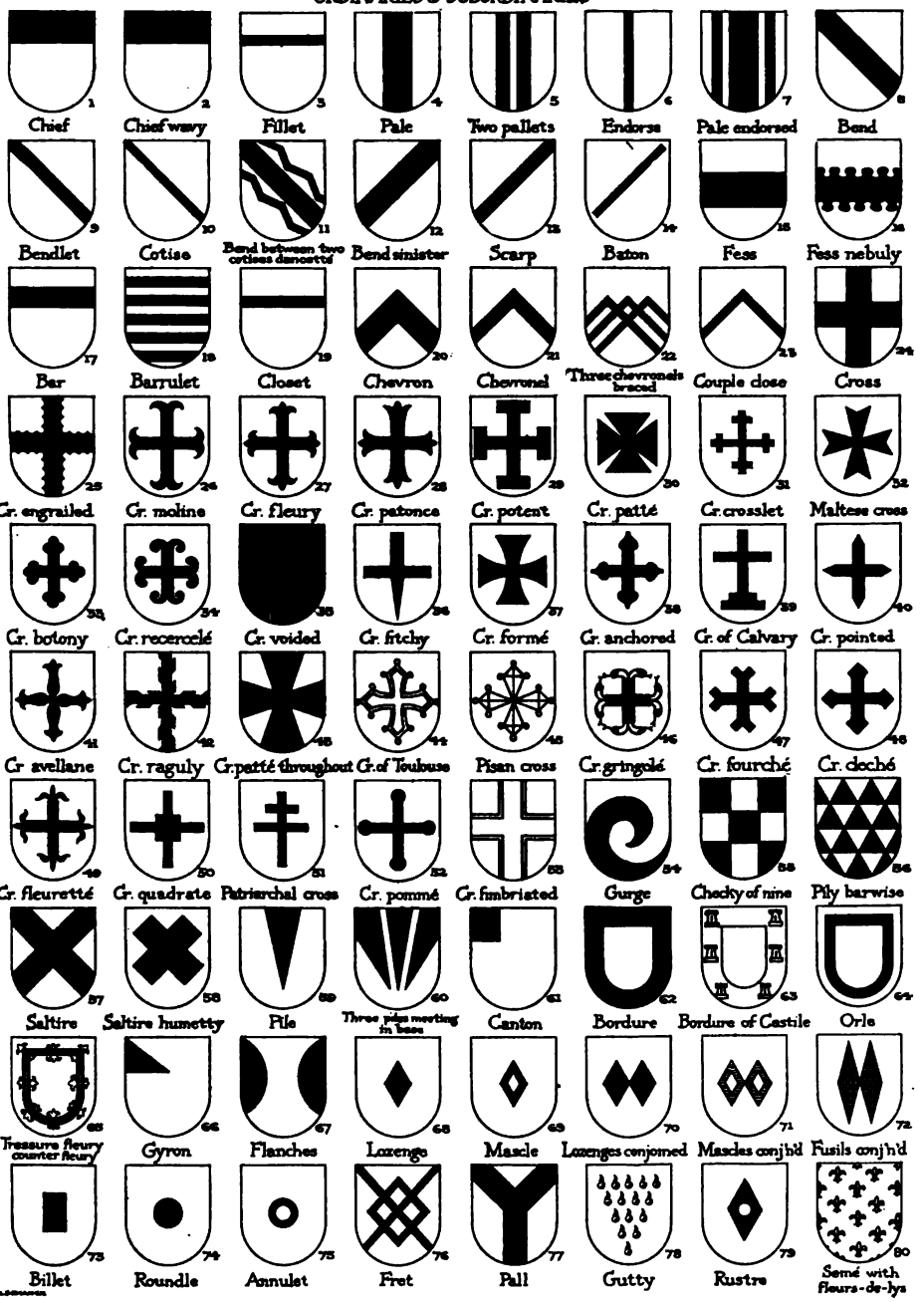
DIVISIONS of the SHIELD

AB	Upper margin
CD	Lower margin
AC	Dexter margin
BD	Sinister margin
123	Chief
456	Fess
789	Base
147	Dexter tierce
258	Pale
369	Sinister tierce



1	Dexter chief canton
2	Chief point
3	Sinister chief canton
4	Dexter flank
5	Center point
6	Sinister flank
7	Dexter canton of base
8	Base point
9	Sinister canton of base
10	Honor point
11	Nombril point

ORDINARIES & SUBORDINARIES



saders, which are five golden crosses on a silver field. A recognized exception exists wherever a charge lies over a field partly of metal and partly of color, or where an animal is attired, armed, unguled, crowned, or chained with a tincture different from that of his body. Marks of cadency, chiefs, cantons, and bordures are also occasionally exempted from the general rule, being, according to some heralds, not laid on the shield, but *cousu*, or sewed to it.

CHARGES. Everything contained in the field of an escutcheon is called a *charge*. Charges are divided by heralds into the three classes of honorable ordinaries, subordinaries, and common charges. Under the name of ordinaries or *honorable ordinaries* are included certain old and very frequent bearings, whose true peculiarity seems to be that, instead of being taken from extraneous objects, they are representatives of the wooden or metal strengthenings of the ancient shields. Nine are recognized by the best usage. See Plate, ORDINARIES and SUBORDINARIES.

(1) The *chief* (Fig. 1) is the upper part of the shield separated from the rest by a line, and comprising, according to the requirements of heralds, one-third of the whole, though this proportion is seldom rigidly adhered to. Its diminutive is the fillet (Fig. 3), supposed to take up one-fourth the space of a chief, in whose lowest part it stands. The line at the base of the chief may be straight, indented, or irregular.

(2) The *pale* (Fig. 4) is a band or stripe from top to bottom, said, like the chief, to occupy one-third of the shield. It has two diminutives, the *pallet*, one-half the breadth of the pale (Fig. 5), and the *endorse*, one-half of the pallet (Fig. 6).

(3) The *bend* (Fig. 8) is a band crossing the shield diagonally from dexter chief to sinister base. Its diminutives are the *bendlet* or *garter*, one-half of its breadth (Fig. 9), the *cost*, or *cotise*, one-half of the bendlet (Fig. 10), and the *riband*, one-half of the cotise. The bend is sometimes borne between two cotises, in which case it is said to be *cotised* (Fig. 11), a term sometimes applied to the other ordinaries when accompanied with their diminutives.

The *bend sinister* (Fig. 12) is a diagonal band from sinister chief to dexter base. Its diminutives are the *scarp*, one-half of the bend sinister (Fig. 13), and the *baton*, one-half of the scarp (Fig. 14). The baton stops short of the extremity of the field at both ends, and has been considered a mark of illegitimacy.

(4) The *fess* or *fesse* (Fig. 15) is a horizontal band in the middle of the shield, said, like the ordinaries already enumerated, to occupy one-third of it. The lines which bound it may be straight or irregular (Fig. 16).

(5) The *bar* is similar in form to the *fess*, but narrower and never placed in the centre of the shield (Fig. 17). It is rarely used singly. When in pairs they are called *bars gemelles*. The diminutives are the *closet*, theoretically half the width of the *bar* (Fig. 19), and the *barrulet*, half the width of the *closet* (Fig. 18). But these terms are seldom used.

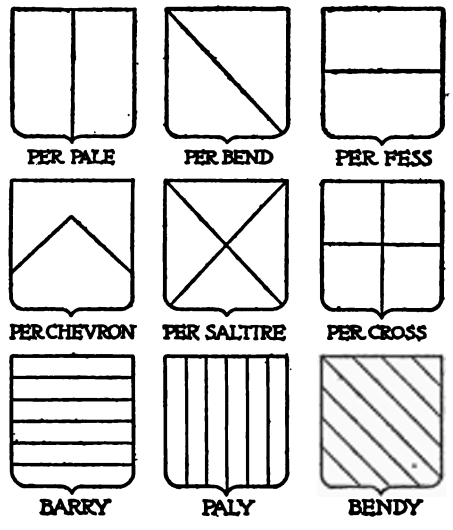
(6) The *chevron* (Fig. 20) is composed of two stripes forming an inverted V. Its diminutives are the *chevronel* (Fig. 21) of half, and the *couple-close* (Fig. 23) one-fourth its width.

(7) The *cross* (Fig. 24) unites the pale and fess, an ordinary which was originally, like the rest, composed of the clamps necessary to the strength of the shield, but had also the deeper meaning of the symbol of the Christian faith. Besides its plain form, the cross was varied in numerous ways, most of these varieties being, however, rather common charges than ordinaries. Of the 39 lesser crosses mentioned by Guillim, or the 385 by Berry in the *Encyclopædia Heraldica*, a few of the most frequently occurring are the following: The *cross moline* (Fig. 26), with the ends turned round both ways; the *cross fleury* (Fig. 27), of which each limb terminates in a fleur-de-lis; the *cross patonce* (Fig. 28), the limb of which has three points; the *cross potent* (Fig. 29), crutch-shaped at the ends; the *cross patté* (Fig. 30), small in the centre, but widening toward the ends; and the *cross crosslet* (Fig. 31), crossed at the ends. The latter is the most frequent of all, and is borne oftener in numbers than singly. Any of these crosses is said to be fitchy when the lower limb terminates in a sharp point, as in Fig. 36. There is also the *cross Maltese;* though not frequent as a heraldic charge, it derives an importance from being the badge of the Knights of Malta, and of many other orders (Fig. 32).

(8) The *saltire*, or Saint Andrew's cross (Fig. 57), is formed by a junction of the bend dexter and bend sinister.

(9) The *pile* (Fig. 59) is a wedge with the point downward. A single uncharged pile should, at its upper part, occupy one-third the breadth of the shield, but if charged, it may be double that width. It is used ordinarily either singly or in threes (Fig. 60).

The *quarter*, consisting of the upper right-hand fourth part of the shield cut off by a horizontal and a perpendicular line, is classed by some authorities with the *honorable ordinaries*, but it is more common to consider it one of the *subordinaries* (see below). It is frequently termed a *canton* (Fig. 61).

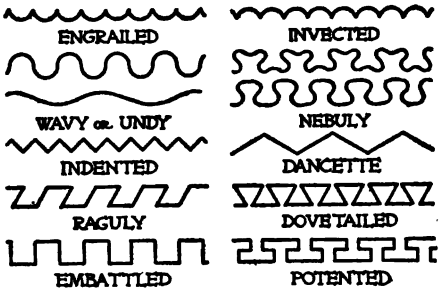


PARTITIONS.

It has been observed that the field of an escutcheon may be of two different tinctures, divided by a partition-line which may vary in direction. (See illustration PARTITIONS.) When divided by a partition-line in the direction of one of the ordinaries, the shield is said to be *party*

per that ordinary; thus we may have a shield party per pale, bend, fess, chevron, saltire, or cross, though *quartered* is a more usual term than *party per cross*. A shield divided into any number of parts by lines in the direction of a pale, bend, or bar, is said to be *paly*, *bendy*, *barry*, the number of pieces being specified, as barry of six. When the field is of a metal and color separated by any of the lines of partition, then the charge placed on it is said to be *counterchanged;* this means that the part of the charge which is on the metal is of the color, and vice versa.

The partition-line which bounds the field, or the boundary-line of an ordinary, is not always even. The commonest forms of irregular partition-lines in use are the *engrailed*, *invected*, *wavy*, *nebuly*, *embattled*, *indented*, and *dancetté*. An ordinary engrailed has the points of the engrailed line turned outward, and an ordinary invected, inward. Dancetté differs from the indented by having much larger spaces between the points. All of these terms, even when unmistakably French in origin, are pronounced as if they were English.



The *subordinaries*, or subordinate ordinaries, are generally enumerated as the following, though there is no very broad line of demarkation between them and the common charges.

The Gyron.—When a shield is at once quartered and party per saltire, the division is called gyronny of eight, and each of the triangles is a gyron (Fig. 66). Gyronny of six, ten, or twelve, also occasionally occur, so called according to the number of the triangles.

The *fret* (Fig. 76) is a cognizance derived from the banding or ornamenting of the shield, and a shield covered with this latticework decoration is said to be *fretty*.

The *bordure*, or border (Fig. 62), is a band encircling the shield. It is much used to distinguish different branches of a family, and is often charged with small devices, on which account it has sometimes been reckoned an honorable ordinary (Fig. 63).

The *orle* (Fig. 64) differs from a bordure in not touching the extremity of the shield and is narrower.

The *tressure*, regarded as a diminutive of the orle, is generally borne double, and fleury counterfleury, as in the arms of Scotland (Fig. 65).

The *pall* (Fig. 77) is the archiepiscopal ornament of that name, sent from Rome to metropolitans, and resembling in form the letter Y. By some authorities this is classed as a common charge and not as a subordinary.

The *flanches* (Fig. 67) are the dexter and sinister sides of the shield cut off by a curved line. Flanches are always borne in pairs, and sometimes charged.

The *lozenge* (Fig. 68) is a figure of four equal sides, with the upper and lower angles acute, and the others obtuse.

The *fusil* (Fig. 72) is longer and more acute than the lozenge.

The *mascle* (Fig. 69) is a lozenge perforated, and showing a narrower border. Mascles may have been originally links of chain armor.

A field is said to be *lozengy*, *fusilly*, or *mascally* when divided by diagonal lines in the direction of these subordinaries. A field divided by horizontal and perpendicular lines into squares of different tinctures is said to be *checky;* in the case of a *fess checky* there are three such rows of squares.

The *inescutcheon* is a small shield charged upon the coat of arms.

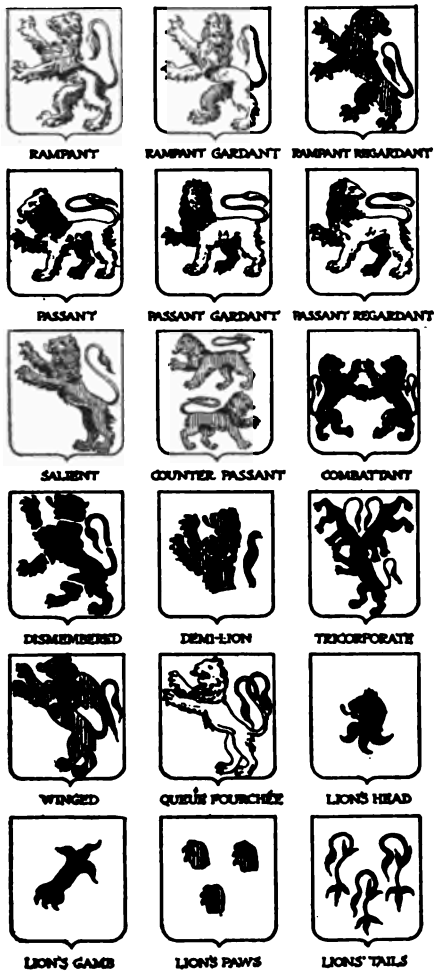
The *billet* (Fig. 73) is a rectangle about twice as high as it is wide. When the shield is freely sprinkled with billets it is termed *billety*. Some think the billets represent bricks, stones, or billets of wood; others think they represent letters or *billets*.

Among subordinaries are sometimes reckoned certain circular charges called *roundles* or *roundlets* (Fig. 74), distinguished in English heraldry by different names according to their tinctures. When of or, they are called *bezants;* of argent, *plates;* of gules, *torteaux;* of azure, *hurts;* of purpure, *golps;* of sable, *ogresses* or *pellets;* and of green, *pommes*.

Common Charges. The third class of figures occurring in armorial bearings are the *common charges*. These are representations more or less conventional of familiar objects, which have no necessary relation to the shield, but are in some way emblematic as concerns family or individual history and character. We can enumerate only a few of the charges of most frequent occurrence.

Among the animals borne in coats of arms the lion holds the most important place. As early as the twelfth century the king of beasts was assumed as an appropriate emblem by the sovereign of England. The kings of Scotland, Norway, and Denmark, the native princes of Wales, the counts of Flanders and Holland, and various other European rulers also chose the king of beasts. Lions occur in different positions. The earliest attitude of the heraldic lion is *rampant*, erect on his hind legs, and looking before him, the head being shown in profile, as he appears in the arms of Scotland, and originally did in those of England. This was the normal position of a lion; but as the royal animal came to be used by all who claimed kindred with royalty, and to be granted to favorite followers by way of augmentation, a diversity of attitude was adopted for distinction's sake: *Rampant gardant*, erect on the hind legs, and affronté or full-faced; *Rampant regardant*, erect on the hind legs and looking backward; *Passant*, in walking position, with the head seen in profile; *Passant regardant*, walking and with the head looking behind; *Statant*, with all the four legs on the ground; *Salient*, in the act of springing forward on his prey; *Sejant*, rising to prepare for action; *Sejant affronté*, rising and full-faced, as in the crest of Scotland; *Couchant*, lying down, but with his head erect, and his tail beneath him; *Dormant*, asleep, with his head resting on his fore paws. Some of these terms are used for the other ani-

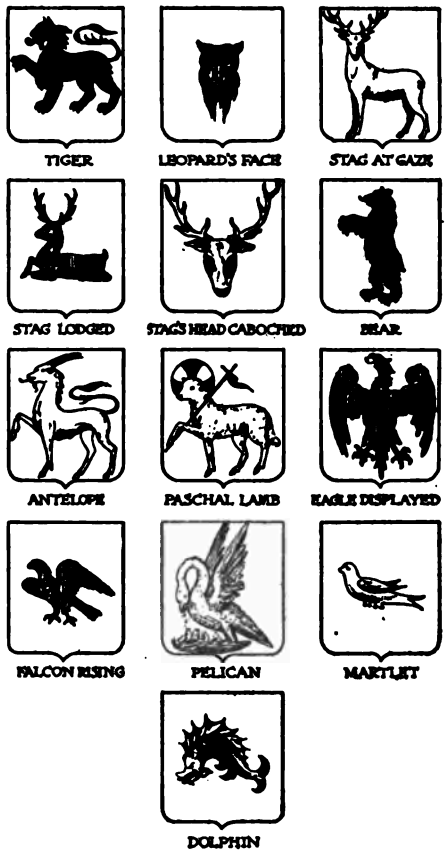
mals. The lion passant gardant is often blazoned as the *lion of England*, and at a time when terms of blazonry were comparatively few it was confounded with the leopard, and hence the lion passant and rampant gardant came to be called respectively the *lion-leopardé* and *leopard-lionné*.



Two lions may be depicted: *rampant combatant*, i.e. face to face; or *rampant addorsed*, placed back to back, or *counter-passant*, i.e. passing the contrary way to each other. The lion is said to be *naissant* when he appears to be rising out of the centre of an ordinary. Among leonine monsters we have two-headed lions, bicorporate and tri-corporate lions, lion-dragons, and lion-poissons. There is also the Bohemian lion, with two tails, and the more celebrated winged lion of Saint Mark, adopted by the Republic of Venice. Two or more lions borne on one shield are sometimes (though never when on a royal coat) blazoned *lioncels*.

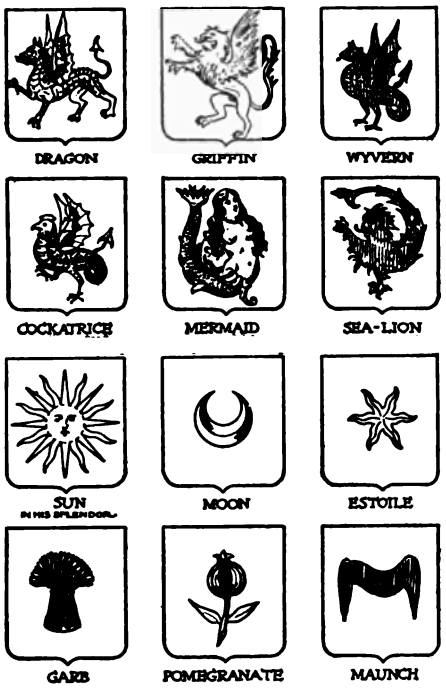
Bears, boars, bulls, and stags are favorite heraldic beasts. A stag walking is said to be *trippant;* when lying down with his head erect he is *lodged;* when running he is *courant;* he is *at gaze* when a lion would be statant-gardant; he is *attired* of any tincture when his horns are of that tincture. The animals that possess horns and hoofs are said to be *armed* in respect to them. The heads and limbs of animals are often borne as charges, and they may be either *couped*, cut off in a straight line, or *erased*, cut off with a jagged edge. When the head is borne without any part of the neck, and full-faced, it is said to be *caboched* or *caboshed*. When the hair of an animal is of a different tincture from the body the animal is said to be *crined* of this color. Animals, as well as other common charges, are usually represented in a purely conventional manner, and frequently bear no resemblance to the object for which they are named.

Of birds, there is the *eagle*, which was, next to the lion, the most favorite cognizance of royal personages, and was adopted by the German emperors, who claimed to be successors of the Cæsars of Rome. The Imperial eagle had at first but one head; the monstrosity of a second head seems to have arisen from a dimidiation of two eagles, to represent the Eastern and Western empires. (See below, MARSHALING OF ARMS.) The eagle of heraldry is most generally *displayed*, i.e. its wings are expanded; sometimes it is *preying*, or standing devouring its prey. The *allerion*, the cognizance of the Duchy of Lorraine



and the family of Montmorency, was originally but a synonym for the eagle (assumed, perhaps, as an anagram for the word Lorraine), but modern heralds have degraded it into a nondescript creature without beak or feet. The *martlet* was originally a martin, which has also in course of time been deprived by heralds of its legs and

beak. (See CADENCY.) The mythical phœnix, the pelican, the swan, the cock, the falcon, the raven, the parrot, or popinjay, and the peacock are all of tolerably frequent occurrence. The pelican generally has her wings placed back to back, and is depicted pecking her breast; she is then said to be *vulned*, i.e. wounded. When in her nest, feeding her young, she is called a pelican *in her piety*. A peacock borne affronté with his tail expanded is said to be *in his pride*. Birds of prey are armed of the color of which their beak and talons are represented. Such as have no talons are *beaked and membered;* i.e. the beak and legs are of a different color from the body. The cock is said to be armed crested and jelloped, the latter term referring to his comb and gills. Birds having the power of flight are, in respect to their attitude, *close*, *rising*, or *volant*.



Fishes and reptiles occur as charges: the former are said to be *naiant* if drawn in a horizontal, and *haurient* if drawn in a perpendicular position; and the *dolphin*, in reality straight, is conveniently borne *embowed* or bent. Sometimes the conventional heraldic form of an animal differs very greatly from its true form, as in the case of the antelope of heraldry, which has the head of a stag, a unicorn's tail, a tusk issuing from the tip of the nose, a row of tufts down the back of the neck, and similar tufts on the tail, chest, and thighs. Of 'animals phantastical,' we have, among others, the griffin, wyvern, dragon, unicorn, basilisk, harpy. We have the human body in whole or part, as a naked man or 'savage,' also arms, legs, hearts, Moors' heads, Saracens' heads, and that strange heraldic freak, the three legs conjoined carried in the escutcheon of the Isle of Man.

Of plants, there are *roses*, *trefoils*, *quatrefoils*, *cinquefoils* (conventional representations of flowers with three, four, and five leaves), *leaves*, *garbs* (i.e. sheaves of corn), *trees*, often *eradicated* or *fructuated* of some other color, and above all the celebrated *fleur-de-lis*, used as a badge by Louis VIII. of France in 1223. When the charge is repeated a large number of times the term *semé* is applied to it. When a plant, animal, or other charge is blazoned *proper*, what is meant is that it is of its natural color.

The heavenly bodies, the sun, moon, and stars, are also pressed into the service of heraldry, as are things inanimate and artificial without number, particularly such as were familiar to the warriors and pilgrims of the twelfth and thirteenth centuries. Helmets, buckles, shields, hatches, horseshoes, swords, arrows, battering-rams, pilgrim's staves, mullets (or spur-rowels), and water-boujets, or bags, in which in crusading times water was carried long distances across the desert; also the clarion or war-trumpet, sometimes erroneously called a *rest*, because it was supposed to represent a rest for a lance. Even the letters of the alphabet have been used as charges.

When the field or any charge is covered with drops it is called *gutty;* when adorned with fleurs-de-lis it is called *fleury* or *flory*. When an ordinary is made up of squares of alternate metal and color it is called *compony* or *gobony*. When an ordinary has a border of different tinctures it is said to be *fimbriated*.

Charges may be placed either simply on the field or on one of the ordinaries; in some instances one of the ordinaries is placed over a charge, in which case the charge is said to be *debruised* by the ordinary. Three charges of one kind are placed two above and one below, unless blazoned *in fess* or *in pale*. In the fourteenth and fifteenth centuries the simplicity of early heraldry began to be departed from by accumulating a variety of charges on one shield, and in later times we have sometimes a charge receiving another charge like an ordinary. The growing complexity of shields arose from augmentations granted to distinguish the younger branches of a family, or charges assumed from the maternal coat by the descendants of an heiress. In the end of the eighteenth and beginning of the nineteenth century, a practice prevailed for a time of introducing into armorial bearings matter-of-fact landscapes, representations of sea fights, and of medals and decorations worn by the bearer, setting all heraldic conventionalities at defiance, and dealing in details not discernible except on the minutest inspection.

The arms of the different members of a family have been distinguished from one another, sometimes by the use of a bordure or other difference; and sometimes, especially by English heralds, by the use of certain figures called *marks of cadency*. (See CADENCY.) Sometimes the differences and marks of cadency are called *diminutions*.

Besides the heraldic devices depicted on the shield, there are the following borne external to it—the helmet, the mantling, the wreath, the crest, the motto and scroll, the supporters, and the coronet.

The *helmet*, originally a piece of defensive armor, became in the course of time one of the usual accompaniments of the shield; and placed over the arms, it came by its form to mark the rank of the wearer. These distinctions date from the reign of Queen Elizabeth, and are applicable only to British heraldry.

NATIONAL COATS OF ARMS

AUSTRIA-HUNGARY

BELGIUM

DENMARK.

FRANCE

GERMANY

GREAT BRITAIN

ITALY

RUSSIA

SPAIN

SWEDEN & NORWAY

JAPAN

GREECE.

NETHERLANDS

PERSIA

PORTUGAL.

TURKEY
(IMPERIAL SIGNET)

SWITZERLAND

CHINA

JULIUS BIEN & CO. LITH N.Y.

The *mantling* is an embellishment of scroll-work flowing down on both sides of the shield, and originating in the *cointoise*, or scarf, wrapped round the body in the days of coat armor.

From the centre of the helmet, within a *wreath* of two pieces of silk usually of the first two colors of the armorial bearings, issues the crest, originally a special mark of honor worn only by heroes of great valor, or advanced to a high military command; now an inseparable adjunct of the coat of arms in English, though not in Continental heraldry, and sometimes assumed or changed arbitrarily, although this is illegal.

The *scroll*, placed over the crest or below the shield, contains a *motto* bearing in many cases an allusion to the family name or arms. The motto was originally the war-cry of the bearer.

Supporters are figures or animals standing on each side of the escutcheon, and seeming to defend or support it. They were in their origin purely ornamental devices, which only gradually acquired an heraldic character. In England the right to use supporters is confined to the royal family, peers, peeresses, and peers by courtesy, Knights of the Garter, Knights Grand Cross of the Bath, and a very few families whose ancestors bore supporters before their general use was restricted. In Scotland supporters are also used by the baronets of Nova Scotia and the chiefs of various families. They have sometimes been conferred on towns, e.g. Liverpool, Belfast.

The crown of the sovereign, the mitre of the bishop, and the coronet of the nobility are adjuncts appended to the shield of those whose dignity and office entitle them to that distinction.

Blazonry. This is the art of describing, in technical terms, the charges borne in arms—their positions, gestures, tinctures, etc., and the manner of arranging them on the shield. As heraldry, though arbitrary, is very exact, the rules of blazoning are observed on all occasions with the most rigid precision. The following are the most important: In blazoning or describing a coat of arms, avoid repetitions and use as few words as possible. Begin with the field, naming the tincture or tinctures, and mentioning the lines by which it is divided—*per pale, per fess*, etc., if such there be—and noticing if they are indented, engrailed, or the like, it being taken for granted that they are straight unless the contrary is mentioned. The charges are named next, beginning with the most important and nearest the centre, giving their number, position, and tincture; e.g. the Affleck family bear *argent, three bars, sable;* the Aldboroughs, *barry of ten, argent and azure, a lion rampant, gules.* Usually the ordinaries and their diminutives come first; but the *chief, bordure,* or *canton* generally comes last; e.g. the Gainsboroughs bear *or frettygules, a canton, ermine.* Where the principal charge is not in the centre its position must be named, as in *first quarter.* When an ordinary *debruises* another charge, the latter is named first unless some other direction is given. Two charges are *in pale*, i.e. one above the other; three are represented two above, one below; when a *fess* or *bend* is between six similar charges, three are in chief and three in base. In all other cases the position of the charges must be described. When the ordinary bears a charge and there are also other charges in the field, the latter are named before the charges on the ordinary. When a tincture occurs twice it is not repeated, but *of the field, of the first*, etc., are used. The Anglesey family bears *sable, on a cross engrailed between four eagles displayed argent, five lions passant-gardant of the field.* When there is an equal number of two charges, 'as many' is used instead of repeating the number. The Leiths bear *or, a cross-crosslet fitchy, sable, between three crescents in chief, and as many lozenges in base, gules.* The Parkers bear *gules, on a chevron, between three keys erect, argent, as many fleurs-de-lis of the field.* Finally the differences, crests, and supporters are described. A full knowledge of blazonry can be acquired only by the careful study of many examples.

Marshaling of Arms. This is the combining of different coats of arms in one escutcheon, for the purpose of indicating family alliance or office. In the earlier heraldry it was not the practice to exhibit more than one coat in a shield, but the arms of husband and wife were sometimes placed *accollé*, or side by side, in separate escutcheons; or the principal shield was surrounded by smaller ones, containing the arms of maternal ancestors; and not infrequently maternal descent or marriage was indicated by the addition of some bearing from the wife's or mother's shield. Then followed *dimidiation*, where the shield was parted per pale, and the two coats placed side by side, half of each being shown. By the more modern custom of impaling, the whole of each coat is exhibited, a reminiscence of the older practice being retained in the omission of bordures, orles, and tressures on the side bounded by the line of impalement. The most common case of impalement is where the coats of husband and wife are conjoined, the husband's arms occupying the dexter side of the shield, or place of honor, and the wife's the sinister side. Bishops, deans, heads of colleges, and kings-at-arms impale their arms of office with their family coat, giving the dexter side to the former.

A man who marries an heiress (in heraldic sense) is entitled to place her arms on a small shield called an *escutcheon of pretense*, in the centre of his achievement, instead of impaling them.

Quartering, or the exhibiting of different *coats* on a shield divided at once perpendicularly and horizontally, is the most common mode of marshaling arms, a practice which, however, was unknown till the middle of the fourteenth century. The divisions of the shield are called quarters, and are numbered horizontally, beginning at the dexter chief. The most common object of quartering is to indicate descent. The coats quartered in an escutcheon must all have been brought in by successive heiresses, who have intermarried into the family. In the case of a single quartering, the paternal arms are placed in the first and fourth quarters, and the maternal in the second and third. The third and fourth quarters may, in after-generations, be occupied by the arms of a second and third heiress. Sometimes an already quartered coat is placed in one of the four quarters of the escutcheon, then termed a grand quarter. We occasionally find a shield divided by perpendicular and horizontal lines into six, nine, or even more parts, each occupied by a coat brought in by an heiress; and in case of an odd number of coats, the last division is inconveniently crowded by the accu-

mulation of coats, including the several coats to which each heiress may, in a similar way, have become entitled. In Germany, sometimes twenty or thirty coats are found marshaled in one escutcheon; but in British heraldry, families entitled to a number of quarterings generally select some of the most important.

Sovereigns quarter the ensigns of their several States, giving precedence to the most ancient, unless it be inferior to the others in importance. In the royal escutcheons of the United Kingdom, England is placed in the first and fourth quarters, Scotland in the second, and Ireland in the third; the relative positions of Scotland and England being, however, reversed on the official seals of Scotland. Spain bears the arms of Leon in the first and fourth quarters, and Castile in the second and third. An elected king generally places his arms surtout on an escutcheon of pretense.

National Coats of Arms. The coats of arms whose use has obtained official sanction by national governments present in most cases the family heraldic insignia of their sovereigns. The English arms, for instance, have reflected every claim of family inheritance of the royal line since the origin of coats of arms in the twelfth century. They were, under Richard Cœur de Lion and his immediate successors, the three leopards of the Plantagenet House. When Edward III. laid claim to the crown of France he quartered with his arms the lilies of the royal house of that country. The Irish harp was added when Henry VIII. took the title of king of that country. Similarly, when the Stuart line succeeded they placed the rampant lion of Scotland in the upper right-hand field. William III. placed a scutcheon with the line of the House of Orange in the centre of the British shield, and the Hanoverian sovereigns replaced this by their family scutcheon. The lilies of France were removed with the disuse of the French title, in 1801, and the scutcheon of the House of Hanover on the accession of Queen Victoria in 1837. Since that time the British coat of arms in its full form has consisted of the shield with four fields, two occupied with the golden leopards of England, the other two occupied by the old arms of Scotland and Ireland respectively. Above the shield is a helmet, and still above this the crown with a golden crowned lion. Surrounding the shield is the Order of the Garter with its legend. Below the shield are two clusters of branches, made up of the English rose, the Scotch thistle, and the Irish shamrock intertwined, and the motto *Dieu et Mon Droit*. As supporters, there are dexter, a golden crowned lion, and sinister, a silver unicorn with a crown around his neck and a chain hanging from this.

France, after having used at various times the oriflamme, the lilies, the Napoleonic eagle, and other emblems, possesses, under the present republic, no authoritative or universally applicable coat of arms. By a decree passed in 1870, however, a seal was adopted consisting of a seated female figure holding a bundle of lictor's rods. In 1896 a decorative emblem was authorized consisting of the initials 'R. F.' (*République française*) surrounded by a crown of laurel leaves, with French flags crossed at the back, oak and laurel branches below, the Order of the Legion of Honor and the fasces at the back. A common device, too, is a shield bearing the national colors in three vertical bars, with the fasces in the central space and the letters R and F on olive branches to right and left.

The arms of the German Empire consist of the great double-headed black eagle of the Empire, surmounted by the Imperial crown and bearing on its breast the Prussian coat of arms. This is a silver shield with a single-headed eagle holding in its claws the royal ball and sceptre, with the Hohenzollern arms on its breast. The silver shield is surrounded by the chain and pendant of the Order of the Black Eagle.

Russia and Austria-Hungary also use the double-headed eagle, in both cases both heads being crowned, and in both with an Imperial crown above. In the Russian arms the eagle bears on its breast a shield with Saint George; in the Austrian a shield with the arms of Hapsburg, Austria, and Lorraine.

The coat of arms of Spain consists of a shield on which the arms of Castile and Leon are quartered, a point below bearing the pomegranate of Granada, and a small central shield bearing the arms of Bourbon-Anjou.

The coat of arms of Italy is a shield with the silver cross on a red field, covered with a red ermine-lined baldaquin, surmounted by the Italian crown. The cross was granted to the counts of Savoy by the Knights Hospitalers in the fourteenth century as an acknowledgment of help given to them against the Turks.

Similarly, the coats of arms of other European countries represent in most cases the origin and fortunes of their royal families.

The newly formed nations of America found it necessary to adopt coats of arms deliberately instead of using the personal devices of their rulers. The Congress of the United States appointed a committee to prepare a coat of arms and a seal for the new nation on July 4, 1776, the very day of the Declaration of Independence. The devices reported by this and by several succeeding committees were not, however, satisfactory, and it was not till June 20, 1782, that the coat of arms was finally approved. Since that time it has not been changed. It consists of the American eagle with a shield upon its breast showing thirteen stripes, alternately silver and red, and thirteen white stars on a blue ground to indicate the original States, holding in its talons an olive branch and a sheaf of arrows, and in its beak a scroll with the motto *E Pluribus Unum*. It is surmounted by a group of stars appearing through a cloud, to indicate the emergence of a new nation in the world. Each State of the American Union has its own coat of arms, though none of them has adopted an individual flag, all using the national flag.

Most of the republics of Central and South America adopted coats of arms on the attainment of their independence, usually introducing into them some objects of local as well as symbolical significance. Mexico, for instance, in 1823, adopted as its national coat of arms a figure of an eagle tearing a snake in its beak, and poised upon a 'nopal' or cactus growing on a rock. The rock and the nopal are both connected with the old name of the city and province of Mexico, *Tenochtitlan*. This coat of arms was afterwards changed by Maximilian, but was restored on the downfall of his empire. The coat of arms of Peru contains a figure of the llama, the national beast of burden, and of the

NATIONAL COATS OF ARMS

MEXICO

GUATEMALA

HONDURAS

SALVADOR

NICARAGUA

COSTA RICA

CUBA

HAITI

UNITED STATES

SANTO DOMINGO

BRAZIL

VENEZUELA

COLOMBIA

ECUADOR

PERU

CHILE

BOLIVIA

ARGENTINE REPUBLIC

URUGUAY

JULIUS BIEN & CO. LITH. N.Y.

tree from which the Peruvian bark or cinchona is taken. That of Guatemala shows the bird Quezal, the 'pito real,' or royal bird, of the old Spanish discoverers. The peaks of the Andes occur in several of the South American national coats of arms. That of the Republic of Brazil, adopted in 1889, consists of a five-pointed star with a round shield placed upon it. On this shield are figured the stars of the Southern Cross, and it is surrounded by twenty silver stars, representing the States of the Republic. Below are a sword and branches of laurel and of the tobacco-plant, with an inscription. See Plates, NATIONAL COATS OF ARMS.

The terms and usages of heraldry vary somewhat in the different countries. In this article the rules of English heraldry have been followed. Information on the usages in other countries can be obtained from the books cited. For information on the details of heraldry, consult: the standard works of Guillim, *Display of Heraldry* (London, 1610; 6th ed. 1724); Edmondson, *Complete Body of Heraldry* (London, 1780); and Nisbet, *System of Heraldry* (London, 1722-43; 3d ed., London, 1816); and for a more discriminating view of the subject, Gourdon de Genouillac, *L'Art heraldique* (Paris, 1889); Hulme, *History, Principles, and Practice of Heraldry* (London and New York, 1892); Woodward and Burnet, *A Treatise on Heraldry, British and Foreign* (Edinburgh, 1891); Eve, *Decorative Heraldry* (London and New York, 1897).

HERALDS' COLLEGE, or COLLEGE OF ARMS. A collegiate body, founded by Edward IV. in 1464, and chartered by Richard III. in 1483. It consists of the heraldic officers of England. After various charters had confirmed its privileges, it was reincorporated by Philip and Mary, who bestowed on it Derby House, on the site of which in Doctors' Commons the present college was built by Sir Christopher Wren.

The presidency of the college is vested in the Earl-Marshal, an office now hereditary in the family of Howard, Duke of Norfolk; he nominates the three kings-at-arms, six heralds, and four pursuivants, who are the members of the collegiate chapter. Persons having an hereditary claim to arms, which has been disused for one or more generations, are empowered by the Heralds' College to resume them on proof and registration of pedigree. A person who has no hereditary claim, and wishes a grant of arms, must memorialize the Earl-Marshal, and show that he is in condition to 'sustain the rank of gentry.' An important department of the college is the recording of pedigrees. Any pedigree showing the existing state or descent of a family may, if accompanied with sufficient evidence, be entered on the books of the college. The members have salaries, but derive their principal income from fees charged for assistance in tracing pedigrees and titles, and for the granting and registration of arms. Since a long time the college has lost all authority to enforce its regulations. In Scotland the corresponding functions belong to the Lyon Court (q.v.), and in Ireland to the Office-of-Arms. See HERALDRY.

HERAT, hĕr-ät'. The capital of the province of the same name in Afghanistan (q.v.). It is situated in the western part of the country, on the River Heri-Rud, about 50 miles south of the Russian frontier, and the same distance east of the Persian border (Map: Asia, Central, H 4). The town is surrounded by strong fortifications, having towers and gates, and with a strong citadel at the northern end. The streets are narrow and crooked and the buildings are unsightly. There is an ancient ruined mosque. The surrounding valley is of remarkable natural beauty and fertility. Fine fields of grain and attractive gardens adorn the landscape. The King's Garden was formerly famous. Herat exports carpets, blades, and rose-water. Its position on the route from Persia to India explains its commercial importance, while its proximity to the Russian border lends to it great strategic and political significance. The population, formerly much greater, is estimated at 45,000, and is very heterogeneous. Herat is supposed to have been founded by Alexander the Great. In the seventh century it came under the dominion of the Arabs. It was conquered by Timur in 1381, under whose reign it grew to be a centre of Persian learning and art. In 1510 it passed into the hands of Persia. The Afghans took it in 1749. During the civil wars in Afghanistan, Herat became independent, and remained so from 1823 to 1863, when it once more became a part of Afghanistan.

HÉRAULT, ā'rō'. A maritime department in the south of France (q.v.), in Languedoc, bounded on the southeast by the Gulf of Lyons (Map: France, K 8). Area, 2393 square miles. Population, in 1896, 469,684; in 1901, 489,421. It is occupied in the north and northwest by the Lower Cévennes. The principal rivers are the Hérault (from which the department derives its name), the Orb, and the Lez. The coast-line is about 66 miles in length; and along the shore, from Agde to the Vidoule, are numerous étangs or marshy lakes, united by the Canal-des-étangs, and communicating with the sea. In the neighborhood of the étangs the climate is unhealthful, but elsewhere throughout the department it is usually fine. Hérault ranks among the foremost wine-growing departments of France. Woolen, silk, and cotton fabrics, leather, brandy, liquors, etc., are manufactured. Coal and copper mines as well as quarries of marbles, building-stone, granite, etc., are worked. Hérault supplies a great part of the salt used in France. Capital, Montpellier.

HÉRAULT DE SÉCHELLES, de sā'shĕl', MARIE JEAN (1760-94). A French revolutionist, born in Paris. An author and advocate, imbued with the teachings of Diderot, he was rather a philosopher than a revolutionist, and was at first but moderately attracted by the radical element in the Legislative Assembly, to which he was elected in 1791. But he soon took his stand with the extreme left, and supported Danton in the Revolution of August and September (1792). He was Deputy from the Department of Seine-et-Oise to the Convention of the same year, and voted for the King's death. As a member of the Committee of Public Safety, he aroused the enmity of Robespierre, who, under the pretext that he had had traitorous dealings with the Army of the Rhine, insisted upon his arrest and execution. The best of his writings were printed under the title *Voyage à Montbard* (last ed. 1890).

HERB (OF., Fr. *herbe*, from Lat. *herba*; probably connected with OLat. *forbea*, food, Gk. *φορβή*, *phorbē*, pasture, *φέρβειν*, *pherbein*, to feed). Any plant that contains no woody tissue, or, at

least, none above the ground. Herbaceous plants commonly die down to the ground at the close of the growing season. In some herbaceous plants, such as annuals, the entire plant dies during the resting period.

HERBA'RIUM (Lat., from *herba*, herb). A systematic collection of dried plants, representing the flora of one or more regions. An herbarium represents the best possible record of plants, and is indispensable as a basis for any systematic presentation of a flora. Of course, the study of living plants in their natural surroundings is the ideal method, and is employed as far as possible. But such a method is necessarily incomplete, and must be supplemented by the complete records of the herbarium. One of the essential features of an herbarium is that it contains the specimens, called 'types,' from which the original descriptions of species and genera were drawn. These types are kept for reference, so that there may be no uncertainty as to the plants described by different authors; and it may be said that, in a certain sense, the value of an herbarium is measured by the number of types and authentic specimens it contains. Large herbaria thus become centres of taxonomic work. Owing, however, to the great expense involved in maintaining them, extensive herbaria are not numerous; the local collections possessed by a large number of institutions and individuals are generally quite small.

In the United States there are three herbaria of first rank, and each is the background of continual publication. The oldest is the *Gray Herbarium*, which belongs to Harvard University. Its great value lies in the fact that it contains the vast majority of the older types of American plants, but its annual additions are also very large. The *Herbarium of the New York Botanical Garden*, formerly at Columbia University, was developed remarkably during the closing years of the nineteenth century. Its accumulation of material and wealth of types makes it indispensable in any taxonomic work. The *United States National Herbarium*, stored in the United States National Museum, has become a collection of national importance, since it contains a vast accumulation of material brought together by Government collectors, and also many of the most important collections of the early Government surveys. After these three great collections, those at the Missouri Botanical Garden (Saint Louis) and at the Field Columbian Museum (Chicago) are probably next in importance. Many of the larger universities also contain noteworthy collections. The three greatest herbaria in Europe deal more with the flora of the whole world than do the American herbaria. The greatest of all herbarium collections is that at the Royal Gardens at Kew, which has been enriched for many years by means of the numerous colonial enterprises of the British Empire. The *Herbarium of the Jardin des Plantes* at Paris is rich in older types, especially of American plants. The University of Berlin has built up a large herbarium, which has become one of first importance. Probably next in importance are the herbaria at Geneva, Vienna, and Saint Petersburg.

For directions as to the collection of plants and their preparation for the herbarium, consult Bailey, *Botanizing* (Providence, R. I., 1899).

HERBART, hĕr'bärt, JOHANN FRIEDRICH (1776-1841). A German philosopher. He was born at Oldenburg, May 4, 1776. He studied at Jena, where Fichte was just beginning to be an influential factor in the university life, and for a while he was ardent in his loyalty to Fichte's views; but after more reflection he found himself obliged to reject much of that system, and to form one of his own. After tutoring for several years in Switzerland, he qualified as docent in philosophy and pedagogy at Göttingen in 1802, and three years later was appointed professor extraordinarius. In 1809, at the instance of W. von Humboldt, then at the head of the Department of Public Instruction, he was called to a professorship of philosophy and pedagogy at Königsberg, to succeed Krug, who succeeded Kant. As in Göttingen, he conducted a seminar at Königsberg; but in 1833 he was recalled to Göttingen, where he continued in incessant pedagogical and philosophical activity until his death, August 14, 1841. His writings were collected and published by Hartenstein in 12 volumes (Leipzig, 1850), and reprinted in Hamburg (13 vols., 1883-93). Another edition is appearing at Langensalza. His pedagogical works have been published in two volumes at different times (1873, 1875, and 1880). Some of his letters were published in 1871 and in 1877. His chief works are: *Allgemeine Pädagogik* (1806); *Hauptpunkte der Metaphysik* (1806); *Allgemeine praktische Philosophie* (1808); *Lehrbuch zur Einleitung in die Philosophie* (1813); *Lehrbuch zur Psychologie* (1816; translated into English by M. K. Smith, 1891); *Psychologie als Wissenschaft* (1824); *Allgemeine Metaphysik* (1828-29). In addition to the one mentioned above, the following translations should be mentioned: *Application of Psychology to the Science of Education*, translated by Mulliner (New York, 1898); *Herbart's ABC of Sense-Perception, and Minor Pedagogical Works*, translated by Eckoff (ib., 1896); *The Science of Education*, translated by H. M. and E. Filkin (Boston, 1893); *Introduction to the Pedagogy of Herbart*, translated by Zimson (ib., 1894); *Outlines of Educational Doctrine*, translated by Lange, and annotated by De Garmo (New York, 1901).

His philosophy is a thorough-going atomism (q.v.), according to which the universe is constituted of monads or 'reals,' simple, unchangeable, and in their real nature unknowable. These 'reals' stand in accidental relations to each other, and it is the changes in these relations that constitute the process of change in the world of experience. The 'reals' disturb each other and provoke reaction in each other in self-defense. Such reactions are our ideas, which are called for by the effort of our unknowable souls to maintain themselves. These ideas in turn tend to preserve themselves, and conscious life is the behavior of these ideas toward each other in the way of conflict or of mutual support—conflict when they are totally or partially opposed; support when they are alike. When conflict occurs, the intensity of ideas is diminished; diminution of intensity beyond a certain point means the disappearance of ideas 'below the threshold of consciousness.' The relation between ideas is thus a mechanical relation and psychology is the mechanics of ideas. In the mechanical relation of ideas, those already in consciousness have an important part to play with regard to new ideas just appearing. The ideas already present are

called the apperceiving ideas, and the new ideas are said to be apperceived. The problem of education is to present such new ideas as can be most easily apperceived, i.e. incorporated with the old ideas to form knowledge. The central principle of all Herbart's reasoning is the abstract law of contradiction, interpreted metaphysically. That is, nothing can be ultimately real of which two contradictory predicates can be asserted. To predicate unity and multiplicity of an object is to predicate contradictions. Hence ultimate reality must be absolutely unitary and without multiplicity, hence also without change. Herbart's influence has been great both in philosophical and pedagogical lines. Among prominent Herbartians of recent times and of the present day may be mentioned M. A. Drobisch, O. Flügel, G. Hartenstein, M. Lazarus, H. Steinthal, L. Strümpell, W. F. Volkmann, T. Waitz, and R. Zimmermann. In America there is a Herbart Society, of which Prof. Charles De Garmo is the leading spirit, and which issues an important *Year-Book*. Herbartian bibliography is very extensive. For the life of Herbart, consult: Hartenstein, in the introduction to his *Herbart's kleinere philosophische Schriften und Abhandlungen* (Leipzig, 1842); Allihn, "Ueber das Leben und die Schriften J. F. Herbarts," in *Zeitschrift für exacte Philosophie* (Leipzig, 1860), which contains a bibliography; Hennig, *J. F. Herbart* (Leipzig, 1877). For an account or for criticism of his views, consult: Lotze, "Ueber Herbart's Ontologie," in *Zeitschrift für Philosophie* (Leipzig, 1843); Fechner, *Zur Kritik der Grundlagen von Herbart's Metaphysik* (ib., 1853); Kaftan, *Soll und Sein* (ib., 1872); Lipps, *Zur Herbart'schen Ontologie* (Bonn, 1874); Just, *Die Fortbildung der Kant'schen Ethik durch Herbart* (Eisenach, 1876); Wigget, *Pestalozzi und Herbart* (Leipzig, 1891); De Garmo, *Herbart and the Herbartians* (New York, 1895); Adams, *The Herbartian Psychology Applied to Education* (Boston, 1898); also the various writings of the Herbartians mentioned above.

HERB BENNETT. An aromatic herb. See GEUM.

HERBECK, hĕr'bĕk, JOHANN VON (1831-77). An Austrian musician, born in Vienna. He was practically a self-educated musician, but by hard work rose rapidly from the position of chorister to that of professor in the Vienna Conservatory. In 1866 he was made chief Court Kapellmeister, and from 1871 to 1875 he was director of the Imperial Opera. He wrote many excellent part-songs and some instrumental music.

HERBELIN, ăr'blăn', JEANNE MATHILDE HABERT (1820—). A French painter of miniatures, born at Brunoy, Seine-et-Oise. She studied oil painting with her uncle, Belloc the artist, but was advised by Eugène Delacroix to confine herself to miniatures, and speedily reached the front rank in that branch of art, in which she created a new style. She exhibited ten miniatures in the Salon of 1848, and received her first-class medal at the Exhibition of 1855 for "Enfant tenant une rose," "Souvenir," and "Petite fille jouant avec un éventail," while one of her miniatures was requested for the Luxembourg Gallery, the first of its kind admitted there. Besides some ideal heads and genre studies, Madame Herbelin painted some notable miniature portraits, such as those of Guizot, Isabey, Robert Fleury, Rossini, E. Souvestre, Rosa Bonheur, and Eugène Delacroix.

HERBELOT, ăr'blō', BARTHÉLEMY D' (1625-95). A celebrated French Orientalist, born in Paris. He studied also in Italy, and was likewise for a time secretary and interpreter of Oriental languages to the French King. Three years before his death he was appointed professor of Syriac in the Collège de France. His celebrated work, *Bibliothèque Orientale*, was published after his death by Galland (Paris, 1697), and afterwards with a supplement (Maestricht, 1776-81); but the best edition is that published at The Hague (4 vols., 1777-82). The work, which was not quite finished, contains extracts from a large number of Arabian, Persian, and Turkish authors, with abundant historical, biographical, and illustrative material relating to the peoples of the East.

HERBERAY DES ESSARTS, ăr'brā' dā zĕs'săr', NICOLAS DE (?-1552). A French officer and translator. He was a Picard noble, and an officer in the royal artillery under Francis I., whom he accompanied to Madrid in 1525. Here he read, and, at the King's request, translated from the Spanish the romance of *Amadis of Gaul* (1540-48). His other works include: *L'amant maltraité de sa mye* (1539); *Le premier livre de la chronique de Dom Flores de Grèce, chevalier des Cignes* (1555); *L'horloge des princes de Guevara* (1555). He has been called the founder of the heroic romance in France.

HER'BERT. An historic British family, dating from the Norman Conquest, which has been ennobled in so many of its branches, by ancient and renewed creations, that it has become a matter of difficulty to ascertain with certainty which is the parent stem. Herbert, Count of Vermandois, who afterwards filled the post of Chamberlain under William II., is mentioned in the roll of Battle Abbey, and received from his sovereign a grant of lands in Hampshire. His wife, Emma, daughter of Stephen, Count of Blois, was a granddaughter of the Conqueror, and his son, Herbert of Winchester, was Chamberlain and Treasurer of King Henry I. In the reign of Henry V., Sir William Herbert, of Raglan Castle, County Monmouth, received the honor of knighthood in reward of his valor in the French wars. His eldest son, a stanch adherent of the House of York, was created Earl of Pembroke by Edward IV. in 1469, but fell into the hands of the Lancastrians after the battle of Danes Moor, and was beheaded the following day, when the title became extinct. It was, however, revived in 1551, in the person of his illegitimate grandson, William Herbert, one of the most influential noblemen of his age, both as a statesman and as a soldier. The fourth Earl, Lord Chamberlain to Charles I., and chancellor of the University of Oxford, was the founder of Jesus College in that seat of learning, his representative descendant being hereditary visitor. The eighth Earl held several high offices under Queen Anne, including that of Lord High Admiral. From him the present representative, Sidney, fourteenth Earl of Pembroke and Montgomery (born 1853), is directly descended. The earls of Carnarvon, more than one of whom have gained celebrity in the field of literature, descend from the eighth Earl of Pembroke, mentioned above. The present earls of Powis are descended

from the same stock maternally, the only child and heiress of the last Earl of Powis of a previous creation having married the eldest son of Robert Clive, the founder of the British Indian Empire, in whose favor the title was renewed in 1804.

HERBERT, Edward, first Lord Herbert of Cherbury (1583-1648). Commonly reckoned as the first of the English deistical writers. He was born of a noble family at Eyton-on-Severn, near Wroxeter, March 3, 1583. He was sent to Oxford in his twelfth year, and by arrangement of his relatives at sixteen married an heiress, but kept on with his studies. The marriage was happy, but there appears to have been little affection between Herbert and his wife, who was four years older than himself. In 1600 he removed to London and attracted Queen Elizabeth's notice. On the accession of James I. he was made a knight and invested with various offices. He left home for travel in France in 1608, and from this time resided very much abroad. After a brief return to his native country he set out again for the Low Countries, where he joined the arms of Maurice of Orange; he again offered him his services in 1614. After a campaign he traveled through Germany and Italy on horseback, and went as far as Venice, Florence, and Rome. On his return he got into trouble by conducting a troop of Protestant soldiers from Languedoc into Piedmont to assist the Duke of Savoy against the Spaniards (1615). He soon returned to England, and proposed to devote himself to study and philosophical inquiry; but important diplomatic duties awaited him. He was sent to France as extraordinary ambassador (1618). His aim was to promote the alliance between France and England, and he was so far successful that he was appointed ordinary ambassador, and continued to reside in Paris. He tried, but without much success, the difficult task of negotiation between Louis XIII. and his Protestant subjects, and was abruptly recalled in 1624. He was elevated first to be a peer of Ireland, and then in 1630, five years after the accession of Charles I., to be a peer of England. When the Civil War broke out he appears to have acted with hesitation, at first siding with the Parliament and then joining the King. His hereditary seat, Montgomery Castle, was attacked and burned. He died in London, August 20, 1648. The result of his religious speculations is contained in his Latin treatises, *De Religione Laici*, and *Ad Sacerdotes de Religione Laici*, issued with his *De Causis Errorum* (London, 1645); and *De Religione Gentilium* (Amsterdam, 1663; trans., *The Ancient Religion of the Gentiles and Causes of Their Error Considered*, London, 1705). Herbert's position at the fountainhead of English Deism gives them a peculiar significance. His speculations are those of a philosophical dogmatist rather than of a critical inquirer. His arguments are abstract and deductive, and not analytical or negative. He offers solutions rather than starts difficulties or obtrudes negations. His other works of general interest are: his *Life and Reign of Henry VIII.* (reprinted 1880); his *Poems* (1881); and particularly his *Autobiography*, edited by Lee, with introduction and continuation (London, 1886).

HERBERT, George (1593-1633). An English poet, brother of Lord Herbert of Cherbury, born in Montgomery Castle, Wales. He was educated at Westminster, and at Trinity College, Cambridge, graduating B.A. in 1612-13, and M.A. in 1616. In 1615 he was elected fellow, and in 1619 he was promoted to the office of public orator. He now made the acquaintance of Bacon; in the hope of preferment, he was induced to spend considerable time about the Court. On the death of James I. he studied divinity, and finally took holy orders. He married in 1629, and the next year received the rectory of Bemerton, Wiltshire. Here he lived a most saintly life. But in less than three years he died of consumption, and was buried beneath the altar of his church. While at Bemerton he wrote *The Temple, or Sacred Poems* (1633), which, though disfigured by conceits in the manner of the time, contains some of the finest sacred lyrics in our language. He also wrote a prose work, *The Country Parson* (1652), which lays down rules for the guidance of a clergyman's life, and may be considered a pendent to *The Temple*. A charming life of Herbert was written by Izaak Walton (*Life of George Herbert*, London, 1670). Consult, also: Shorthouse, reprint of *The Temple* (London, 1882); *Complete Works in Prose and Verse*, with Walton's *Life*, edited by Grosart (London, 1874); *Poems*, S. P. C. K. (ib., 1890), and *Life*, S. P. C. K. (ib., 1893).

HERBERT, Henry Howard Molyneux. See Carnarvon, fourth Earl of.

HERBERT, Henry William (1807-58). An American novelist, born in London. He studied at Eton from 1820 to 1825, graduated at Caius College, Cambridge, in 1830, emigrated to America in 1831, and for eight years taught Greek and Latin in a private school in New York City. He established in 1833 the *American Monthly Magazine*, which he edited till 1836, and contributed widely to newspapers and magazines. In 1834, under the pen-name of 'Frank Forester,' he began to write books on sports, and sketches of outdoor life, which formed a series of great usefulness and popularity. His more serious literary work included several carefully written novels, chiefly historical, and translations from the French of Eugène Sue and Dumas. The last years of his life were imbittered by domestic troubles and the estrangement of personal friends, and he died by his own hand. The most important of his novels and works on history are: *Cromwell* (1837); *Marmaduke Wyvil* (1843); *The Brothers: A Tale of the Fronde* (1844); *The Roman Traitor* (1846); *The Miller of Martigne* (1847); *The Captains of the Old World* (1851); *The Cavaliers of England* (1852); *The Chevaliers of France* (1853); *The Puritans of New England* (1853); *The Captains of the Roman Republic* (1854); and *Memoirs of Henry VIII. of England and His Six Wives* (1858). Chief among the 'Frank Forester' series are: *My Shooting Box* (1846); *Field Sports of the United States and the British Provinces of America* (1848); *The Warwick Woodlands* (1849); *Frank Forester and His Friends* (1849); *Complete Manual for Young Sportsmen* (1852); *Sporting Scenes and Characters* (1857); *Horses and Horsemanship of the United States and British Provinces* (1859). His *Poems* were published in 1887. Consult: Picton, *Frank Forester's Life and Writings* (New York, 1881), and Judd, *Life and Writings of Frank Forester* (New York, 1882).

HERBERT, Hilary Abner (1834—). An American Congressman and Secretary of the Navy. He was born at Laurensville, S. C.; was early taken by his parents to Greenville, Ala.; was educated at the University of Alabama and the University of Virginia, and adopted the profession of the law. In the Civil War he commanded the Eighth Alabama (Confederate) Regiment, and was disabled at the battle of the Wilderness in 1864. He was a member of Congress from 1877 to 1893, serving during several terms on the Committee on Naval Affairs, and hence was prominently connected with the reconstructions of the navy. From 1893 to 1897, during the second administration of President Cleveland, he was Secretary of the Navy, and subsequently practiced law in Washington. He edited *Why the Solid South? or, Reconstruction and Its Results* (1890).

HERBERT, Ivor John Caradoc (1851—). An English soldier, born at Llanarth, Monmouthshire. At nineteen he became a grenadier guardsman, and he was made a captain four years afterwards. He distinguished himself in Egypt (1882), on the Nile expedition (1884-85), and was promoted to the rank of colonel in 1889. As major-general, Herbert was at the head of the militia in Canada for five years (1890-95), and afterwards was appointed assistant adjutant-general in England.

HERBERT, John Rogers (1800-90). An English painter, born at Maldon, Essex. He was a pupil of the Royal Academy, and exhibited there in 1830; then for some years did illustrating and subject pictures. Of these, "The Appointed Hour" (1834) attracted some attention, and after several successes he went abroad. In 1840 he became a Roman Catholic, and afterwards his subjects were chiefly religious. His best works are the frescoes in the Houses of Parliament: "King Lear Disinheriting Cordelia;" and a series of subjects called "Human Justice;" "Sir Thomas More and His Daughter;" and "Saint Gregory Teaching His Chant." He was one of the masters in the School of Design in Somerset House (1841), and a Royal Academician (1846).—His son Cyril Wiseman (1847-82) became a painter of note, despite his premature death.

HERBERT, Michael Henry (1857—). An English diplomat, the son of Sidney Herbert and Lady Herbert of Lea, known as an authoress, and brother of the Earl of Pembroke. He entered the diplomatic service in 1888, was appointed chargé d'affaires at Washington, and in 1892 was secretary of the British legation there. In 1893 he was made secretary of legation at The Hague, and thereafter held successively similar positions at Constantinople (1894-97), at Rome (1897-98), and at Paris (1898-1902). In the latter year he was appointed Ambassador from Great Britain at Washington as the successor of Lord Pauncefote.

HERBERT, Sidney, first Baron Herbert of Lea (1810-61). An English administrator, second son of the eleventh Earl of Pembroke. He was born at Richmond, Surrey; was educated at Harrow School and at Oriel College, Oxford, and entered the House of Commons in 1832 as member for South Wilts, which he represented until his elevation to the peerage in 1861. He began his political career as a Conservative, and was Secretary of the Admiralty in Sir Robert Peel's Administration from 1841 to 1845, when he became Secretary for War. As a member of this Administration, it fell to him to oppose Cobden's motion for a select committee to inquire into the effect of the corn laws on farmers, and afterwards to argue in support of the free trade in corn. He went out of office with his party in 1846. In 1852 he was again Secretary for War, in the Aberdeen Ministry, and the sufferings of the army before Sebastopol were laid in a great degree at his door. He was for a few weeks Colonial Secretary in the first Administration of Lord Palmerston in 1855, and Secretary for War in his second Administration in 1859. Great improvements in the sanitary condition and education of the army, the amalgamation of the Indian with the royal army, and the organization of the volunteer force, signalized his army administration. He largely reformed the War Office, and was devoting himself with equal zeal and intelligence to his Ministerial duties, when, owing to failing health, he resigned his seat in the House of Commons, and in 1860 was called to the Upper House, under the title of Baron Herbert of Lea.

HERBERT, Sir Thomas (1606-82). An English traveler and author, born at York, and educated at Oxford and possibly at Cambridge. When he was twenty-one he set out to Persia with Sir Dodmore Cotton, Ambassador to the Persian King. With letters of safe conduct from Court, Herbert traveled through Persia, and made important explorations on his way home. Siding with Parliament in the Civil War, he was commissioned to treat for the surrender of Oxford, and in 1647 was given charge of Charles, whose personality won him to the royal cause. Herbert was the King's constant and sole attendant during his last days, and accompanied him to his execution. He was created a baronet after the Restoration. Among his publications are narratives of his travels: *A Description of the Persian Monarchy* (1634), and *Some Yeares Travels into Divers Parts of Asia and Afrique* (1638; including the former work); and the Royalist *Threnodia Carolina* (1678; and, 1702, under the title *Memoirs of the Last Two Years of the Reign of that Unparallell'd Prince of Very Blessed Memory, King Charles I.*).

HERBERT, Victor (1859—). An Irish-American bandmaster, orchestra conductor, and composer, born at Dublin, Ireland, and a grandson of the famous novelist, Samuel Lover. He was surrounded by musical influences from earliest childhood, and at seven years of age was studying music in Germany, in which country he received his musical education. Although trained in the entire range of music, he perfected himself on the 'cello, and secured his first important engagement as the first 'cellist of the Court Orchestra at Stuttgart, which, after an interval spent on tour, was followed in 1886 by a similar position with the Metropolitan Orchestra of New York. He afterwards played under Thomas, and later Seidl, acting under the latter in the double capacity of 'cellist and associate conductor. When the successor of Gilmore in the famous New York Twenty-second Regiment Band resigned, and a leader was required to keep up the high reputation of the organization, he was chosen conductor. He was soon after engaged to conduct the Pitts-

burg Orchestra. Meanwhile he had been equally busy with his pen, and had published several compositions, chiefly instrumental. Among his comic operas are: *Prince Ananias* (1894); *The Wizard of the Nile* (1895); *The Serenade* (1897); and *The Idol's Eye* (1897). He is also the composer of an oratorio, *The Captive*, written for the Worcester (Mass.) festival.

HER'BICIDE (from Lat. *herba*, herb + *cædere*, to kill). A name applied to any substance used to destroy weeds. Of the various chemicals that have been successfully and inexpensively employed in weed destruction, dilute solution of carbolic acid, strong brine, copper-sulphate solutions, arsenic, sal soda, arsenate of soda, kerosene, etc., have been most extensively used upon walks, drives, courts, etc., in the destruction of dandelions, plantain, knotweed, ragweed, and various grasses. For best results, salt should be applied dry. At the rate of 3000 pounds of crude salt per acre, meadows can be freed from the orange hawkweed, a plant that resists all other methods of destruction. The interesting discovery has been made that some weeds, such as charlock, penny cress, wild radish, shepherd's purse, etc., may be destroyed without permanently injuring the crops among which they grow, by spraying the fields with a solution of copper sulphate (blue stone) at the rate of 40 gallons per acre. The most satisfactory strength of solution to use has been found to be one pound of copper sulphate to four gallons of water. The spraying should be made on a calm bright day, when the weeds have attained only three or four leaves. If the solution be well applied the weeds will be killed. Iron sulphate (copperas) may be substituted for the blue stone, but then a stronger solution is required, viz. one pound of the salt to a gallon of water. This treatment has been repeatedly tried in England, France, Germany, and the United States with great success. If rain falls soon after the spraying is done, or if the plants have been allowed to become too old, a second application should follow the first within a week or ten days. Young clover growing in the cereals will not be injured by the treatment.

HERBIV'ORA (Neo-Lat. nom. pl., from Lat. *herba*, herb + *vorare*, to eat). A term in the old classifications, variously defined and limited, which designated herbivorous as contrasted with carnivorous animals, but ordinarily referred to such as grazed. The term long ago ceased to have any exact significance in science.

HER'BORT VON FRITZ'LAR. A German poet of the twelfth and thirteenth centuries, so called from his residence at Fritzlar in Hesse. He was somewhat read in the classics, and was probably in orders. He wrote the *Liet von Troie*, a poetic version of the Trojan War, and the oldest extant German work on that subject, based closely on the *Roman de Troie* of Benoît de Sainte More. The work is in the four-stressed rhyming distich. The language is decidedly Middle German, and mistranslations of the original are not infrequent. There are some worthy passages, such as the address of Achilles to the dead Hector. Perhaps Herbort von Fritzlar is to be identified with a Herbort who appears as the author of a drama, now lost, on Saint Otto.

HERB ROBERT. A common weed. See GERANIUM.

HERBS, CULINARY. Aromatic plants used in the preparation of viands. The plants popularly employed owe their flavoring properties to volatile oils which in most instances are derived from the leaves, either fresh or cured; in other cases, for example, dill and caraway, the seed is utilized. In Europe these plants are essential adjuncts of the cuisine, especially of France, where the ethereal flavors of such plants as fennel, basil, and balm are sought, and of Germany and England, where preference is given to more pronounced flavors, such as dill, sage, and mint. In America, few herbs are known beyond the confines of the larger cities, where the foreigners are slowly educating their neighbors in the uses of these plants. Uses they certainly have, in rendering certain inert salads and the too often tasteless 'made-over' dishes not merely palatable, but delicious.

The kinds most commonly employed in America are parsley, sage, thyme, marjoram, and savory (qq.v.). Each of these may be grown from seed, either in the garden or in boxes of good soil on a sunny window-sill. No special care is necessary, except to remove weeds and to keep the surface of the soil loose. When well established, the leaves may be gathered without injury to the plants; indeed, the yield may be increased by judicious removal of the tips of the shoots, or, in the case of parsley, of the individual leaves when they have attained the very dark green stage. The leaves should be gathered just when the flower-buds appear, and preferably immediately after the dew has disappeared in the morning, because the plants then contain the most oil. By spreading the leaves thinly upon trays in a heat not exceeding 120°, and occasionally turning them, they will soon be dry enough to pulverize, an operation generally performed by rubbing between the hands. The powder will keep best in air-tight jars, poorest in paper or pasteboard packages, because the paper absorbs the oil and permits its escape into the air. Herbs may also be preserved in alcohol or vinegar. When this method is employed a jar is filled with leaves and liquid enough poured over to cover them completely. After standing a few days the liquor will be ready for use. Dried herbs are generally used where the presence of specks is not objectionable, as in dressings, stews, soups, etc.; infusions in clear sauces, and the fresh herbs in salads. In general, sage is regarded as the proper flavoring ingredient in dressings with goose, duck, pork, and other rich meats; parsley, savory, fennel, balm, and marjoram, either singly or mixed, in dressings with turkey, chicken, veal, and similar delicate meats. Tarragon is perhaps most used in sauces with boiled fish, spearmint with spring lamb, dill with cucumber pickles. Individual taste, however, has much to do with the kind and quantity used and with what kinds of food.

HERBST, hĕrpst, EDUARD (1820-92). An Austrian politician, born in Vienna. He was elected a Deputy to the Bohemian Diet, and then, in accordance with the February patent of 1861, was elected by the Diet to the Lower House in the Austrian Reichsrat, where he became one of the most conspicuous leaders of the German Liberal or Constitutional Party. In 1867 he was appointed Minister of Justice in the Liberal Cabinet (Bürgerministerium) of Prince Carlos Auersperg. As such he introduced a number of im-

portant reforms, among them the abolition of imprisonment for debt; the introduction of the jury in libel suits against the press; the organization of the district courts; and, above all, the confessional ordinances of 1868. In 1870 his party lost its control of the Government, and he led the opposition in the Reichsrat in its attacks on the Ministries of Potocki and Hohenwart, until the fall of the latter in October, 1871, brought the German Constitutional Party once more into power, when he became a leader of the Government forces in the Lower House. In the latter years of his life, during the Taaffe régime, Herbst lost much of his former influence. Among his writings may be mentioned his *Handbuch des österreichischen Strafrechts* (7th ed. 1882-84).

HERCHER, hĕr'kĕr, RUDOLF (1821-78). A German Hellenist. He was born at Rudolstadt, and after studying at Jena, Leipzig, and Berlin, was appointed to a professorship at the Joachimsthal Gymnasium in Berlin (1861). In 1873 he was made a member of the Berlin Academy of Sciences. His works, which are distinguished by critical accuracy, include editions of *De Fluvii* (1851), which he proved had not been written by Plutarch; Arrian's *Scripta Minora* (1854, 2d ed. by Eberhard, 1885); *Scriptores Erotici Græci* (2 vols., 1858-59); *Ælian* (1858); the *Oneirocritica* of Artemidorus (1864); Plutarch's *Moralia* (vol. i. 1872); the *Epistolagraphi Græci* (1873); and Apollodorus's *Bibliotheca* (1874). His *Homerische Aufsätze* on the topography of Ithaca were collected by C. Robert (1881).

HERCULANEUM, hĕr'kû-lā'nê-ŭm (Lat., from Gk. Ἡράκλειον, *Hērakleion*, city of Hercules, from Ἡρακλῆς, *Hēraklēs*, Hercules). An ancient city of Italy, situated at the northwestern base of Mount Vesuvius, about five miles east of Naples. It was doubtless founded by Oscans, but Etruscans seem to have gained a foothold there. It subsequently was conquered, with all the rest of Campania, by the Samnites, and later it fell into the hands of the Romans. In A.D. 63 the city was seriously injured by a violent earthquake; and in 79 it was buried, along with Pompeii and Stabiæ, by the memorable eruption of Vesuvius (q.v.). It now lies at a depth of from 30 to 120 feet below the surface, owing to successive eruptions of later days, and is filled up and covered with volcanic tufa, composed of *lapilli* and ashes, and consolidated to some extent by water, which is often thrown up in great quantities during volcanic eruptions. Above it, on the modern surface, are the two large villages Portici and Resina. The very existence of Pompeii had been forgotten, but the knowledge had never been lost of the burial-place of Herculaneum. Finally, in 1719, an Austrian general, Count Elbeuf, sank a shaft which fortunately struck the ancient theatre, from which centre some tunneling was done, and objects of interest discovered. But after a short time the Government stopped the work till 1738, when explorations were begun under royal authority. From that time excavations have been carried on intermittently, being more difficult than in Pompeii. For the greater part of the city lies deep under the modern villages, and work must be done by tunneling through a troublesome tufa, which needs constant support lest the vaults collapse, and with them the foundations of the houses above. Hence visitors can see only a very small portion of this entombed city. The chief edifice shown is the theatre, which was very large, and was built but a short time before the fatal eruption. It has 16 rows of stone seats, and could accommodate about 3000 persons. A part of the Forum, with adjacent buildings, some private houses, two small temples, and a villa have also been discovered; and from these buildings many beautiful statues and remarkable paintings have been obtained. The art relics of Herculaneum far exceed in value and interest those found at Pompeii. Most remarkable was the discovery in the villa of nearly two thousand rolls of manuscript on papyrus, charred into a coal-like condition by their long burial under moist earth. Some of these have been deftly unrolled by a delicate process invented for the purpose, and their contents (philosophical treatises) deciphered. These treasures, together with such vases and domestic implements as have been found, have been conveyed to the museum at Naples. Latterly, the portion of Herculaneum toward the sea, which had been covered only by loose ashes, has been laid open, and ancient buildings may now be seen there. Consult: Ruggiero, *Storia degli scavi di Eucobano* (Naples, 1885); Comparetti and De Petra, *La villa ercolanese dei Pisoni* (Turin, 1883); Furchheim, *Bibliografia di Pompei, Ercolano e Stabia* (Naples, 1891).

HERCULANO, ar'kōō-lā'no, ALEXANDRE DE CARVALHO E ARAUJO (1810-77). A Portuguese poet and historian, born in Lisbon. In 1828, to escape the despotism of Dom Miguel, he went to Paris, and two years afterwards to London. In 1832 he returned to Lisbon, joined the Liberal Party, and gained much fame as an editor of *Panorama*. His *Poesias* (1850), including *A voz do propheta* and *A harpa do crente*, the latter of religious and political importance, were followed by the historical novels: *Enrico, o Presbytero* (1847); *O monge de Cister* (1848); *O Bobo;* and *Lendas e narrativas* (1851). In 1845, as librarian at Ajuda, he began his historical work. The *Historia de Portugal* (1846-53) is an authority on Portuguese history to the end of the thirteenth century; equally important are: *Da origem e estabelecimento da inquisição em Portugal* (1854-55); *Questões publicas* (1873); and *Controversias e estudos historicos* (1876-84). As a member of the Lisbon Academy, Herculano edited *Portugaliæ Monumenta Historica*. Consult Pimentel, *Herculano e o seu tempo* (Lisbon, 1881).

HER'CULES (Gk. Ἡρακλῆς, *Hēraklēs*, also known at Thebes as Ἀλκαῖος, *Alkaios*, and frequently in literature called Ἀλκείδης, *Alkeidēs*, or Alcides; Lat. *Hercules*). The typical hero of Greek myth, and the subject of numberless legends. In general, these may be conveniently treated in three groups, centring about Thebes, Argos, and Mount Œta, near Thermopylæ, and corresponding to the birth, middle life, and death of the hero. Thebes seems to have been generally recognized as the birthplace of Hercules, and Amphitryon, the husband of Alcmene, is certainly a Bœotian hero; but when Argos had become the centre of his life it was necessary to connect his parents with that region, and so both Alcmene and Amphitryon become descendants of Perseus, and are represented as exiles from Tiryns, living at Thebes. According to the common story, during the absence of Amphitryon, Zeus came to Alc-

mene in her husband's form, and by him she became the mother of Hercules, while by Amphitryon she conceived his twin brother Iphicles. The jealous Hera, throughout his life the enemy of Hercules, sent two serpents to destroy the infants in their cradle; but the hero, who had been gifted by Zeus with superhuman strength, strangled them. Thebes is also the scene of the madness of Hercules, immortalized by Euripides in his play, *The Man Hercules*. In this fit he killed his children, and in some versions his wife, Megara, and was ordered by the Delphic oracle to expiate his crime by serving Eurystheus, King of Argos or Mycenæ. This feature seems much like an addition to bring the Theban hero into Argolis, and it is quite probable that the original Theban legend contained many exploits afterwards transferred to Peloponnesus. The killing of the lion of Mount Cithæron can scarcely be other than a variant of the first labor. At Argos the central feature is the servitude to Eurystheus, to which Hercules was bound even before his birth by a trick of Hera. To this servitude belongs a series of 'labors,' which were gradually fixed into a canon of twelve. The exact date when this was brought about is uncertain. It can scarcely be due to an early epic, for even in the fifth and fourth centuries there is no hard and fast line between the 'labors' and the other deeds, and the final classification appears first for us in the mythographers of Alexandria, who also arranged the *parerga*, or other deeds attributed to the hero in appropriate places in the cycle. Traces of an earlier cycle of ten labors are perhaps to be found in the story that, because in the second Hercules had the aid of Iolaus, and in the fifth concealed from Augeas that he was performing the command of Eurystheus, the latter refused to count these and required the performance of the eleventh and twelfth.

The first labor was to destroy the lion which haunted the forests of Nemea and Cleonæ and could not be wounded by the arrows of a mortal. Hercules boldly attacked him with his club, but in vain, and he was finally obliged to strangle him with his hands. From this time he wore the lion's skin as armor. The second was to destroy the Lernæan hydra with its many heads, which he accomplished with the assistance of his friend Iolaus. His third was to catch the Arcadian hind of Diana, famous for its swiftness, its golden horns, and its brazen feet. The fourth was to bring alive to Eurystheus a wild boar, which ravaged the neighborhood of Erymanthus. The fifth was to cleanse the stables of Augeas, King of Elis, where 3000 oxen had been confined for many years, a task which he accomplished in one day, by turning the river Alpheus or Peneus through the stables. His sixth was to destroy the carnivorous birds, with brazen wings, beaks, and claws, which ravaged the country near the Lake Stymphalus, in Arcadia. The seventh was to bring alive to Peloponnesus a bull, remarkable for his beauty and strength, which Poseidon had, upon his request, given to Minos, King of Crete, in order that he might sacrifice it. This, however, Minos afterwards refusing to do, Poseidon made the bull mad, and it laid waste the island. Hercules brought the bull on his shoulders to Eurystheus, who set it at liberty. It appears again as the Marathonian bull in the story of Theseus. The eighth labor was to obtain the mares of Diomedes, King of the Bistones in Thrace, which fed upon human flesh. The ninth was to bring the girdle of Hippolyta, Queen of the Amazons. The tenth labor was to kill the triple-bodied monster Geryon and bring his herds to Argos. The eleventh was to obtain the golden apples from the garden of the Hesperides. Atlas, who knew where to find the apples, brought them to Hercules, who meanwhile supported the vault of heaven; but according to others, Hercules went himself and stole the apples, after slaying the dragon who guarded them. The last labor was to bring from the infernal regions the three-headed dog Cerberus. Hades promised him Cerberus on condition that he should not employ arms, but only force. When Hercules had brought the monster to Eurystheus, the latter, pale with fright, commanded him to be removed. Hercules set him at liberty, whereupon Cerberus immediately sank into the earth. Hercules was now free from his state of servitude.

Into the cycle of 'labors' are wrought many of the *parerga* performed by Hercules in his wanderings. Thus the battle with the centaurs, a favorite subject in archaic art, was localized at Pholoe in Arcadia, and connected with the chase of the Erymanthian boar. On his journey to Thrace for the horses of Diomedes he was entertained by Admetus, and, after wrestling with Death, restored to him from the grave his wife, Alcestis. The tenth and eleventh labors, with their long journeys, gave opportunity for many scenes. The hero voyages toward the western home of Geryon in a bowl given him by the Sun, and on his return through Italy kills the robber Cacus, who stole his cattle, and dedicates the *Ara Maxima* at Rome. While in search of the apples of the Hesperides, he wrestles with Nereus, the Old Man of the Sea, slays in Libya the giant Antæus, by his strength escapes from the Egyptian King, Busiris, who seeks to offer him as a sacrifice, and frees Prometheus from his captivity. He frees from Hades the captive Theseus. During the period of freedom from Eurystheus we find that Hercules made one of the Argonauts, and engaged in an expedition against Troy, because after freeing Hesione from a sea monster her father, Laomedon, had refused him his reward. In this period was also placed another fit of madness, in which he killed his friend Iphitus, and was in consequence required to serve the Lydian Queen, Omphale.

The legends that cluster about Mount Œta are concerned with the death of the hero. He had won Deianira, daughter of Œneus of Calydon, by overcoming his rival, the river god Acheloüs. With her he now repaired to Trachis. Having arrived at the river Evenus, he encountered the centaur Nessus. Hercules passed through on foot; but Nessus, under pretense of carrying Deianira over, attempted to offer her violence, whereupon Hercules slew him with an arrow dipped in the poison of the Lernæan hydra. Nessus, before expiring, instructed Deianira that a robe dipped in his blood would prove an infallible philter to regain her husband's love. The hero now made war against Eurytus, King of Œchalia (who had defrauded him), slew him and his sons, and carried off his daughter Iole. Thence he went to Cenæon, in Eubœa, and erected an altar to Zeus Cenæos. In order to celebrate the rite with due solemnity, he sent Lichas to Trachis for a white garment. Deianira, being

jealous of Iole, anointed the robe with the philter she had received from Nessus. Hercules put it on, and immediately the poison penetrated his bones. Maddened by the terrible pain, he seized Lichas by the feet and flung him into the sea. He tore off the dress, but it stuck to his flesh, which was thus torn from his bones. In this condition Hercules was conveyed by sea to Trachis, and Deianira, being informed of what had occurred, destroyed herself. Hercules himself repaired to Mount Œta, where he erected a funeral pile, and, ascending it, commanded that it should be set on fire. The burning pile was suddenly surrounded by a dark cloud, in which, amid thunder and lightning, Hercules was carried up to heaven. There he became reconciled to Hera, and married Hebe.

Popular legend represented the great, patient, suffering hero as fond of good cheer and relaxation in his hours of rest, and thus in the comedy of Attica and Magna Græcia Hercules was frequently introduced as a jovial sensualist, whose intellectual powers are by no means equal to his physical.

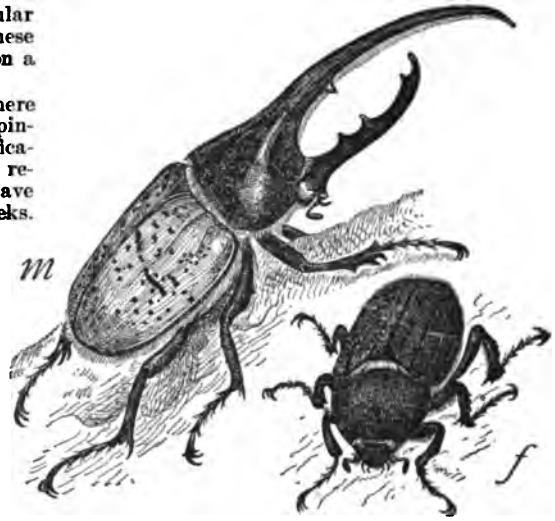
In Greek art, from the earliest times Hercules is a favorite figure. His labors adorned the metopes of the Temple of Zeus at Olympia and the treasury of the Athenians at Delphi. His statues are numerous. Scopas seems to have represented him in youthful vigor, but in the Hellenistic period the type is that of a bearded man, of athletic build, often with the muscular development carried to excess, as in the Farnese Hercules of Glycon, which perhaps is based on a work of Lysippus.

As to the nature and origin of Hercules, there has naturally been the widest diversity of opinion. Some, following the later Greek identifications with the Phœnician Melqart, and the resemblances to the Babylonian hero Gilgames, have seen only a Semitic deity adopted by the Greeks. Others again have considered him a solar hero. It seems clear that the story of Hercules in its earliest features is pure Greek; the Oriental elements are, to judge from our sources, later accretions. Whether the hero or the god is the original form is, however, still matter for debate. E. Meyer (*Geschichte des Alterthums*, ii., Halle, 1894) has pointed out that Attica, Bœotia, and the Achæan colonies are the seat of the divine worship of Hercules, and insists that he is originally a nature deity, who, like many others, partakes of the changes of nature, now triumphant, now suffering, and that under the Dorian influence, and especially literary tradition, the god sank to the hero. On the other hand, U. von Wilamowitz-Möllendorff holds that in Hercules we have the perfect ideal of the Dorian man, who became a divinity to the tribes with whom the Dorians were in contact. Much can be said in favor of both views, and a positive decision between them is not as yet attainable; but it must be admitted that the degradation of a god to a hero seems common in the development of Greek mythology, while the reverse is by no means so clearly proved a process. Consult: Wilamowitz-Möllendorff, *Euripides's Herakles* (2d ed., Berlin, 1895); Furtwängler and Peters, in Roscher, *Lexikon der griech. u. röm. Mythologie* (Leipzig, 1884-97); and Dunbach, in Daremberg and Saglio, *Dictionnaire des antiquités* (Paris, 1892).

HERCULES, PILLARS OF (Gk., *al Ἡρακλέους στῆλαι, hai Hērakleous stēlai*, Lat., *Herculis Columnæ*). The name given by the ancients to the two rocks forming the entrance to the Mediterranean at the Strait of Gibraltar, Calpe (Gibraltar) in Europe and Abyla (Ceuta) in Africa. Their erection was generally ascribed by the Greeks to Hercules, on the occasion of his journey to the Kingdom of Geryon. According to one version of the story, they had once been united, but Hercules tore them asunder, to admit the flow of the ocean into the Mediterranean; another version represents him as causing them to unite temporarily, in order to form a bridge. The first author who mentions them is Pindar, who seems to connect them with Cadiz, and in later times there was much discussion as to their exact location, and especially as to whether they were to be identified with the promontories at the straits, or to be sought in islands, or were pillars erected by Hercules.

HERCULES AND STAG. An antique bronze sculpture in the Museo Nazionale, Palermo, Sicily, representing the lithe and youthful god grasping a stag by the horn and bearing it down to the earth. It was found at Pompeii.

HERCULES BEETLE. A scarabid beetle (*Dynastes Hercules*), remarkable not only for its great size (five inches long), but for the singular appearance of the male. An enormous



HERCULES BEETLE.
m, male; *f*, female.

horn projects from the head, and is opposed by a similar but smaller projection of the thorax, the whole resembling a pair of great but unequal pincers. It is a native of Brazil. Two species occur in the United States. *Dynastes tityus* is a large greenish-gray species of the Southern States; *Dynastes Granti*, of the far West, has a much larger thoracic horn than the former. Compare GOLIATH BEETLE.

HERCULES'S CLUB, ANGELICA TREE. See XANTHOXYLUM.

HERCULES'S CLUB GOURD. See BOTTLE GOURD.

HERCULES STRANGLING THE SERPENTS. A mythological painting by Sir Joshua

Reynolds (1788), and one of his best works. It represents the god, still a child, choking with miraculous strength two serpents which have attacked him; while Alcmene and her attendants rush to his rescue and Juno appears above him in a cloud. The painting, which hangs in the Hermitage Museum at Saint Petersburg, was ordered by Catharine II. of Russia, who saw in the subject a symbol of her country's early struggles for life.

HERCYNIAN FOREST (Lat. *hercynia silva*). A name variously applied by the ancient writers to portions of the central mountain system of Europe. Aristotle makes the Ister (or Danube) and the other great northern rivers take their rise in the Hercynian Forest. Cæsar, who estimates it at nine days' journey in breadth and sixty in length, comprehends under this name a great part of the mountain ranges in Germany north of the Danube; while some identify it with the Bohemian Forest, and others with the Thuringian Forest. Some geographers apply the term to the complex of mountain ranges, mountain groups, and plateaus which stretch from Westphalia across Middle Germany and along the northern borders of Austria to the Carpathians.

HERD, David (1732-1810). A Scotch collector of national ballads. He was born in the Parish of Marykirk, Kincardine, where his father had a farm, but early left the country for the town and became a well-known figure among the literary men of Edinburgh. His claim to remembrance rests upon his *Ancient and Modern Scottish Songs, Heroic Ballads, etc.* (2 vols., 1776), of which a modern edition was published in Glasgow in 1869.

HERDER, hĕr'dĕr, Bartholomäus (1774-1839). A German publisher, born at Rottweil, in Württemberg. In 1801 he opened a bookstore and printing-office in Meersburg, on Lake Constance, but soon afterwards removed to the city of Constance, and in 1810 to Freiburg, Baden, where he opened the Herdersche Universitätsbuchhandlung. He accompanied the Allies to Paris in 1814 as Imperial field printer in Metternich's suite, and on his return added to his printing business establishments for lithography, copper-engraving, and plastic art. The Catholic character of the firm was developed under his sons and successors, Karl Raphael Herder and Benjamin Herder, and it became one of the best-known publishing houses of this Church in Germany. In 1888 Hermann Herder, a son of Benjamin and grandson of the founder, inherited the business, which became known as the Herdersche Verlagshandlung. The firm also established an office at Saint Louis, Mo., U. S. A. Among the important works which the firm has published is *Wetzer und Welte's Kirchenlexikon oder Encyklopädie der katholischen Theologie* (12 vols., 1847-56; 2d ed. 1882-1901).

HERDER, Johann Gottfried von (1744-1803). An eminent German philosophical and critical writer, of the classical period, born at Mohrungen. He was the son of a schoolmaster and cantor. His frail health unfitted him for industrial life, and his first earnings were as copyist to Deacon Trescho, a voluminous but forgotten author. Here he was neither appreciated nor justly treated, but he gained a knowledge of books and an easy style. He had begun independent composition when he awakened the interest of a Prussian surgeon, with whom he went to Königsberg, where he hoped to have an operation performed on an eye, and then to study medicine. But for the latter his nerves proved too weak, and he turned to theology, getting a small scholarship and eking out a livelihood by teaching. He soon won notice both as pedagogue and preacher, and became intimate with Kant, the philosopher, who, with Rousseau, was the guide of his future metaphysical speculations. In 1764 he accepted a call to the Cathedral School at Riga, where he maintained his reputation, and would have remained had he not become involved in a literary controversy with Klotz about Lessing, in the course of which he was led to protest that he had not written articles that universal opinion, supported by circumstantial evidence, held that he had. Thus he lost reputation, and resolved to recruit his health in the south of France in 1769. He returned to Germany in that year. He became tutor to the Prince of Holstein-Eutin, sharpened his critical genius in a fortnight with Lessing at Hamburg, found at Darmstadt his future congenial mate in Karoline Flachsland, and accepted a call to the pastorate of Bückeburg. He went thither in 1771, after a long stay in Strassburg for optical treatment, during which he was a helpful friend and critic of the young Goethe. He had printed the famous critical attacks on the artificial literary spirit of his time, *Fragmente über die neuere deutsche Litteratur* (1767) and the *Kritische Wälder* (1769), and a prize essay, *Ueber den Ursprung der Sprache* (1772). He now began to gather material for the *Ideen zur Philosophie der Geschichte der Menscheit*, his greatest work, though unfinished, published 1784-91 (translated by Churchill), for *Aelteste Urkunde des Menschengeschleohts* (1774), an æsthetic study of Genesis, and for the studies in popular poetry (*Volkslieder*, 1778-79), the works that were to constitute his chief title to fame. In 1773 he married. In 1776 Goethe procured for him the posts of Court preacher and member of the Upper Consistory at Weimar, where he found the environment best suited to his delicately organized genius and labored effectively for Church reform, though he soon found himself in moral estrangement from Goethe and his associates. Many of Herder's important publications were completed in the period between 1778 and his journey to Italy in 1788. They consist of theological, æsthetic, philosophic, philologic, and political studies, of *Vom Geiste der Ebräischen Poesie* (1782), translated by Marsh (*The Spirit of Hebrew Poetry*, 1833), of a translation of *The Cid* (1805), and of *Stimmen der Völker* (Voices of the Peoples) (1778-80), in which he translated the popular songs of many nations with a felicity and sympathy that preserve in wonderful degree the local color and feeling. Herder's original work in æsthetics, philosophy, literature, and philology has powerfully influenced German thought. He was possibly best as an interpreter of others; for he had a truer perception of the relation of language to human nature and national character than any other of his day. He was thought, if not a systematic a most stimulating thinker, perhaps more a seer than a scholar, yet by the scope of his intuitional perceptions he abounded in suggestions that have borne fruit in the modern correlation of the sciences. Herder's *Works* are in 60 vols. (1827-30). The literary portion has been best reëdited by Suphan and

Redlich (9 vols., Berlin, 1884 et seq.). For Herder's biography, consult his widow's *Erinnerungen aus dem Leben Johannis Gottfried von Herders* (Stuttgart, 1830); his sons, *Lebensbild* (Erlangen, 1846-47); and his *Letters* (ib., 1846-48). There are *Lives* by Haym (Berlin, 1880-85); Kühnemann (Munich, 1894); and in English by Nevinson (London, 1884).

HERD'S GRASS. See REDTOP.

HÉRÉDIA, ā'rā'dē'ä', JOSÉ DE (1842—). A French poet, of Spanish parentage, born at Santiago de Cuba. He was the most talented disciple of Leconte de Lisle (q.v.). His sonnets are the supreme result of the cultivation of form that the French call 'Parnassian,' very picturesque and as impersonal as lyric poetry can be. Leconte de Lisle was not quite impassive in his pessimism, but in Hérédia's work one perceives of the author only the expansion of the heart toward beauty and heroism. The immediate response of the public to the fifty sonnets of *Les Trophées* (1893) was significant of the revival of stricter classical taste in a reaction against the fantastic license of the Symbolists and the followers of Baudelaire (q.v.). Hérédia's poems resemble Gautier's in polish. They show the reticences of the conscious artist, and a vague suggestion of the subjective. He is the most condensed, plastic, and precise stylist of modern France—rich in suggestions of color and melody, incomparable in the union of sonorousness and compression. His subjects reflect in the main the scenes and traditions of his youth at Havana rather than those of his later studies at the Ecole des Chartes. The heroic epoch of Spanish conquest is his most inspiring theme, and he uses it also in his sole picaroon prose romance, *La nonne Alferez* (1894), and in a translation of Bernal Diaz's *Chronicle*. But he is often superb in merely exotic description, as in the brilliancy of *Récif de corail* or the splendor of *Blason céleste*. Hérédia was elected a member of the French Academy in 1894. There is a translation of the sonnets into English blank verse in Frank Sewall's *The Trophies* (Boston, 1900).

HEREDIA, ā-rā'dē-ä, JOSÉ MARIA DE (1803-39). A Cuban poet, born in Santiago de Cuba. He completed his law studies at Havana in 1823, but was immediately thereafter exiled on account of the liberality of his political views. He published his first volume of poems in New York (1825), and their popularity with his countrymen all over the globe resulted in an invitation to Mexico, where he entered into the practice of his profession and was honored by important official positions. An enlarged edition of his poems was published in two volumes in 1832. They have been translated from the Spanish into the chief modern tongues, and critics of all nations have approved of them. Heredia wrote three dramas which were staged in Mexico (1826-29), and *Lecciones de historia universal* (1830-31), besides translating some famous French and Italian poems into Spanish verse.

HEREDIA Y CAMPUZANO, ā kām-pōō-zä'nō, JOSE MARIA (1803-39). A Cuban lyric poet, born in Santiago de Cuba, December 31, 1803. His father and mother were from Santo Domingo. Very early Heredia was taken to Florida, then to Santo Domingo, and in 1812 to Venezuela. At the age of ten he began to study philosophy in Caracas, whence he went to Mexico. Thence he went to the University of Havana in 1817. Heredia had scarcely become a lawyer when he was arrested for conspiracy against Spain and banished from Cuba (1823). He now lived in the United States for two years, making a scanty livelihood by his poems and by giving lessons in Castilian. We next find him in Mexico, whither he had been called by Guadalupe Victoria. Heredia held in Mexico various offices both legal and educational. In 1827 he married a Mexican, Jaida Yáñez. After thirteen years of banishment Heredia sought and obtained permission to visit his mother and sisters at Matanzas. Three months later he had to leave them. Heredia died at Toluca, Mexico, May 12, 1839. Though he is infinitely less gifted than his young cousin, José Maria de Heredia (q.v.), this Cuban poet is well worth reading, because he is the first of the Cuban poets of the patriotic group. Heredia's Spanish is remarkably pure. His verses are often rhetorical, sometimes crude, and one is continually impressed by the weakness and the vanity of their author; nor is there ever any great power in Heredia's reasoning, which is often that of an hysterical nun, but his verses are often imaginative and they reflect the melancholy of exile. Consult: The *Obras poiticus de Don José Maria de Heredia*, ed. of Nestor Ponce de Leon (New York, 1875); *Poesias lirisias con prólogo se Elias Zerdo* (Paris, 1893); and Hills, *Bardos Cubanos* (Boston, 1902).

HEREDITAMENT (ML. *hereditamentum*, from Lat. *hereditare*, to inherit, from *heres*, heir). In English law, a comprehensive term including everything that goes to the heir-at-law. Hereditaments are regularly classified as corporeal and incorporeal. A house or land held in freehold is a corporeal hereditament; while tithes, advowsons, profits *a prendre*, and even future estates in land are incorporeal, being dealt with, in our legal system, as impalpable rights enjoyed in corporeal things. The term most frequently appears in the phrase 'lands, tenements, and hereditaments,' technically used by Blackstone and other common-law writers to denote every species of real property. Hereditaments is the most comprehensive term of the three, as it includes not only lands, but incorporeal interests, such as those above referred to, and not only tenements, but such things as heirlooms (q.v.). On the other hand, it does not include interests in lands, such as leasehold estates and life estates, which do not descend to the heir. See HEIR; REAL PROPERTY.

HEREDITY (Fr. *hérédité*, from Lat. *hereditas*, inheritance, from *heres*, heir). The phenomenon of correlation in the deviations of blood relatives from the mean. No two individuals are alike; by marshaling in a series a large number of individuals of a species we shall find it possible to recognize a typical or middle condition of each organ or quality. From this typical condition called the mode, the organs or qualities of most individuals deviate to a certain extent. Thus, if stature be the quality in question, we shall find that adult males of the United States have a modal stature of, say, 67 inches. Then a person whose stature is 70 inches deviates 3 inches from the mode in a + direction. According to heredity, his close relatives will, on the average, deviate in this same direction, and will

deviate from the mode to an extent which can be predicted, or which we may hope some day to be able to predict. The subject will here be treated under the following heads: (1) The classes of heredity; (2) the mathematical laws of normal inheritance; (3) special cases of inheritance not following the normal law, and (4) the limits of inheritance.

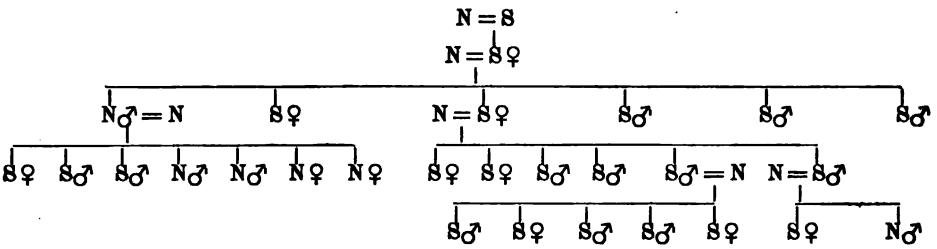
(1) CLASSES OF HEREDITY. Heredity deals, as we have seen, with the qualities of organisms and their parts. Now there are, in the case of two parents and their offspring, four general methods of inheritance of qualities: (*a*) The qualities of the parents may blend in the offspring. This case of *blending heritage* is illustrated by human stature. Let us imagine the wholly supposable case of a family of children all of whose maternal ancestors for five generations back had been two inches taller than the mode of females, and all of whose paternal ancestors had been four inches taller than the mode of males; then the stature of the male offspring or of the female offspring would be found close to three inches above the mode of male or female stature, as the case might be. The tendencies in the two parents have precisely blended, and the offspring are intermediate. Another illustration of blending heritage is skin-color in man. The mulatto is a half tint, the quadroon a fourth tint, and so on. (*b*) The quality may be inherited from one parent wholly, and not at all from the other parent. This case is known as *alternative heritage*. This sort of inheritance is illustrated by human eye-color. Galton (*Natural Inheritance*, p. 139) says: "If one parent has a light eye-color and the other a dark eye-color, some of the children will, as a rule, be light and the rest dark; they will seldom be medium eye-colored, like the children of medium eye-colored parents." Cases of alternative heritage have also been described for plant hybrids. Alternative heritage is exhibited in the hair-color of some mammals. For when a white and yellow mouse are crossed, some of the offspring may be pure white (albinos), like the one parent, and the others may be yellow, like the other parent, with no sign of the yellow becoming lighter. (*c*) In one part of the body the quality may be exactly like that of one parent; in another part, exactly like that of the other parent; in other words, there may be a patchwork intermingling of parental qualities. This case is known as *particulate inheritance*. Particulate inheritance is common in hair-color of horses, dogs, mice, and other mammals. When we cross two plants in which the leaf-hairs differ, this sort of inheritance often occurs, so that the two kinds of hairs of typical form are scattered over the leaf. (*d*) *Reversion*. This is inheritance from a remote ancestor, or, perhaps, more truly, the absence of typical inheritance. Reversion is often illustrated when two domesticated races of very dissimilar color are crossed. The result may be offspring which resemble neither parent, but are like the ancestral, wild species. It is at present impossible to predict what kind of inheritance will be shown by the qualities of any new cross.

(2) MATHEMATICAL LAWS OF NORMAL INHERITANCE. Man, like most other animals, has two parents, four grandparents, eight great-grandparents, sixteen ancestors of the fourth generation, and, generally, $2n$ ancestors of the nth ancestral generation. We inherit not only from our parents, but also from our remote ancestors. The law of inheritance in the case of blending heritage has been worked out by Galton as follows: To the total heritage the parents together contribute 50 per cent.; the four grandparents together, 25 per cent.; the third ancestral generation, $(\frac{1}{2})^3$ or 12.5 per cent.; and, generally, with the nth ancestral generation $\frac{1}{2^n}$ per cent. of the total heritage. It is a corollary of this law that the offspring of an exceptional pair will, in the long run, be less exceptional than their parents, unless, which is extremely improbable, their ancestors for six or seven generations have all been as exceptional as the parents. It is because the vast population of one's ancestors is pretty sure to be mediocre that the sons of exceptional parents tend to be less exceptional than they. There is a regression of the progeny toward mediocrity. We can measure this regression (on the average), and say the deviation of the son's stature from the mean will be only 446 + the deviation of the father's stature from the mean, or less than half. From the law of ancestral inheritance we may indeed calculate the relative relationship between two blood relatives in respect to any blending character. This has been done by Pearson in the following table:

Parent	.3000	First cousins	.0750
Grandparent	.1500	First cousins, once removed	.0844
Great-grandparent	.0750	Second cousins	.0172
Great-great-grandparent	.0375	Second cousins, once removed	.0062
Brothers	.4000	Third cousins	.0041
Uncles and nephew	.1500	Great-uncle and nephew	.0026

(3) SPECIAL CASES OF INHERITANCE NOT FOLLOWING THE NORMAL LAW. The normal law has so far been demonstrated only for cases of blending inheritance. For the other cases our knowledge is almost wholly qualitative. The normal condition of inheritance in these cases may be said to be equal inheritance of any quality from father and mother; or, in the case of alternative heritage, an equal proportion of offspring affected by the two parents. The first deviation from this law is the phenomenon of prepotency, or the excessive inheritance from one parent or one race. It often happens that a certain family characteristic crops out again and again, and in a larger percentage of cases than is called for by the normal law of inheritance. This is most marked when the parents belong to distinct races. Thus, when a common house mouse and a domesticated white mouse are crossed, the offspring are more like the house mouse in color than they are like the tame albinos. Ewart, in crossing horses, found that the male was strongly prepotent. The fact of prepotency is also familiar to plant-breeders who have tried to formulate some of its laws. Thus, it is asserted that the older species, or the more vigorous, is prepotent. 'Sports,' or considerable deviations from the typical condition, are apt to be prepotent. Bell has shown that deaf-mutism is a prepotent quality. The following case of inheritance of syndactylism in man is given by Smith and Norwell, in the *British Medical Journal* for July 7, 1894. Syndactylism, or the growing together of two or more fingers, is a rather rare abnormality. In the diagram ♂ stands for male, ♀ for female, N for normal, and S for syndactylic. Of two parents, the male precedes the female. When the law of normal inheritance calls for 20 per cent. of syndactylic individuals in the latest generations, observation gives 69 per cent.

Another class of exceptions to the normal law of inheritance is that of reversions. When two domesticated races of dissimilar qualities are crossed, the progeny are often unlike either



parent, but 'hark back' to some early ancestral condition. The cause of reversion is completely unknown. It is difficult to understand how hereditary qualities can lie so long latent; but the fact has to be recognized.

TELEGONY. An alleged case of irregular inheritance is that known as 'telegony,' or the influence upon subsequent offspring of the first sire. The most famous case is that of Lord Morton's mare. Toward the end of the last century Lord Morton, an Englishman, imported some 'quaggas'—in reality, Burchell's zebra. (See ZEBRA.) One of these was crossed with a pure-blood Arabian mare, which breeds very true, and a hybrid foal was obtained. Subsequently the Arabian mare was crossed with an Arabian horse, and the foal was marked like the hybrid. Another case was that of Mr. Giles's sow, described in the *Transactions* of the Philosophical Society (London, 1821). A black and white Essex sow was mated with a wild boar of a deep chestnut color, and the "pigs produced partook in appearance of both boar and sow, but in some the chestnut color of the boar strongly prevailed" (prepotency of the ancestral race). Later the sow was mated with a boar of her own black and white race, which usually breeds very true, yet the sow produced pigs marked with the same chestnut tint as the pigs of the first litter. Darwin (*Variation of Animals and Plants Under Domestication*, 1868) gives references to other cases. Belief in telegony is widespread among breeders of domestic animals, but it still lacks acceptance among scientific naturalists, chiefly because the possibility of its occurrence is hard to understand.

(4) LIMITS OF INHERITANCE. As we have just seen in regard to telegony, the limits in the capacity for inheritance are uncertain. But more important still is the question of the kinds of qualities which are or are not inherited. All qualities of organisms are classified as innate and acquired. Innate characters are those determined in the fertilized egg; acquired characters are such as affect the organism from without during its development. Innate qualities are, of course, inherited. Whether acquired characters can be inherited is disputed; the whole point at issue is, What are acquired characters? (See LAMARCK; NEOLAMARCKISM; USE-INHERITANCE.) The effects of nutrition, which are generally placed in the category of the acquired, are certainly felt in the second generation, especially among plants. But whether the education of a race for many generations eventually so affects the young that they are more docile is, at the present time, doubtful. The characters which are inherited are not only physical, but also mental and moral. The family of Jukes in New York State affords a striking illustration of inheritance of crime. In fact, the majority of crimes against the person are done by members of recognized criminal families. It would be a reasonable measure of self-defense for the State to prevent the marriage of criminals. The strength of inheritance is in some cases stronger than that of environment and nurture. Galton, in his history of twins, tells of identical twins, who, living far apart, fell ill of the same disease at the same time, so exactly were their bodies attuned.

THE PHYSICAL BASIS OF HEREDITY. Although Owen (1849), and afterwards H. Spencer (1866), and Darwin (1868; see PANGENESIS), had suggested that there was a physical basis of heredity, the first one to offer an objective and scientific basis was Dr. G. Jäger, who in 1876 (and more fully in 1878) thus stated his position:

"Through a great series of generations the germinal protoplasm retains its specific properties, dividing in every reproduction into an ontogenetic portion, out of which the individual is built up, and a phylogenetic portion, which is reserved to form the reproductive material of the mature offspring. This reservation of the phylogenetic material I described as the continuity of the germ protoplasm. Encapsuled in the ontogenetic material the phylogenetic protoplasm is sheltered from external influence, and retains its specific and embryonic characters."

It should be observed that Spencer (*Principles of Biology*) based the phenomena of heredity on the supposed presence of 'physiological units,' which he conceived to be immensely more complex than chemical units or molecules. Darwin imagined that the cells of the body throw off minute 'gemmules,' which are dispersed throughout the whole system. But his hypothesis was experimentally disproved by Galton (1875). Nägeli (1884) conceived that in every living cell there are an enormous number of minute particles (micellæ). These correspond to the plastidules of Elsberg and of Haeckel, the 'idioblasts' of O. Hertwig, and the 'biophores' of Weismann. Sedgwick Minot suggested that Nägeli's hypothetical idioplasm, which he (Nägeli) supposed to exist in every living cell, is probably identical with the nuclear chromatin of cells, and that heredity is due to the transfer from parent to offspring of this nuclear substance.

In 1885 were published Weismann's essays on heredity. His view was in the line of Jäger's hypothesis, but greatly expanded, and with many new and original suggestions. He proposed the now famous doctrine of 'the continuity of the germ plasm.' According to his view, "The nature of heredity is based upon the transmission of nuclear substance with a specific nucleoplasm of the germ cell, to which I have

given the name of germ plasm." This germ plasm exists in the nuclei of the reproductive cells.

The word 'continuity' expresses the hypothesis that heredity depends on the fact that a minute quantity of this germ plasm lies unchanged in the nucleus of the reproductive cells during the growth of the plant or animal, and afterwards grows and gives rise to the germ cells. A further elaboration of Weismann's views is not here necessary (see USE-INHERITANCE and WEISMANNISM), but to him we are mainly indebted for the view now generally held, that the germ plasm (chromatin) of the nuclear matter is the bearer of heredity.

The hypothesis seems supported by the experiments of Boveri on the eggs of the species of two genera of sea-urchins. By cross-fertilization of whole eggs or bits of eggs of sea-urchins of different genera having nuclei, larvæ are developed that share the larval forms of the parents of both genera. On the other hand, larvæ arising from the *enucleated* bits of eggs have inherited the characters of the male genus only. Hence he claims to have demonstrated the law that the nucleus alone is the bearer of heredity.

It may be observed that Hertwig, for the germplasm theory of Weismann, substituted the theory of the controlling inter-adjustments of the embryonic cells, and later of the tissues and organs.

HOMOCHRONOUS HEREDITY. A form of heredity called by Darwin "inheritance at corresponding periods of life," and by Haeckel "homochronous heredity." Darwin thus describes the phenomenon: "When the embryo leads an independent life, that is, becomes a larva, it has to be adapted to the surrounding conditions in its structure and instincts, independently of those of its parents; and the principle of inheritance at corresponding periods of life renders this possible." (*Variation of Animals and Plants Under Domestication.*) Again: "On this principle of inheritance at corresponding periods, we can understand how it is that most animals display from the germ to maturity such a marvelous succession of characters" (ib.).

Examples of this law are the complicated metamorphosis of certain free, but more especially the parasitic worms, notably the flukeworms (see TREMATODA) and the cestodes (see CESTODA), the complicated metamorphoses of the echinoderms, of the mollusks, crustaceans, and of those insects with a complete metamorphosis, and more especially such insects as the Meloidæ, Rhipiphoridæ, and Stylopidæ, in which there is a hypermetamorphosis.

It is not altogether improbable, says Packard, that the phenomena of alternation of generations is primarily due to changes in surroundings, and hence of habits, resulting in new needs which were met by adaptation to the new surroundings, and that the different stages were fixed by homochronous heredity.

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HEREFORD, hĕr'e-ford. The capital of Herefordshire, England, a Parliamentary and municipal borough of great antiquity, and an episcopal see; on the Wye, 51 miles south of Shrewsbury (Map: England, D 4). The chief building is the cathedral, dating from 1079, and the fourth church built on the site; it was restored in 1856-63. The chapter-house contains the famous *Mappa Mundi*—map of the world—of the thirteenth century. Other edifices are the bishop's palace, originally a Norman hall; the Coningsby Hospital, 1610; the corn exchange, and the Doric shire hall. Hereford has an endowed grammar school of the fourteenth century. It owns profitable markets and real estate, gas, water, and electric-lighting plant; maintains a fire brigade, free library and museum, and the Castle green. Its industries and trade are chiefly agricultural. The see of Hereford was created in 673; the town was a fortified place in the reign of Athelstan, and numerous charters begin with King John. For its loyalty and sufferings during the Civil War, Charles I. bestowed the motto "Invictæ fidelitatis præmium." Population, in 1891, 20,300; in 1901, 21,400. Consult: Duncumb, *History and Antiquities of Hereford* (Hereford,

1804; new ed., London, 1882); Fisher, *Hereford Cathedral* (London, 1898).

HEREFORDSHIRE. An inland county in the west of England, bounded on the west by South Wales, and on the east by the counties of Worcester and Gloucester (Map: England, D 4). The surface of the county is hilly, with occasional valleys. Among the chief hill-ranges are the Black Mountains on the western, and the Malvern Hills on the eastern border. The Wye and its affluents, with the Lugg, the Arrow, and the Teme, are the principal rivers. Herefordshire is essentially an agricultural county, with four-fifths of its area of 840 square miles under cultivation. Population, in 1891, 115,949; in 1901, 114,400. Capital, Hereford.

Herefordshire formed a portion of the territory of the ancient Silures, and was conquered by the Romans about A.D. 73. During the heptarchy it was included in Mercia. From its position on the Welsh border—a portion of the county being included in the debatable land called the "Marches"—Herefordshire was long the scene of frequent contests.

HEREMANS, hĕr'e-mâns, JACOB FRANS JAN (1825-84). A Dutch philologist, born at Antwerp. He studied at the Antwerp Athenæum, and in 1843 was appointed assistant librarian of the city. In 1864 he was appointed professor of the Dutch language and literature at the University of Ghent. He was a specialist also in Flemish literature, and wrote biographies of the Flemish poets Ledeganck (1847) and van Rijswijck (1850), and of the historian David (1868). His other books include: *Nederlandsche dichterhalle* (1858-64); *Hoffmann von Fallersleben en de Nederlandsche letterkunde* (1874); *Over den invloed van Noord-Nederland op de letterkunde in de zuidelijke provinciën gedurende het tijdperk 1815-30* (1874), all on literary topics; and *Nederlandsche spraakleer* (1846); *Nederlandsche metriek* (1862); and his Dutch-French dictionary (1865-69). He founded the *Nederlandsch Museum* in 1874.

HERERO-LAND, hâ-rā'rō-lânt, or DAMARA-LAND. A northern part of German Southwest Africa (q.v.), inhabited by the Herero or Ova-herero tribe (Map: Africa, F 6).

HERESY (OF. *heresie*, Fr. *hérésie*, from Lat. *hæresis*, school of thought, from Gk. *αἵρεσις, hairesis*, choice, from *αἱρεῖν, hairein*, to take). The name given to religious opinion declared by ecclesiastical authority to be erroneous and contrary to the accepted standards of the Church. In the Septuagint the word is used of the various Jewish parties—Pharisees, Sadducees, and Essenes—and similarly in the Acts of the Apostles. Paul employs it to denote the party divisions into which the Corinthian Christians have fallen, and he rebukes them because they destroy the unity of Christ's flock. Once only in the New Testament (II. Peter ii. 1) has the word its later meaning of *wrong belief*. For some time the boundary line between right and wrong doctrine, orthodoxy and heresy, was not perfectly clear, but a distinction was soon rendered possible by the growth of ancient Catholic Christianity. Before the close of the second century the bishops had begun to test doctrinal soundness by the Rule of Faith (q.v.) and the Canon of Scripture as standards, the interpretation of which was held to rest with themselves. Thus judged, the Gnostics (q.v.) are heretics to Irenæus (180) and Tertullian (c.200).

Beginning with Nicæa (325) the œcumenical councils gave united expression to the doctrinal belief of Christendom, so that the determination of what constituted heresy became much easier than before. With the adoption of Christianity as the State religion under Constantine, the civil Government was led to take cognizance of heresy, on the ground that it imperiled the public welfare. The first Imperial edicts to be mentioned in this connection are those of Constantine against the Donatists (q.v.), in 316. Under succeeding emperors similar decrees become frequent, and increasingly severe. Especially important are the edicts of Theodosius the Great, who in 381 set about enforcing orthodoxy throughout his whole empire. Saint Augustine lent his support to a policy of coercion, and sought to rest it upon the authority of Christ, who said: "Compel them to come in" (Luke xiv. 23). The first Christian to suffer death for his belief, at the hands of fellow Christians, was the Spaniard Priscillian (q.v.), who was charged with holding doctrines akin to those of the Manichæans (q.v.), and was executed at Treves, in 385, by order of the usurping Emperor Maximus. In the sixth century Justinian, the great codifier of Roman law, collected the Imperial edicts against heresy in the first book of his celebrated *Codex*. The spirit which had already taken possession of the Christian Church is well illustrated by the saying of Pope Gelasius I. (492-496): "Toleration of heretics is more injurious than the worst devastation of the provinces by the barbarians."

Anti-heretical laws were more fully developed from the eleventh century onward, when the various sects of the Cathari (q.v.) began to infest Southern Europe. It was in connection with the Albigensian Crusade (see ALBIGENSES), in the thirteenth century, that the Dominican courts of inquisition were established. (See INQUISITION.) During this period the close alliance between Empire and Papacy made it possible for each to aid the other in detecting and punishing offenders. The penalties for heresy included loss of civil rights, banishment, and confiscation of property. In addition, the Church could inflict punishments of her own, such as excommunication. A clergyman, if convicted, could be deposed and degraded from office. Like treason, heresy was construed as a capital offense. But it was an established Catholic axiom that "the Church does not thirst for blood." According to mediæval usage, therefore, a heretic, declared guilty by the ecclesiastical courts, was handed over to 'the secular arm' for execution. The earliest recorded instance of the legal use of burning, as a form of inflicting the death penalty, occurs in Lombardy in 1224. This soon became the favorite method of executing obstinate offenders. The English law, *de hæretico comburendo*, was enacted in 1401, in which year the first burning in England took place. The last execution by this means in England was in 1612.

According to the canon law, 'formal heresy' (*hæresis formalis externa*) exists, in the case of a baptized Christian, when he consciously adopts and persistently maintains an opinion known to be contrary to the doctrinal standards of the Church. What is called 'material heresy' consists in falling into heretical opinion through

ignorance, and this is an offense of far less gravity. Previous to the Protestant Reformation the Church was in a better position to carry out a systematic policy of repression than it has been since. The legalizing of several different ecclesiastical bodies, the growth of toleration, and the final attainment of complete religious freedom in the United States, have effectually removed religious opinion from the jurisdiction of civil government. It remains solely a matter of ecclesiastical discipline. See DISCIPLINE, ECCLESIASTICAL.

Different churches differ widely in the extent to which they attempt to control the belief of their adherents. The most effectual system is that of the Roman Catholic Church, which, in its modern form, goes back to the establishment of the Congregation of the Holy Office in 1542. In general, Roman Catholics are forbidden all *communicatio in sacris* with heretics. For many years (from Urban V. in 1364 to Clement XIV. in 1769) the Papal bull, *In Cœna Domini*, which enumerated the heresies condemned by the Church, was publicly read in Rome on Maundy Thursday. More recently the Pope has sometimes felt compelled to warn the faithful against prevalent error, which, if adopted and persisted in, might become open heresy. Thus Pope Pius IX. published his celebrated *Syllabus of Errors* in 1864, condemning eighty current opinions as erroneous.

Some of the Protestant reformers held almost as stringent views respecting the repression of heresy as did their Catholic contemporaries. Calvin approved the execution of Servetus (q.v.), and Beza and Melanchthon defended it. But most Protestants have gradually tended to rest satisfied with securing, by means of adequate tests, a reasonable degree of theological uniformity among the clergy, trusting the laity to conform their belief to that of their spiritual leaders. Heresy trials have occurred in several denominations in recent times, but their outcome does not encourage the hope that doctrinal agreement can be promoted by such means. The Protestant churches of to-day show an increasing aversion to the thought of trying men for their beliefs, and a desire to emphasize their fundamental principle of the right of private judgment, which was asserted at the Reformation.

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HERETIC. A person holding an erroneous religious belief or one contrary to the standards of the Church. (See HERESY.) The most important of the individuals and sects commonly classed as heretical may be thus enumerated. The early orthodox writers represent Simon Magus (Acts viii.) as the father of heresies. After him, in the first two Christian centuries, come Menander, Cerinthus, the Ebionites, Nicolaitans, Nazarenes, and Elkesaites (Judaizing parties). In the second century, the Gnostics, Saturnilus, Basilides, Valentinus, Ptolemæus, Marcus and Heracleon; the antinomian sects of Ophites, Cainites, and Sethians, with whom we may class Carpocrates; the representatives of the ascetic tendency, Tatian and the Encratites; Marcion, and his followers, the Marcionites; Montanus and the Montanists; the Alogi, of Asia Minor (who rejected the Logos idea and the fourth Gospel); and among the earlier Monarchians, Theodotus of Byzantium, Theodotus the moneychanger, Artemon, Praxeas, and Noëtus of Smyrna. In the third century, Sabellius, Paul of Samosata, Mani (from whom come the Manichæans), Novatian and his adherents. In the fourth century, the Arians (who opposed the Athanasian doctrine of the Trinity), the (schismatic) Donatists, who run over into the fifth century, the Macedonians, and the Apollinarians. In the fifth century, in the East, the Nestorians, Eutychians, Monophysites, and Origenists (all of whom were heterodox in Christology); in the West, the Pelagians and Semi-Pelagians, all of whom were combated by Saint Augustine. The Semi-Pelagians run over into the sixth century. In the seventh century, the Monothelites (logical successors to the Monophysites). In the eighth, the Paulicians of Armenia, descended from an ancient Adoptianist type of Christianity, whose origin is perhaps to be sought in the teaching of Paul of Samosata. In the eleventh century we find the Euchites, inaccurately described as Manichæans. In the twelfth, the Bogomiles, Petrobrusians, Cathari, and Waldenses (the last two having a considerable period of activity). In the thirteenth century, the important and numerous Albigenses. In the fourteenth, the Friends of God and the Brethren of the Free Spirit, and (in England) Wiclif and the Lollards. In the fifteenth, Hus and the Hussites, Taborites, Calixtines, or Utraquists, Jerome of Prague, the Bohemian Brethren, and Savonarola.

From the Roman Catholic point of view, the Reformers were heretics. The great change in the ecclesiastical situation wrought in the sixteenth century, and the speedy legalizing of new Church organizations, has made the whole problem of heresy a different one since that time. It is, therefore, undesirable to proceed further with the list. See the various titles mentioned in this article, and, for bibliography, see HERESY.

HERETIC BAPTISM. One of the great questions in the Christian Church of the third century relating to the reception into the Church of those who had been baptized by heretics. Up to that time it would seem that the baptism of such persons had been accepted, and the rite had not been repeated. Clement of Alexandria (d. c.215), it is true, in passing calls 'heretic baptism not proper and true water,' but he does not say that it was invalid, and the universal practice was to consider it valid. But in the early part of the third century Agrippinus, Bishop of Carthage, took opposite ground, influenced perhaps by Tertullian, who says: "Heretics have no fellowship in our discipline. . . . Therefore their baptism is not one with ours . . . a baptism which, since they have it not duly, doubtless they have not at all." This Agrippinus presided over a synod held in Carthage between 218 and 222 which pronounced heretic baptism invalid, and the same declaration

was made by two Asia Minor synods held about this time. It then became the practice in Carthage and elsewhere to rebaptize those received into the Church from the heretical sects, on the ground that the baptism which they had received was no baptism.

But the Roman Church, and apparently the majority of the churches in the West, dissented from Agrippinus, considering that the use by heretics of the baptismal formula made their baptism valid; and accordingly, on the ground that baptism was not to be repeated, did not baptize those coming into the Church from heretical sects. In so acting these churches followed precedent, and instituted the practice since followed by the Roman Catholic Church throughout the world.

When Cyprian, the great Bishop of Carthage, came into his see (in the year 248-49) he accepted the view of the Carthaginian Church, and when it was criticised he called synods, in 255 and 256, which formulated this view and enjoined the corresponding practice of rebaptism of converts from the heretics upon the churches. Cyprian sent a report of the doings of the councils to Stephen, the Bishop of Rome from 254 to 257. This was a deliberate rebuke to the Church at Rome and those churches agreeing with her, and so Stephen wrote against Cyprian.

The position of Stephen found vigorous supporters and probably little opposition in the Western Church generally. Thus Augustine, Bishop of Hippo (d. 430), the final teacher of the Western Church, lays down the same doctrine, in writing against Petilian, the Donatist: "When the water of baptism is given to any one in the name of the Father, and of the Son, and of the Holy Spirit, it is neither ours nor yours, but His of whom it was said to John, 'Upon whom thou shalt see the Spirit descending, and remaining on Him, the same is He who baptizeth with the Holy Spirit.'"

But Cyprian's view was accepted and defended in many places, and universally by the Donatists, as was natural seeing that their leader and founder was Donatus, the Bishop of Carthage, in 313. So when Augustine entered in debate with the Donatists he devoted an entire treatise to the refutation of Cyprian's position (*De baptismo contra Donatistas*).

The Eastern Church has followed Cyprian rather than Stephen in denying validity to heretical baptism and insisting upon an orthodox interpretation of the baptismal formula. That this was early the case is shown by the remark of Cyril, Bishop of Jerusalem (d. 386): "We may not receive baptism twice or thrice . . . for there is only one baptism . . . heretics, however, are rebaptized since the first [so called] baptism was no baptism;" by the council in the *Apostolic Constitutions*, of uncertain date, but probably prior to the sixth century: "Be ye likewise contented with one baptism alone, that which is into the death of the Lord; not that which is conferred by wicked heretics, but that which is conferred by unblamable priests. . . . Those that receive polluted baptism from the ungodly will become partakers in their opinions;" and yet more strongly by the command in the *Apostolic Canons*, dating from the same period: "If a bishop or presbyter . . . does not baptize him who is polluted by the ungodly [i.e. has received heretical baptism], let him be deprived." Athanasius (d. 373) expressed himself to the same effect: "There are many other heresies too, which use the words [of the baptismal formula], but not in a right sense . . . nor with sound faith, and in consequence the water which they administer is unprofitable, as deficient in piety, so that he who is sprinkled by them is rather polluted by irreligion than redeemed." The voice of the Council of Nicæa (325) is of the same tenor: "With respect to the Paulianists, who wish to return to the Catholic Church, the rule which orders them to be rebaptized must be observed;" but the Council of Laodicea (somewhere between 343 and 381) distinguishes between heretics upon the ground of their position respecting the Trinity, enjoining rebaptism upon those who came into the Catholic Church from the Montanists (canon 8), but not upon those from the Novatians or Quartodecimans (canon 7).

Thus the West universally accepted the teaching of Stephen that where baptism was administered in the name of the Trinity it is valid; while the East qualified it by insisting that the person baptizing must be orthodox as to the Trinity, otherwise the baptism was invalid. The present teaching of Roman Catholics and Protestants is that of Bishop Stephen; while in the *Orthodox Confession of the Greek Church* direct mention is made of the necessity of an orthodox interpretation of the formula, and the same is implied in the *Longer Catechism of the Eastern Church*.

HEREWARD, hĕr'e-wērd. An English outlaw who has passed into legend as the last champion of Saxon England against the Normans. He was a native of Lincolnshire, and appears in Domesday as the owner of lands in a number of places in that shire. In 1070 Hereward headed a revolt among the inhabitants of Peterborough and with the aid of a Danish fleet burned the town and plundered the abbey. He then retreated to the Isle of Ely, among the fens, where for more than a year he held out against the Normans. Here he was joined by a number of Saxon leaders, among them Morkere the former Earl of Mercia. He was finally driven from his refuge by William the Conqueror. Hereward's subsequent career is unknown, but it would seem that he made his peace with the King, who employed him in his wars in Normandy. The surname of Wake or Watchful dates from a much later period. Charles Kingsley has depicted Hereward as "the last of the English" in his novel, *Hereward the Wake*.

HERFORD, hĕr'fôrt. A town in the Province of Westphalia, Prussia, situated on the Werre, 10 miles from Bielefeld (Map: Prussia, C 2). It is a town of great antiquity and contains an old Münsterkirche begun in the twelfth century, another church dating from the thirteenth century, a gymnasium founded in 1540, and a theatre. The chief manufactures of the town are linen, clothing, chocolate, and confectionery, cigars, tobacco, furniture, etc. The trade is important. Herford is supposed to owe its origin to the convent founded in 822, whose abbess enjoyed a princely rank. The convent was abolished in 1803. Population, in 1890, 19,255; in 1900, 25,109, mostly Protestants.

HERFORD, Charles Harold (1853—). An English scholar born at Manchester, and edu-

cated at Trinity College, Cambridge, and in Germany. He was appointed professor of English language and literature at University College, Aberystwyth, Wales, in 1887; lectured at Oxford in 1897, at Baltimore and Chicago in 1900, and elsewhere. In 1885 he founded the English Goethe Society. Ripe and painstaking scholarship appears in his contributions to the *Dictionary of National Biography*, in his *Studies in the Literary Relations of England and Germany in the Sixteenth Century* (1886), and *Age of Wordsworth* (1897). His interest in Scandinavian literature led him to several translations, among which are Ibsen's *Brand* in the original metres (1893), and *Love's Comedy* (1900). He also edited the "Eversley" Shakespeare in 1902.

HERGENRÖTHER, hĕr'gen-rē'tĕr, JOSEPH (1824-90). A Catholic theologian of Bavaria. He was born at Würzburg, and studied theology there and in Rome. He became a priest in 1848, instructor at Munich in 1855, and in 1852 professor of Church law and history at Würzburg. In 1868 Pius IX. made him a member of the canonical commission for the Vatican Council. He is best known for his *Anti-Janus* (1870), an answer to Döllinger's *Janus*, and the *Kritik der von Döllingerschen Erklärung vom 28. März 1871* (1871), in which he defended the doctrine of the Pope's infallibility. He was made a cardinal in 1879. His historical works are: *Der Kirchenstaat seit der Französischen Revolution* (1860); *Photius, Patriarch von Konstantinopel* (1867-69); *Katholische Kirche und Christlicher Staat in ihrer geschichtlichen Entwickelung und in Beziehung auf die Fragen der Gegenwart* (1872-76); *Handbuch der allgemeinen Kirchengeschichte* (last ed. 1884-86); *Kardinal Maury* (1878); *Abriss der Papstgeschichte* (1879); and *Leonis X., Pontificis Maximi, Regesta* (1884-91). Consult: Steiner, "Kardinal Hergenröther," in *Episkopat der Gegenwart* (Würzburg, 1876); and Stamminger, *Zum Gedächtnisse Kardinal Hergenröthers* (Freiburg, 1892).

HER HOR, hĕr hōr, or SMENDES. An Egyptian King, of the twelfth century B.C., founder of the Twenty-first Dynasty, originally chief priest of Ammon. He built much at Karnak, and it was he who stored away the royal mummies discovered by Brugsch Bey in 1881.

HÉRICART-FERRAND, ā'rē'kär' fā'rän', LOUIS ETIENNE FRANÇOIS, Vicomte de Thury (1776-1854). A French engineer and agriculturist, born in Paris, and educated there, at the School of Mines. From 1809 to 1830 he was inspector-general of quarries, and for the last seven years of this period was director of works. In agriculture he made a special study of irrigation. He was a Deputy in 1815-27, and in 1824 was elected to the Academy of Sciences. Besides contributions to the *Journal des Mines* (1799-1815), to the *Annales des Mines*, and to the *Annales de la Société d'Horticulture*, his principal works were: *Descriptions des catacombes de Paris* (1815); *Considérations sur les puits forés* (2d ed. 1829); and *Du desséchement des terres cultivables* (1831).

HÉRICAULT, ā'rē'kō' (DE RICAULT), CHARLES JOSEPH (1823—). A French historian and romancer, born at Boulogne-sur-Mer. He began his literary career by writing for the *Revue des Deux Mondes* and other journals, and for seven years (1883-90) he conducted one he had himself founded, the *Revue de la Révolution*. His novels include: *La fille aux bleuets* (1860); *Un gentilhomme catholique* (1863); *La reine sauvage* (1869); *Les cousins de Normandie* (1874); *Le premier amour de lord Saint-Albans* (1879); *Le dernier amour de lord Saint-Albans* (1879); and *Aventures de deux Parisiennes pendant la Terreur* (1881); while the best of historical work is to be found in *Origine de l'épopée française et son histoire au moyen âge* (1860); *La France guerrière* (1867); *Histoire nationale des naufrages et aventures de mer* (1870); *Thermidor, Paris en 1794* (1872); *La Révolution, 1789-1882* (1882). He also edited the works of Gringoire, Clément Marot, and Charles d'Orléans.

HERING, hā'rĭng, CONSTANTIN (1800-80). A German-American physician. He was born in Oschatz, Saxony; studied medicine and surgery at Leipzig, Würzburg, and Dresden, and soon afterwards became a convert to homeopathy. In 1833 he emigrated to America, and settled in Philadelphia, where he founded the first American homeopathic school, and from 1845 to 1860 was professor of the institutes of medicine and materia medica in that institution. He was the editor of several homeopathic magazines, and published a number of books, including: *Rise and Progress of Homœopathy* (1834); *Effects of Snake Poison* (1837); and *Guiding Symptoms and Analytical Therapeutics* (1875).

HERING, EWALD (1834—). A German psychologist and physiologist. He was born at Alt-Gersdorf in Saxony, on August 5, 1834; practiced medicine in Leipzig in 1860, and became docent in physiology at the university there in 1862. Three years later he was appointed professor of physiology at the medico-surgical Josephs-Akademie, Vienna. From 1870 to 1895 he occupied a similar position at the German University at Prague, and in 1895 he was called to Leipzig. Hering's publications are many of them of unusual scientific merit and importance. Best known are: *Beiträge zur Physiologie* (1861); *Die Lehre vom binocularen Sehen* (1868); *Ueber das Gedächtnis als eine allgemeine Funktion der organisierten Materie* (1870; Eng. trans., *On Memory as a General Function of Organized Matter*, 1897); *Grundzüge einer Theorie des Temperatursinnes* (1877); *Zur Lehre vom Lichtsinne* (1878); "Raumsinn des Auges —Augenbewegungen" (1879), "Temperatursinn" (1880), both in Hermann, *Handbuch der Physiologie; Ueber Newton's Gesetz der Farbenmischung* (1887); *Zur Theorie der Nerventhätigkeit* (1899).

Hering has won a high place among psychologists by his contributions to psychophysics. His name is especially associated with four features of this science, by (1) his investigations into visual space perception, wherein he argued for the nativistic or physiological theory against the 'empiristic' position of Helmholtz; (2) his treatise on memory as a general function of organized matter; (3) his attack upon Fechner's 'fundamental law of psychophysics,' otherwise known as 'Weber's law;' and (4) his theory of color vision, which stands out in sharp rivalry with that of Helmholtz. Nearly all subsequent theories may be regarded as improvements upon, or modifications of, these two theories. Hering's cardinal postulates are: (1) An independent brightness process (grays); (2) a paired ar-

rangement of the constituent processes (white-black, red-green, yellow-blue); and (3) an antagonistic relation between the colors of each pair. The advantages of this theory as an explanation of the psychological phenomena of vision have won for Hering the support of the great majority of psychologists.

HERING, RUDOLPH (1847—). An American engineer, born in Philadelphia. He graduated at the Polytechnic School in Dresden, Germany, and from 1868 on was employed in important engineering work, among other offices holding those of engineer in charge of the water-supply for Philadelphia and Chicago. In 1881 he prepared, for the National Board of Health, a comprehensive report on the sewerage of European cities.

HERINGSDORF, hā'rĭngs-dōrf. The principal German summer resort on the Baltic coast, situated on the island of Usedom in the Prussian Province of Pomerania, 40 miles from Stettin (Map: Germany, F 1). It is a picturesque place with numerous fine villas and hotels, and is visited by about 13,000 people in the season. Population, in 1900, 874.

HERIOT (AS. *heregeatu*, military apparel, from *here*, Goth. *harjis*, OHG. *heri*, Ger. *Heer*, OChurch Slav. *kara*, OPruss. *karjis*, OPers. *kāra*, army + *geatu*, equipment). In old English law, a customary tribute of goods and chattels, payable to the lord of the fee on the death of a freehold tenant. It may have had its origin in the practice of returning to the lord the martial equipment which he had furnished to his vassal. But in course of time it came to be regarded as a form of relief (q.v.), payable by the heir on succeeding to the inheritance, as a sort of inheritance tax or death duty. If a vassal fell in battle in the service of his lord, no heriot was demanded. As heriots were due only of tenants who held by knight's service, they disappeared with the abolition of military tenures. Nominally, however, the right still exists in England in connection with copyhold estates, but it is in practice obsolete. See TRIBUTE.

HERIOT, hĕr'ĭ-ot, GEORGE (1563-1624). A Scottish goldsmith and philanthropist, founder of Heriot's Hospital, Edinburgh. He was the son of a goldsmith of Edinburgh, and followed his father's business. In 1597 he was appointed goldsmith to Anne of Denmark, consort of James VI. of Scotland, and four years afterwards to the King, on whose accession, in 1603, to the English throne Heriot went to London, where as Court jeweler and banker he amassed a large fortune. Of this he left £23,625 to the town council of Edinburgh for the education of the children of decayed burgesses and freemen of that city. According to his will, the hospital or school which he wished to found was to be in imitation of Christ's Hospital, London. The school was opened in 1659; in 1885 it was reorganized for secondary and higher branches. In 1902 the funds yielded upward of £50,000, and besides supporting the original foundation, furnished many scholarships at the Heriot-Watt College, the university, and other schools of Edinburgh. Heriot figures as "Jingling Geordie" in Scott's *Fortunes of Nigel* (Edinburgh, 1822).

HERIOT, GEORGE (1766-1844). A Canadian official and author, born on the Isle of Jersey. In 1799 he was at Quebec, in the Ordnance Department. The following year he was appointed Deputy Postmaster-General, and held the position for six years. He turned soldier during the War of 1812, was next in command to De Salaberry at the battle of Chateauguay, and in 1841 was made a major-general of militia. He represented Drummond County (1830-34), and wrote a *History of Canada* (2 vols., 1804), wherein he is largely indebted to Charlevoix, as well as *Travels Through the Canadas* (1807).

HERIOT, JOHN (1760-1833). A Scotch author, born at Haddington. He was educated at Edinburgh High School and University, but left without graduating, on account of lack of means, and went to London. Here he entered the marine service, was made a lieutenant at the age of eighteen, was in several of the naval engagements of the period, and was wounded in Rodney's famous fight with the French (April 17, 1780). When the war was over, Heriot was retired upon half pay, which he supplemented by making light literature out of his heavy experiences, such as *The Sorrows of the Heart* (1787), and *The Half-Pay Officer* (1789); but more important is his *Account of Gibraltar* (1792). After starting and editing two newspapers, he retired into Government positions, and from 1810 to 1816 lived in Barbadoes as deputy paymaster-general of the troops in the Windward and Leeward Islands. The last seventeen years of his life he spent in Chelsea Hospital, where he was comptroller.

HERI-RUD, hĕr'ē-rōōd' (Lat. *Arius*). A river of Central Asia, rising in the Koh-i-Baba range of the Hindu Kush Mountains, 150 miles west of Kabul (Map: Afghanistan, H 4). It flows through Afghanistan, for more than 300 miles through a fertile and beautiful valley past Herat; then, bending suddenly to the north, it flows along the Persian boundary, and afterwards northwest through Turkestan, making a farther course of 400 miles, till it terminates in the swamp of Tejend. After entering Turkestan, the Heri-Rud assumes the name of Tejend. Its chief tributary is the Keshef from the west.

HERISAU, hā'rē-sou. A town of Switzerland, in the Canton of Appenzell, situated near the river Glatt, six miles southwest of Saint Gall (Map: Switzerland, D 1). The town is irregularly built, has a church-tower reputed to date from the seventh century, a public library, an arsenal, a new town house, and a hospital. The manufactures comprise muslin, cotton, and silk. In the vicinity are iron springs. Population, in 1900, 13,497. Herisau was known early in the ninth century, and was ruled by the abbots of Saint Gall till the middle of the fifteenth, when it entered the Swiss Confederation.

HÉRISSON, ā'rē'sôN', MAURICE, Count (1840-98). A French officer and publicist, born in Paris. He entered the army, and took part in the Italian campaign and in the Chinese War, under General Montauban. In 1869 he was sent to America to make statistical studies. He returned to France at the outbreak of the Franco-Prussian War; was on the staff of General Schmitz, and later an ordinance officer under General Trochu, and was present at the interview between Bismarck and Jules Favre at Ferrières. In 1875 he was sent on an archæological expedition to Tunis, and in 1891 was made head of the French militia in Congo. His main works are: *Etudes sur la*

Chine contemporaine (1864); *L'esprit chinois et l'esprit européen* (1869); *Journal d'un interprète en Chine* (1885); *Journal de la campagne d'Italie* (1889); and *Les responsabilités de l'année terrible* (1891).

HERISTALL, hĕr'ĭ-stâl. A town in the Province of Liège, Belgium. See HERSTAL.

HERITABLE BOND, or HERITABLE SECURITY. In Scottish law, a bond or other obligation secured by a pledge or conveyance of heritable, i.e. real, property. In modern times it has taken on the form of the English and American mortgage of real property. See MORTGAGE.

HERITABLE JURISDICTIONS. A remarkable class of criminal jurisdictions held hereditarily from the Crown of Scotland. These jurisdictions amounted to upward of a hundred in number, and consisted of sheriffships, stewartries, constabularies, but principally of regalities and bailleries, with some offices of distinction. One of the more important was the office of the Lord Justice-General, and the Lordship of Argyle and the Isles, both belonging to the family of Argyle. In virtue of their hereditary rights the possessors of these jurisdictions exercised an arbitrary power over vassals and others within the limits of their domain, and could punish them by fines, scourging, imprisonment, and even in some cases put them to death, without interference of the common law. As repugnant to social policy, and more particularly with the view of extinguishing the authority of Highland chiefs over their clans, these heritable jurisdictions were abolished by act of Parliament in 1747 (20 Geo. II., c. 43), the possessors receiving payment for the estimated value of their rights. The abolition of these jurisdictions was followed by the appointment of sheriffs and the placing of the administration of the law in Scotland upon a uniform and modern basis. Consult Hume, *Commentaries on the Law of Scotland Respecting Crimes* (Edinburgh, 1844).

HERJULFSON, hĕr'yŭlf-son, BJARNI. The hero of an ancient Icelandic saga, according to which he was the first Norse discoverer of America. He was the son of Herjulf, one of the early settlers of Iceland. When he grew to manhood he became a sea-rover, and spent most of his time abroad, returning only to pass alternate winters at his father's house. During one of his absences Herjulf removed to Greenland with Eric the Red, and when Bjarni on his return to Iceland the following year (986) found his father gone, he determined to follow. Three days after he had left Iceland a storm arose and the ship drifted for some time at its mercy. When at last the storm abated, the crew hoisted sail and came to a land covered with trees. As this could not have been Greenland, Bjarni refused to go ashore; so they sailed away, leaving the land on their left. Three times more they made the land, and the third time they found Eric's settlement in Greenland. News of the discovery they had made of a well-wooded country to the southward came to the ears of Leif Ericson (q.v.), son of Eric, and incited him to make his famous voyage to Vinland. Consult Reeves, *The Finding of Wineland the Good* (London, 1890).

HERKIMER. A village and the county-seat of Herkimer County, N. Y., 81 miles west by north of Albany; on the Mohawk River, the Erie Canal, and the New York Central and Hudson River Railroad (Map: New York, F 2). It has a free library of over 7000 volumes, and the Folts Mission Institute. The village is in a dairying region, and manufactures knit goods, paper, furniture, beds, mattresses, etc. The water-works and electric-light plant are owned by the municipality. Population, in 1900, 5555.

HERKIMER, NICHOLAS (1715?-77). An American soldier of the Revolutionary War. He was born probably in what is now Herkimer County, N. Y., where his father, J. J. Hercheimer, a German from the Rhenish Palatinate, was a patentee. Nicholas served as a lieutenant of militia in the French and Indian War, and was in command of Fort Herkimer in 1758, when the French attack on German Flats was made. In 1775 he was commissioned a colonel of militia, and was chairman of the Committee of Safety of Tryon County. In the following year he was appointed a brigadier-general of the New York militia, and operated against Sir John Johnson. After Ticonderoga fell into the hands of Burgoyne's advancing army on July 7, 1777, Colonel Saint Leger joined Sir John Johnson at Oswego, and with a mixed force of 1800 British regulars, Tories, and Iroquois Indians under Joseph Brant, advanced toward Fort Stanwix (q.v.). The fort was invested on August 3d, and two days later Herkimer, with a force of 800 hastily recruited militia and volunteers, marched to its relief. Apprised by his Indians of the advance of the relieving column, Saint Leger arranged an ambuscade in a swampy ravine at Oriskany. Into this Herkimer, who had been compelled to give up his original plan of attack, marched. The battle that ensued, perhaps the most obstinate and murderous of the entire Revolution, was indecisive. The Americans held the field and drove their opponents off, but lost a third of their force in dead and wounded, and were too weak to continue the advance. Saint Leger's force, on the other hand, was so crippled and disorganized as to render out of the question both the continuation of the siege and the advance southward. Early in the fight Herkimer had his horse shot under him and his leg shattered by a musket-ball; but, seated on his saddle-bags underneath a tree, he continued calmly to smoke and shout out his commands until the fight was over. Ten days later he died, as a result of an unskillful operation. A monument 85 feet high was erected to his memory on the field of Oriskany in 1884.

HERKOMER, HUBERT (1849—). A genre and portrait painter and etcher of the English school. He was born at Waal, near Landsberg, Bavaria, May 26, 1849. His family emigrated to the United States in 1851, but returned to England in 1857. Herkomer's early life was a struggle with poverty and ill health. He evinced early talent for painting, and in 1865 he studied under Echtler in Munich. In 1866 he studied at South Kensington under Frederick Walker, whose influence is evident in his early works. In 1870 he removed to London, where he soon became famous as an illustrator for the London *Graphic*, as well as for his painting. He was an excellent water-colorist, and became a member of the Royal Society in 1871, but was not made an Academician until 1890. In 1873 he settled at Bushy, Hertfordshire, where in 1881 he established an art school, in which various branches

of art besides painting were practiced. In 1882 he visited America, painting a number of portraits and delivering lectures in New York and Boston; he came again in 1883, and in 1885 he opened a studio in Boston. From 1885 until 1895 he was Slade professor of fine arts, Oxford, succeeding John Ruskin. His lectures before the university were published under the title *Etching and Mezzotint in Engraving* (London, 1892). He has been the recipient of many honors in European countries, and has taken three gold medals.

Herkomer's work includes not only oil and water-color painting, but also excellent etchings. He has worked successfully in various branches of applied art, such as wood-carving, wrought-iron work, and architecture, and has also figured as a playwright, actor, magazine writer, musical composer, and singer. His paintings are excellent in drawing and good in color. The best known of them is the "Last Muster," which took the grand medal of honor at the Paris Exposition of 1878. It represents the veterans of Chelsea at prayer in their chapel. Among his other paintings are: "After the Toil of Day" (1873); "Eventide" (1878); "Life, Light, and Melody" (1879); "God's Shrine" (1880); "Der Bittgang" (Bavarian peasants praying for harvest); and "Pressing to the West" (1884), representing the arrival of emigrants at Castle Garden; "Gathering in the Charter House;" "The Magistracy of Landshut" (1893), which he presented to his native town. His portraits are marked by strong characterization and excellent technique. The best include: The "Lady in White," which took the medal of honor at the Berlin Exposition in 1886; the "Lady in Black" (an American girl); the artist's father, Lorenz Herkomer, in the series "Makers of My House;" Wagner (1878); Ruskin (1881); Browning; Tennyson; Archibald Forbes (1882); and Hans Richter (1883). Among his best-known water-colors are: "Im Walde;" "The Wood Cutter's Rest;" "The Poacher's Fate;" and "At the Well." Consult: The articles on "Herkomer," by Dafforne, in the *Art Journal* (1880); Courtney, *Art Annual* (1892).

HERKULESBAD, hĕr'kōō-lâs-bät. See MEHÁDIA.

HERLIN, hĕr'lēn, **FRIEDRICH** (?-c.1499). A German painter, born in Rothenburg or Nördlingen. He was probably the pupil of Rogier van der Weyden the Elder. At any rate, he painted in the style of that master. There is an altarpiece by him, representing scenes from the life of the Virgin, in the Church of Saint James at Rothenburg; a "Madonna and Saints" in the town hall at Nördlingen; and a "Nativity" in the Church of Saint Blasius at Bopfingen.

HERM (Lat. *Hermes*, from Gk. Ἑρμῆς, connected with Skt. *Sāramēya*, dog of the lower world, from *Saraman*, messenger of Sudra, from *sar*, to run, to flow, to hasten). A pillar, generally surmounted with a head of Hermes or Mercury, erected commonly in many parts of ancient Greece, especially in Attica, where they were used as milestones, Hermes being the god of traffic, roads, and boundaries. Sometimes heads of other divinities, such as Athena and Eros, were combined with that of Hermes. The Romans used them rather for merely decorative purposes than with any religious significance. Many examples are preserved in European museums.

HER'MAN, HENRY (1832-94). An English dramatist and novelist, born in Alsace. He was educated at a military college, emigrated to America, and served in the Confederate Army during the Civil War, losing an eye as a result of a wound received in action. Afterwards he removed to London, and began to write for the stage. His first play, *Jeanne Dubarry*, was produced at the Charing Cross Theatre in May, 1875, and was followed the next year by *Slight Mistakes*, a farce. In November, 1882, was produced his first great success, *The Silver King*, written in collaboration with Henry Arthur Jones, with whom he also wrote *Breaking a Butterfly* (1884) (Ibsen's *Doll's House*) and *Chatterton* (1884). He then wrote *Claudian* with William Gorman Wills (1884), and *The Golden Band* (1887) with Freeman Wills. He also wrote: *For Old Virginia* (1891); *Eagle Joe* (1892); and *Fay o' Fire* (1885), a romantic opera, for which Edward Jones composed the music. Between 1887 and 1891 he wrote several novels in collaboration with David Christie Murray, such as: *One Traveler Returns* (1887); *A Dangerous Catspaw* (1889); *The Bishop's Bible* (1890); *He Fell Among Thieves* (1890); and *Paul Jones's Alias* (1891). He also wrote alone a large number of novels.

HERMAN, ār'mān', MARTIAL JOSEPH ARMAND (1749-95). A French revolutionist, born at Saint Pol. He became a lawyer and an ardent revolutionist, and in 1793, when he had laid aside all his earlier counsels of moderation and had become intimate with Robespierre, he was appointed president of the Revolutionary Tribunal, and tried Marie Antoinette, Danton, and many others who died in that year. As Minister of Justice (1794) he had, and used, fresh opportunity for horrible judicial murders. Accused of being bribed by Robespierre in 1794, and of complicity with Fouquier-Tinville (1795), he was condemned on May 6th and guillotined the next day.

HERMANDAD, ār'mān-dād', THE (Sp., brotherhood). The name given to associations formed at various times by the principal cities of Castile, Leon, and Aragon for the defense of their liberties in times of trouble. These confederacies were sanctioned by the sovereigns as agents for suppressing the increasing power of the nobles, and for maintaining public security throughout the land with no cost to the Government. In Aragon the first Hermandad was established in the middle of the thirteenth century, and in Castile about thirty years later. In 1295 thirty-four cities of Castile and Leon formed a confederacy, and entered into a compact by which they pledged themselves to inflict summary punishment upon every noble who had either robbed or injured a member of their association and who refused to make just atonement for the wrong; or upon any one who should attempt, even by the order of the King, to levy an unjust tax. During the long period of anarchy, in which the Christian rulers of Spain were powerless to maintain order in their own dominions, the *Santa Hermandad*, or Holy Brotherhood, presented the only check against the unbounded license of the nobles. Isabella of Castile, seeing the beneficial effects which an extension of the

institution was capable of producing, obtained the sanction of the Cortes (1476) for its thorough reorganization and extension over the whole kingdom. A court was established in every community of thirty families, and an appeal from the local court went to the Supreme Council. A general junta met annually, and instructions were transmitted to the provincial juntas. The crimes reserved for the jurisdiction of the Hermandad were all acts of violence and theft committed on the high roads or in the open country, and the penalties attached to each misdemeanor were specified with the greatest precision in the codes of laws which were enacted at different times in the yearly assemblies of the deputies of the confederated cities. An annual contribution was assessed on every hundred householders or *vecinos* for the equipment and maintenance of the horsemen and *quadrilleros*, or officials of the Brotherhood, whose duty it was to arrest offenders and enforce the sentence of the law. Although the Hermandad was regarded with much disfavor by the aristocracy, it continued for some time to exercise its functions, until the country had been cleared of banditti and the ministers of justice enabled to discharge their duties without hindrance from lawless disturbers of the peace. In 1485 the association issued its code of laws, known as the *Quaderno de las leyes nuevas de la Hermandad*. In 1498, the objects of the Hermandad having been obtained and public order established on a firm basis, the functions of the Brotherhood were greatly reduced and most of its officials done away with; in the course of half a century the Hermandad became transformed into a mere police force. Consult: Mariana, *Historia de España* (Valencia, 1783-96); Prescott, *History of Ferdinand and Isabella* (Boston, 1838). See SPAIN.

HERMANFRID, hĕr'mân-frĕt (?-531). The last King of the Thuringians, son of Basinus. He ruled at first with his two brothers, Baderich and Berthar, but, urged on by his ambitious wife, Amalberga, killed Berthar and joined with Theoderich I., King of the Franks, against Baderich, who was defeated and dethroned in 516. Hermanfrid now refused to give up half of his kingdom, as he had promised, to Theoderich. The latter joined Clotaire I., his brother, and the Saxons, in a grand alliance against Thuringia, and dethroned Hermanfrid in 531. One story says that he was killed by his own armor-bearer. Amalberga went to Italy with her children, the bulk of Thuringia was joined to the kingdom of the Franks, and the Saxons took the northern part. The story of Hermanfrid has been dramatized by Wetzel and by Schlönbach.

HERMANN. A town and the county-seat of Gasconade County, Mo., 81 miles west of Saint Louis; on the Missouri River and on the Missouri Pacific Railroad (Map: Missouri, E 3). It is the centre of extensive vine-growing interests, and manufactures wine, in which there is an important trade, beer, flour, foundry products, etc. The picturesque scenery of the vicinity attracts many excursionists during the summer. Population, in 1890, 1410; in 1900, 1575.

HERMANN, hĕr'mân. The leader of the Cherusci in their celebrated victory over the Roman legions of Varus (A.D. 9). See ARMINIUS.

HERMANN, Count of WIED (1477-1552). Archbishop and Elector of Cologne, born at Wied. He was elected Archbishop of Cologne in 1515, and supported the claims of Charles V., whom he crowned at Aix-la-Chapelle in 1520. The next year, at the Diet of Worms, he strongly opposed heresy, and endeavored to have Luther declared an outlaw, in spite of the fact that he himself was striving to bring about a reform, though within the Church. In 1542 he became an advocate of the new teachings, and in consequence was outlawed by the Emperor and banned by the Pope. The Emperor then secured the election of Adolf of Shaumburg to the Archbishopric, and Hermann withdrew to his Earldom of Wied, where he died a few years later. Consult Varrentrapp, *Hermann von Wied und sein Reformationsversuch in Köln* (Leipzig, 1878).

HERMANN, FRIEDRICH BENEDIKT WILHELM VON (1795-1868). A German political economist. He was born in Bavaria, and studied at the universities of Erlangen and Würzburg. His attention was early directed to mathematics and political economy. In 1823 he became privat-docent at the University of Erlangen; in 1825 he was called to the professorship of mathematics at the Gymnasium of Nuremburg; and in 1827 he became professor extraordinary of *Kameralwissenschaften* in the University of Munich. His great work, *Staatswirtschaftliche Untersuchungen*, which appeared in 1832, ranks as one of the most important contributions to German economics. In 1835 he was made member of the Royal Bavarian Academy of Science. He was inspector of technical instruction in Bavaria; in 1845 was appointed one of the Councilors to the Minister of the Interior; and in 1848 sat as a member for Munich in the National Assembly at Frankfort, where he was one of the founders of the so-called 'Great-German Party,' which opposed the rise of the hegemony of Prussia; in 1850 he assumed charge of the Bureau of Statistics, and in 1855 he became Councilor of State. He published a large number of pamphlets and papers on political, economic, and industrial subjects, and the annual reports which he published as head of the Bureau of Statistics entitle him to the rank of one of the founders of the science of statistics.

HERMANN, GOTTFRIED (1772-1848). A German philologist. He was born at Leipzig, November 28, 1772; studied there and at Jena, and was made in 1798 professor extraordinary of philosophy at Leipzig. In 1803 he was professor of eloquence, becoming in addition professor of poetry in 1809, and in this position he remained till his death, December 31, 1848. The first department which he began to cultivate on original principles was metre, of which he attempted to develop a philosophical theory from the categories of Kant; and on this subject he wrote, besides his *Handbuch der Metrik* (1798), several Latin treatises, among which his *Epitome Doctrinæ Metricæ* (1818) reached a third edition in 1852. Of wider importance, however, was the new method which he introduced into the treatment of Greek grammar. The principles of this method are not only explicitly developed in his *De Emendenda Ratione Græcæ Grammaticæ* (1891), but are practically illustrated in his numerous editions of the ancient classics. Hermann's power of dealing with chronological, topographical, and personal questions is shown in his *Opuscula* (7 vols., Leipzig, 1827-30), which also

contain some poems. Consult: Jahn, *Gottfried Hermann, eine Gedächtnisrede* (Leipzig, 1849); Köchly, *Gottfried Hermann* (Heidelberg, 1874); Bursian, *Geschichte der klassischen Philologie in Deutschland* (Munich, 1883).

HERMANN, KARL FRIEDRICH (1804-55). A German classical scholar. He was born at Frankfort-on-the-Main, and was educated at Heidelberg and Leipzig. In 1832 he was appointed professor of classical philology at the University of Marburg, and in 1842 succeeded O. Müller as professor of philology and archæology at the University of Göttingen, where he remained until his death. His principal works were his *Lehrbuch der griechischen Antiquitäten* (6th ed. 1882-92), a standard work on Greek antiquities; *Geschichte und System der Platonischen Philosophie* (1839); *Kulturgeschichte der Griechen und Römer* (1857-58); and text revisions of Plato (6 vols., 1851-52); Juvenal's *Satires* (1854); and Persius (1854). Consult Lechner, *Zur Erinnerung an Karl Friedrich Hermann* (Berlin, 1864).

HERMANN, ROBERT (1869—). A Swiss composer, born at Bern. He studied music at the Frankfort Conservatory in 1891, and with Humperdinck (1893-94). In 1895 the Berlin Philharmonic Orchestra gave his *Symphony in C*, and since that time his compositions have met with increasing favor in Germany. His works include pieces for violin and piano, songs, a concert overture in D minor, quintets, trios, etc.

HERMANNSTADT, hĕr'mân-stât, Hung. **NAGY-SZEBEN,** nŏd'y'-sĕ'bĕn (Lat. *Cibinium*). An important town of Hungary, formerly the capital of Transylvania, beautifully situated on the Cibin, or Zibin (Hung. *Szeben*), an affluent of the Aluta, about 70 miles west-northwest of Kronstadt (Map: Hungary, J 4). Hermannstadt is the seat of a Greek archbishop and of a Lutheran superior consistory, possesses many fine schools, a library of 40,000 volumes, and a number of fine churches. There are extensive barracks. Tanning, wax-bleaching, and the making of cloth, combs, paper, and gunpowder are among the chief industries. Population, in 1890, 21,500; in 1900, 26,077, of whom two-thirds are Germans and the rest Magyars and Rumanians. Hermannstadt is the principal town in the so-called Saxon Land, and is supposed to have been founded by German colonists in the twelfth century.

HERMANN UND DOROTHEA, ōōnt dō'rō-tā'a. An idyllic poem by Goethe (1797). The plot was suggested by the appearance in Weimar and Eisenach of French emigrants who had been driven from Würzburg by the Bishop. This reminded Goethe of the historic expulsion, in 1731, of several hundred Protestants from his territory by the Archbishop of Salzburg, and on this the poem was based. The scene is laid in a small German town in 1796. Hermann, the son of an innkeeper of the town, meets Dorothea among the exiles and falls in love with her. The opposition of his father is overcome, and after clearing up the misconception of Dorothea, who at first understands that Hermann is seeking her as a servant for his father's household, Hermann wins her love. The poem is in nine cantos and contains 2000 hexameter verses. Goethe acknowledged indebtedness to Voss's *Luise* for the idea of his poem, which, however, surpasses Voss's work in all particulars.

HERMANN VON FRITZLAR, fŏn frĭts'lär. A German mystic of the fourteenth century. Of his life we know merely that he came from Fritzlar, in Hesse, and that he traveled through Europe, visiting the tombs of the saints. It is surmised that he was a rich layman. He wrote *Die Blume der Schauung*, a speculative work now lost, and a mystical *Heiligenleben*, preserved in a manuscript written under his own supervision. This valuable document for the reconstruction of German mysticism in the fourteenth century is edited by Pfeiffer, in his *Deutsche Mystiker*.

HERMANN VON REICHENAU, rĭ'ĸe-nou, HERMANN DER LAHME, or HERMANNUS CONTRACTUS (1013-54). A German poet and mathematician. He was the son of the Swabian Count Wolverad. From childhood his limbs were painfully contracted, whence the name by which he is generally known. He attended a monastic school at Reichenau, and at the age of thirty joined the brotherhood. He was an earnest and a successful teacher, and drew about him a zealous body of pupils from various places. He wrote a treatise on the abacus (published by Treutlein in the *Boncompagni Bulletino*, vol. x., Rome, 1877); and did much to extend the knowledge of the column computation. Unlike Gerbert (see SYLVESTER II.), however, he seems to have had no knowledge of the Hindu numerals. He also wrote on a number-game, 'Rhitmomachia,' and on the use of the astrolabe (q.v.). He is best known, however, for his *Chronicon*, a work on history down to the year of Hermann's death. It was continued by Berthold (edited by Pertz, vol. v. of *Monumenta Germaniæ Historica*, 1844; and translated by Nobbe, 1892). Among his poems are: *De Octo Vitiis Principalibus* (ed. by Dümmler, in *Zeitschrift für deutsches Altertum*, vol. xiii.), and the Latin hymns, *Salve Regina* and *Alma Redemptoris Mater*. Consult Hansjakob, *Hermann der Lahme von der Reichenau* (Mainz, 1875).

HERMANN VON SALZA, zäl'tsä (?-1239). A grand master of the Teutonic Order, probably descended from the lords of Salza, in Thuringia. He became grand master in 1210, and raised the Order to an enviable position both in the East and in Europe. He made his headquarters in Venice, though his duties kept him continually traveling in Egypt, Palestine, Italy, and Germany, and several times he acted as arbitrator in the frequent quarrels between the Pope and the Hohenstaufen Emperor Frederick II. Carlyle says of him: "He is reckoned the first great Hochmeister . . . fourth in the series of masters; perhaps the greatest to be found there at all, though many were considerable." Consult: Carlyle, *History of Frederick the Great*, vol. i. (London, 1858-65); Koch, *Hermann von Salza, Meister des Deutschen Ordens* (Leipzig, 1885).

HERMANRICH, hĕr'mân-rĭĸ (c.269-375). King of the Ostrogoths, variously called Hermanrich, Ermanarich, Ermanrich, and in myth Ermrich. He was the founder of a great Ostrogothic power about the middle of the fourth century, when he conquered many Slavic and Finnish tribes, so that the saga makes him rule from the Black Sea to the Baltic. This story makes him

order that Swanhilde, wife of a defeated prince, be torn asunder by horses, for which Hermanrich is slain by her three brothers. According to another tradition he is said to have put an end to his life, at the age of more than a hundred years, when he saw that he was about to be attacked by the King of the Huns, Balamir.

HERMAPH'RODITE (Lat. *hermaphroditus*, from Gk. Ἑρμαφρόδιτος, son of Hermes and Aphrodite, from Ἑρμῆς, *Hermēs*, Hermes + Ἀφροδίτη, *Aphrodite*, Aphrodite). An obsolete term in botany, formerly used to designate those flowers that contain both stamens and pistils, these organs then being regarded as sexual.

HERMAPH'RODITE BRIG. See BRIG.

HERMAPH'RODITISM. See SEX.

HER'MAPHRODI'TUS. The son of Hermes and Aphrodite, born on Mount Ida, where he was brought up by naiads. Going in his fifteenth year to Caria, he rejected the love of Salmacis, the nymph of a fountain in which he bathed. Salmacis prayed to the gods to unite her to the boy forever, and a being resulted half male and half female. The origin of the dual conception is probably to be found in the Cyprian Aphroditus, worshiped in connection with Aphrodite. The form in which Hermaphroditus is represented in art was fixed by Polyclitus. It became a favorite subject for sculpture in the late Greek and Græco-Roman period.

HER'MAS, SHEPHERD OF (Lat., from Gk. Ἑρμᾶς). The title of a work (in Greek), written by a Christian of the second century, who lived in Rome; it is included among the works of the Apostolic Fathers (q.v.). Hermas was a well-to-do freedman, and a brother of Pius, Bishop of Rome about the middle of the second century. He was an earnest, simple-minded Christian, with little education or culture, but typical, no doubt, of many in the Church of his day. Some later writers, like Jerome, confuse him with the Hermas mentioned in Rom. xvi. 14, which is not surprising in view of the fact that he refers to persons and events of the Apostolic age as if they were contemporary. Parts of *The Shepherd* may have been written near the beginning of the second century, but other parts are obviously later, and the work as a whole should probably be dated not long before A.D. 140.

The book takes its name from one of its principal characters, an old man in shepherd's garb, who appears at the close of the first part, and thereafter attends Hermas as a sort of guardian, committing to his charge certain divine commands. The general theme is repentance and the duty of moral strenuousness. The book is divided into (1) five 'Visions,' which form the introduction; (2) twelve 'Mandates,' or commandments respecting the Christian life, and (3) ten 'Similitudes,' or parables, which picture among other things the progress of the Church. The whole forms an important source for our knowledge of second-century Christianity in Rome. Here and there it shows close resemblances to the Epistle of James. Visions and revelations play such an important part in the book that it is properly classed among early Christian apocalypses. A few recent critics hold that it was originally a Jewish book which received Christian revision and enlargement.

For some time after it was written opinion was divided as to whether *The Shepherd* deserved to be classed among the 'Scriptures,' that is, among what we call the canonical books of the New Testament. Irenæus cites from it as 'Scripture,' and Clement of Alexandria and Origen esteemed it highly. It was often read in public worship. Tertullian, on the other hand, speaks slightingly of its moral teaching. In the fourth century it was still held in honor, as Eusebius and Jerome testify, but there was no longer any doubt that it stood outside the sacred canon.

The Greek text, with English translation, has been published by Lightfoot, *Apostolic Fathers*, edited by Harmon (London, 1893). An English translation is given in volume i. of the American edition of *Ante-Nicene Fathers*, edited by Roberts and Donaldson (Buffalo, 1886). In general consult: Cruttwell, *Literary History of Early Christianity*, vol. ii. (London, 1893); Krüger, *History of Early Christian Literature* (New York, 1897); Taylor, *The Shepherd of Hermas* (New York, 1901).

HERMENEGILD, hĕr'me-ne-gild (c.560-c.610). Son of Leovigild, King of the Visigoths, and centre of a Catholic legend. In 580 he rebelled against his father to induce him to become a Catholic, says the story, although there is no evidence that Hermenegild was a Catholic apart from the fact that he married Ingunthis, daughter of Sigibert and Brunhilde, who was orthodox. The son was defeated by his father and driven into exile. The legend makes him martyred by his father, whose second wife was an Arian. He was canonized by Pope Sixtus.

HER'MENEU'TICS. See EXEGESIS.

HERMENGYLD, hĕr'mĕn-gild. The constable's wife, in Chaucer's *Man of Law's Tale*. Constance is falsely accused of her murder.

HERMES, hĕr'mēz. See MERCURY.

HERMES, hĕr'mĕs, GEORG (1775-1831). A German Roman Catholic theologian and philosopher, born in Dreyerwalde, Westphalia. His student life was passed in Münster, where he afterwards taught at the gymnasium (1798-1807), and lectured with marked success at the Academy (1807-19). In 1799 he was ordained to the priesthood. In 1819 he was called to the University of Bonn, where he spent the remainder of his life. As a professor of theology Hermes achieved the distinction of being the founder of a 'school,' known after him as the Hermesians. It was not long before all his colleagues at Bonn recognized him as their leader. It is said that his influence was sufficient to prevent the appointment of Möhler and Döllinger to professorships there. In Breslau, too, he gained many adherents. Spiegel, Archbishop of Cologne, was an active and powerful supporter of the new movement, and until his death (1836) the Hermesians were in high favor throughout the provinces of the lower Rhine. There seems to have been no doubt of their orthodoxy or of their loyalty to Catholicism, and so long as Hermes lived hardly a sign of opposition appeared. He died in 1831, at peace with the Church, and generally recognized as one of the foremost leaders of German Catholicism.

Four years later (1835), to the astonishment of the Hermesian party, Pope Gregory XVI. issued a brief, condemning Hermes's teaching and prohibiting his writings. The brief declared that

many complaints had reached the ears of the Pontiff, and that after careful examination Hermes's works had been found erroneous, scandalous, and injurious to faith. The sections especially objectionable related to the nature of faith and of divine revelation, the authority of Scripture and tradition, the necessity of grace, the evidence of God's existence, and the idea that through reason men could gain a knowledge of supernatural truth. Such teaching was declared to lead toward skepticism and indifference.

Since the year 1832 the party had had an organ, the *Zeitschrift für Philosophie und katholische Theologie*. In its columns and elsewhere defenses at once began to appear. The Hermesians declared that the Pope had been misinformed by persons who were ignorant of philosophy and theology alike. It was freely admitted that the doctrines specified in the Papal brief were heterodox, but it was alleged that these were not the doctrines of Hermes; that neither he nor his school had ever held or taught them. At this point the similarity of their defense to that adopted long before by the Jansenists (q.v.) should be noticed. So confident were they that the Pope was wrong that two of the Bonn professors (Braun and Elvenich) undertook a mission to Rome to persuade him to withdraw the brief. They found, however, that their hopes were baseless, and they were forced to return without having accomplished anything. About 1838 philosophical criticism began to add its strength to the opposition which had already developed in other quarters, and the decline of Hermesianism was rapid. The two Bonn professors, Braun and Achterfeldt, who had been most active in defense of Hermes's memory, retired in 1844. They were not subjected, however, to any ecclesiastical censure. Before the middle of the century the whole movement had become a matter of history.

Hermes's writings are few. Their titles are: *Ueber die Wahrheit des Christentums*, which appeared in 1805; *Einleitung in die christkatholische Theologie*, in two parts (1819 and 1829); *Christkatholische Dogmatik* (1834) published posthumously under the editorship of Achterfeldt. In general consult: Niedner, *Philosophiæ Hermesii Explicatio* (Leipzig, 1838); Braun and Elvenich, *Acta Romana* (Hanover, 1838); Werner, *Geschichte der katholischen Theologie* (Munich, 1866); Lichtenberger, *History of German Theology in the Nineteenth Century* (Edinburgh, 1889).

HERMES, hēr'mēz, or **MERCURY REPOSING.** A life-size bronze statue found at Herculaneum, now in the Museo Nazionale at Naples. It represents the youthful messenger of the gods seated and leaning forward with limbs relaxed. The attitude is life-like, and the statue is one of the most famous extant representations of the god.

HERMES CARRYING THE INFANT BAC'CHUS. A masterpiece of Praxiteles, found in 1877 at Olympia, and now preserved in the museum there. The figure of the god is the most perfect example extant of the Greek conception of youthful masculine beauty. Hermes stands leaning his left arm, draped with a cloak, on a tree-stump, and holding the infant god of wine. His right arm is missing, but evidently the raised hand held some object for the babe's amusement.

HER'MESI'ANAX (Ἑρμησιάναξ). A Greek elegiac poet, who lived in the time of Alexander the Great, and was a native of Colophon, in Asia Minor. His chief work was Λεόντιον, an elegiac poem in three books, addressed to his mistress, Leontium. The fragment of ninety-eight lines of the third book preserved by Athenæus (lib. xiii.) describes, in a somewhat disconnected though not ungraceful style, the love-stories of the poets and sages from Orpheus down to Philetas. Consult the editions by Bailey (London, 1839); by G. Hermann in his *Opuscula* (Leipzig, 1828); and by Bergk, in his *Anthologia Lyrica* (2d ed., Leipzig, 1868); also Bergk, *De Hermesianactis Elegia* (Marburg, 1845); and Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit* (Leipzig, 1892).

HERME'SIANISM. See HERMES, GEORG.

HERMES OF AN'DROS. A statue in the National Museum at Athens, wrongly so called. It does not represent the god, but is a portrait statue belonging to a tomb, and is considered the best example of this class of statues. It dates from the fourth century B.C.

HERMES, OR A PHILOSOPHICAL INQUIRY CONCERNING UNIVERSAL GRAMMAR. A technical work by James Harris, much influenced by Aristotle. It was published in 1751, and was translated by Thurot in 1796 by order of the French Directory.

HERMES TRIS'MEGIS'TUS. See HERMETIC.

HERMET'IC (ML. *Hermeticus*, relating to Hermes, from *Hermes*, Gk. Ἑρμῆς, Hermes). The ancient Egyptians considered the god Dhouti, or Thoth, identified by the Greeks with their god Hermes, as the patron of literature, and the scribe of the gods. Therefore, several magical and religious texts, partly embodied in the *Book of the Dead* (q.v.), were reputed to have been written by this god with his own hands. As such writings could claim the most direct inspiration, the word Hermetic was applied, in Greek times, to writings of the highest degree of sanctity, and served in a general way to designate all inspired books. Clemens of Alexandria states that the Egyptian priests had to study forty-two (i.e. the number of assessors of Osiris) sacred or Hermetic books, divided into six subjects: sacred law, ritual, science, astrology, hymnology, and medicine. It is questionable if such a canon existed throughout Egypt. The claim that the great medical papyrus discovered by Ebers was one of these Hermetic books has not been substantiated. In early Christian times it was customary to ascribe a certain type of magical and gnostic writings in Greek to Hermes Trismegistus, who lost his divine personality more and more, and came to be regarded as a great magician. These pseudographs often claimed to have been translated from the Egyptian, although they bear a thoroughly Greek character and mostly exhibit un-Egyptian ideas of Jewish, Neo-Platonic, etc., origin. They may, however, have been written in Egypt. The most noticeable product among them is *Hermes Trismegistus* (most recent edition by Parthey, Berlin, 1854). These writings exercised a strong influence upon the various secret sciences; hence the term Hermetic became very popular in alchemy and astrology, and some mediæval writings claim the title of Hermetic books. Hermetic

medicine meant the most mysterious and powerful medicine, and the expression 'hermetic sealing,' for the most complete, air-tight closure, has survived to our own day. Consult Dufresnoy, *Histoire de la philosophie hermétique* (Paris, 1742); Baumgarten-Crusius, *De Librorum Hermeticorum Origine atque Indole* (Jena, 1827); Hilger, *De Hermetis Trismegisti Poëmandro* (Leipzig, 1855); Ménard, *Hermès Trismegiste* (Paris, 1866); Pietschmann, *Hermes Trismegistus* (Leipzig, 1875).

HERMIA, hĕr'mĭ-ȧ. An Athenian lady in Shakespeare's *Midsummer Night's Dream*. She is the daughter of Egeus, and is enamored of Lysander.

HERMI'AS (Lat., from Gk. Ἑρμίας, *Hermias*, or Ἑρμείας, *Hermeias*). A slave of Eubulus, tyrant of Atarneus, in Mysia, Asia Minor, whom he subsequently succeeded on the throne (B.C. 347). At Athens he made the acquaintance of Plato and Aristotle. The latter spent some years at the Court of Hermias, but fled when Artaxerxes III., captured the tyrant and put him to death. The philosopher, who was married to one of the relatives of Hermias, erected a statue in his honor.

HERMINJARD, ăr'mĕ'nyăr', AIMÉ LOUIS (1817—). A Swiss author, born at Vevey, Vaud. He was a teacher, and practiced his profession in Russia, Germany, and France, before going to Geneva, where he became a friend of Amiel. His great work, the *Correspondance des reformateurs dans les pays de langue française*, began to appear in 1866 (vol. ix., covering the period 1543-44, in 1897).

HERMIONE, hēr-mī'ô-nē. (1) The beautiful daughter of Menelaus and Helen, married against her will to Neoptolemus (Pyrrhus), the son of Achilles, in performance of a promise made by her father. According to late tradition, she was carried off by Neoptolemus, who was killed by Orestes, to whom she had already been promised. (2) The much-injured wife of Leontes, the madly jealous King of Sicily, in Shakespeare's *Winter's Tale*. The character is taken from Bellaria, in Greene's *Pandosto*. (3) The scornful love of Pyrrhus and loving mother of Astyanax, in Racine's *Andromaque*. After Andromache has persuaded Orestes to murder Pyrrhus, in the act of ascending the altar with Hermione, the latter becomes Regent of Epirus.

HERMI'ONES, or **HERMIN'ONES**. One of the three great divisions of the German peoples, so named from their mythical progenitor Irminus. They were the oldest, best, and most-powerful of the West-Germanic stock, and their eastern boundary was the Vistula and the Carpathians. Among the nations to whom the name Hermiones applied were the Suevi, the Hermunduri, the Lombardi, the Vandali, the Heruli, and the Quadi. Their early home was about the basin of the Elbe and the Main. Consult Stubbs, *Constitutional History of England*, ch. 1, 6th ed. (Oxford, 1897).

HERMIP'PUS OF SMYRNA (Gk. Ἑρμίππος, Hermippus). A Greek philosopher who lived about B.C. 200. A disciple of Callimachus of Alexandria, he was called ὁ Καλλιμάχειος, the Callimachean. He was the author of Βίοι, a work containing the biographies of all the Greek philosophers, historians, and poets. Though it is repeatedly referred to by later writers, only fragments have been preserved. Consult Müller, *Historicorum Græcorum Fragmenta* (Paris, 1868-83).

HERMIT (from OF. *hermite, ermite*, from Lat. *eremita*, from Gk. ἐρημίτης, *erēmitēs*, hermit, from ἔρημα, *erēmia*, desert, from ἔρημος, *erēmos*, quiet; connected with Gk. ἠρέμα, *ērema*, quietly, Goth. *rimis*, quiet, Skt. *ram*, to rest). One of the names given in the early ages, and still more in the later Church, to a class of solitary ascetics, who, with a view to more complete freedom from the cares, temptations, and business of the world, withdrew from the ordinary intercourse of life and took up their abode in natural caverns or rudely formed huts in deserts, forests, mountains, and other solitary places. The hermits of the Middle Ages, like the primitive anchorites, often lived in complete solitude; but a much more common, and, in its influence on the Church, more important form of the institute was that of a community of hermits, each possessing his separate hermitage, but all meeting at stated times for mass, prayer, religious instruction, and other common exercises. The various hermits of this class are regarded as constituting religious orders, and although never attaining to the popularity which distinguished the Franciscans, Dominicans, and other active orders, they have formed, nevertheless, a numerous and not uninfluential element in the spiritual life of the Roman Catholic Church. It would be impossible to enumerate the many small associations of this kind. For some of the more important, see AUGUSTINIANS; CELESTINES; HIERONYMITES; PAULITES.

HERMITAGE, THE. (1) A celebrated palace and museum at Saint Petersburg (q.v.). (2) A garden on the side of a hill overlooking Moscow, Russia, which has become a noted fashionable resort. (3) The name given to Rousseau's retreat in the valley of Montmorency, France. It was built for the philosopher by Madame d'Epinay, and was occupied by him from 1751 to 1757. *La nouvelle Héloïse*, *Le discours sur l'inégalité des conditions*, and a part of the *Dictionary of Music* were written here. In 1813 Grétry died in this place. (4) An old house near Nashville, Tenn., where Andrew Jackson resided for a great part of his life, and near which he was buried. The mansion is now owned by the State.

HERMIT CRAB. One of a large group of small crabs (q.v.) of the family Paguridæ, having the abdominal or tail segments much more largely developed than in true crabs, but undefended by hard plates, and not forming an organ for swimming. The soft and tender tail requires a protective covering, which the instinct of the hermit crabs leads them to find in some coiled shell of a suitable size. On the slightest alarm the hermit crab retires backward into the shell, guarding the aperture of it with one claw, which is much larger than the other, the hard points of the feet also projecting a little. The whole structure of the animal is adapted to such a habitation. The part which in the lobster becomes a finlike expansion at the end of the abdomen, becomes in the hermit crab an appendage for firmly holding in the shell; and so well does the hermit crab hold that it may be pulled to pieces, but cannot be pulled out. Some species have suckers to render the hold more perfect. They

often remain in a single shell for a long time, so that colonies of Hydractinia and other hydroids grow over a large part of it. Often sea-anemones attach themselves to the shells in which hermit crabs live, and thus get the benefit of free and rapid transportation. (See COMMENSALISM.) A Chinese species is said to carry an anemone on its claw, so that when withdrawn into its shell the anemone forms an effectual stopper to the opening. Increase of size, however, renders it necessary for hermit crabs to relinquish their shells and seek new ones from time to time, and when thus engaged they are very interesting animals to watch. They try on shell after shell before finding one that suits them, and they are constantly quarreling savagely over their houses; yet in fact they are great cowards. Hermit crabs are very interesting inmates of the aquarium, but their locomotive habits and their voracity make them unsuitable for an aquarium stocked with valuable animals. They feed on mollusks and other crustaceans, and all the animal garbage of the seashore.

The most common American species (*Pagurus longicarpus*) is an interesting object to every visitor of the seashore, and may be found in abundance wherever little pools are left by the tide on a rocky or shelving coast, from Massachusetts Bay to South Carolina.

This species never reaches a large size, and is usually under an inch in length. It is very gregarious, and large numbers are usually found together. A closely related larger species is *Eupagurus pollicaris*, which is found in shallow water from Massachusetts to Florida, inhabiting the shells of Natica and other gastropods. The common European species, *Eupagurus Bernhardus*, is also found in somewhat deeper water off the northeastern coast of America. In the tropics some interesting forms occur, including one or two of large size. One of the most interesting is the Diogenes crab (*Cœnobita Diogenes*), which is several inches long when fully extended. It lives on land, and is found in the driest places, as active as other forms are in the sea. Allied to the hermit crabs are the palm or robber crabs (*Birgus latro*) of the East Indies, which live in holes in the ground at the foot of cocoanut palms, on the fruit of which they feed. They do not carry a shell with them. See LAND-CRAB.

While the shallow-water hermit crabs are symmetrical behind the thorax, in certain deep-sea forms the abdomen is symmetrical, showing that the ancestors of the ordinary hermit crabs were all symmetrical. *Polycheles Agassizii* of the West Indian seas lives in straight tubes of compacted sand, the abdomen being symmetrical. This also is the case with *Xylopagurus rectus*, living in open tubes of wood or bamboo stem. *Tylaspis anomala*, inhabiting the South Pacific at a depth of 2375 fathoms, has a shortened but symmetrical abdomen, with distinct segments and symmetrical legs. Another form (Chœnopagurus) takes refuge in a sheet or blanket formed by the cœnosarc of a colony of polyps. It also is symmetrical. The polyp (Zoanthus) is tucked by the crab under its telson by one end and pulled over its back by the other, and the two animals, crab and polyp, seem incapable of independent existence. (See COMMENSALISM.) Hermit crabs have rarely been found in a fossil state, and then only their claws are found preserved. These have been obtained in the Eocene rocks of Hungary.

Consult: Emerton, *Life on the Seashore* (Salem, 1880); Verrill, *Invertebrates of Vineyard Sound* (Washington, 1874); Arnold, *Sea Beach at Ebb Tide* (New York, 1901); Milne-Edwards et Bouvier, "Description des crustacés de la famille des Pagurieus pendant l'Expedition de la Blake" (*Memoirs Museum of Comparative Zoölogy*, Cambridge, 1893).

HERMITE, ãr'mēt', CHARLES (1822-1901). One of the best-known French mathematicians of the nineteenth century. He was born at Dieuze, Meurthe, and received his early education in the Lycée Louis-le-Grand. He entered the Ecole Polytechnique in 1842, but left at the end of the year, in order to devote his attention exclusively to mathematics. From 1848 to 1876 he was connected with the Ecole Polytechnique in various capacities, and from 1862 to 1873 was maitre de conférences in the Ecole Normale Supérieure. From 1876 until his death he gave his time to the university, where he held the chair of higher algebra (1869-97). He was a member of the Academy of Sciences, and a grand officer of the Legion of Honor (1892). His work was chiefly along the line of theory of functions, in which subject he was for many years the leader in France. His first great work, the one which secured for him his election to the Academy of Sciences, was *Sur la théorie de la transformation des fonctions abéliennes* (*Comptes rendus*, 1855). At about the same time begin his discoveries in the new theory of algebraic forms and in the theory of numbers. His most remarkable memoirs, twenty-six in number, *Sur quelques applications de la théorie des fonctions elliptiques*, appeared in the *Comptes rendus* (1877-82). His memoir, *Sur l'équation du 5ème degré* (1866), may be said to have finally settled the great question of the solubility of the quintic equation to the entire satisfaction of the mathematical world. His memoir *Sur la fonction exponentielle* (1874), in which he proved the incommensurability of e, paved the way for Lindemann's proof (1882) of the incommensurability of π. Hermite was a very prolific writer. A substantially complete list of his memoirs may be found in the *Catalogue of Scientific Papers of the Royal Society of London*, vols. iii. and vii. Besides his memoirs, which contain his most valuable contributions, he published a *Cours d'analyse de l'Ecole Polytechnique* (1873; 2d ed. 1894), and assisted Serret in editing Lacroix's calculus (9th ed., Paris, 1881, 2 vols.). Consult articles by Mittag-Leffler and Picard in *Acta Mathematica*, vols. xxiii., xxiv. (Stockholm, 1901-02).

HERMIT HUMMING-BIRD. A name given to a group of humming-birds which agree in having the beaks much curved, and the edge of the mandibles not serrated. The 'true' hermits are of the genus Phaëthornis, whose sixteen species are found from Mexico to Southern Brazil, mostly in the hot lowlands. The 'sickle-billed' hermits of the genus Eutoxeres have the beak greatly bent downward, sometimes describing a full half-circle. The whole group keep themselves secluded in dense forest, whence the name. See HUMMING-BIRD.

HERMIT KINGDOM. A popular name given to Korea (q.v.).

HERMIT THRUSH. See THRUSH.

HERMOC'RATES (Lat., from Gk. *Ἑρμοκράτης, Hermokratēs*) (c.460-407 B.C.). A Syracusan politician and statesman, son of Hermon. His great work was the union of the Siceliots (424), which made possible Syracuse's success when attacked by the great fleet from Athens (415). He was at the head of the aristocratic party, and was opposed by the demagogue Athenagoras. In B.C. 412 he went with a large Syracusan fleet to join the Spartans off the western coast of Asia Minor. Here he was very successful for a time, but lost the battle of Cyzicus, and for this was removed from command and exiled. He then fought against Carthage, and died in his attempt to reinstate himself in Syracuse. His daughter was married to Dionysius in 405.

HER/MODAC'TYL (from Gk. *ἑρμοδάκτυλος, hermodaktylos*, hermodactyl, from *Ἑρμῆς, Hermēs*, Hermes + *δάκτυλος, daktylos*, finger). The name of a medicine that had a high repute among the later Greek and the Arabian physicians as a remedy for gout and rheumatism. It is mentioned by Alexander of Tralles, who flourished A.D. 560; by Paulus Ægineta, who lived a century later; by Avicenna, Serapion, and others. By some of the old writers it was termed *anima articulorum*, or *the soul of the joints*. It is impossible now to speak with certainty of the nature of hermodactyl. Corms, probably of several species of colchicum, are still sold in Greece and in the East under the name of hermodactyls. Different botanists and pharmacologists have referred the corms to *Colchicum illyricum, Colchicum autumnale, Colchicum variegatum, Colchicum bulbocodiodes*, etc. See COLCHICUM.

HERMOGENES, hĕr-mŏj'ē-nēz (Lat., from Gk. *Ἑρμογένης*). A Greek rhetorician, who flourished about A.D. 170, born at Tarsus. His ability as a lecturer won him the favorable notice of the Emperor Marcus Aurelius, who appointed him a public teacher of oratory when he was only seventeen years of age. Between the ages of eighteen and twenty he published his famous *Rhetoric* (*Τέχνη Ῥητορική*,) which was for centuries regarded as a standard and became the subject of extensive commentaries. At the age of twenty-five his faculties gave way, and he spent the remainder of his life in a state of intellectual impotency. A large part of the *Rhetoric* has survived, and was published by Walz, *Rhetores Græci* (Stuttgart, 1832-36), and by Spengel (Leipzig, 1853-56).

HER/MON. A lofty mountain of Syria, the southern end of the Anti-Lebanon Range, from which it is separated, however, by a deep ravine (Map: Turkey in Asia, B 1). It rises to the height of 9166 feet above the level of the sea. Its crown is divided into three distinct peaks, the western one a little lower than the northern and the southern, which are of the same height. These peaks are always covered with ice and snow, and can be seen as far south as the Sea of Galilee. The lower part of the mountain is clothed with forests and a specially rich vegetation, due to the numerous rivulets caused by the melting snow. Hermon was a sacred mountain, and is therefore encircled with ruins of ancient temples, most of which were consecrated to the Baal-worship. It is often referred to in Hebrew poetry. It is also held by tradition to have been the Mount of Transfiguration. It is now called Jebel-esh-Sheikh ('the mountain of the old man'), or Jebel-eth-Thel ('the snow mountain').

HERMON'THIS (Lat., from Gk. *Ἑρμωνθις*). A city of ancient Egypt on the left bank of the Nile, a little above Thebes. Its Egyptian name was On, and, to distinguish it from other places of the same name, it was called On of the South or On of the god Mont. The local deity was the hawk-headed god Mont (q.v.), and hence the city bore the sacred name of *Per-Mont* (house of Mont), of which the Greek *Hermonthis* is a corruption. It was a very ancient town, but was eclipsed by the rise of its neighbor Thebes. With the decline of Thebes On rose again in importance, and finally, as Hermonthis, became the capital of the district. According to Strabo, Apollo (i.e. Horus) and Zeus (i.e. Mont) were worshiped here, and a sacred bull, called by the Greeks Bacis, was also revered. Of the magnificent buildings which adorned the place in ancient times only scanty ruins now remain. The site is occupied by the modern town of Erment, which contains extensive sugar-refineries.

HERMOP'OLIS, or **HERMUP'OLIS** (Gk. *Ἑρμούπολις*, city of Hermes). The capital of the Greek nomarchy of the Cyclades, situated on the eastern coast of the island of Syra (Map: Greece, F 4). It consists of the old mediæval town and the newer portion constructed since the Revolution of 1821. The town is lighted by gas, and has a number of educational institutions, including two gymnasia and a theatre. The chief industry is ship-building. Commercially Hermopolis is one of the most important cities of Greece, being one of the chief centres in the trade with the Levant, although its commercial importance has somewhat decreased since the rise of Piræus. Hermopolis is the seat of a number of consular agents, of a Greek archbishop and a Roman Catholic bishop. Population, in 1896, 18,760.

HERMOPOLIS, or **HERMU'POLIS MAG'NA**. An ancient city of Middle Egypt, on the left bank of the Nile, between the river and the Bahr-Yûsuf ('Joseph's Canal'), opposite Antinoë, not far south of the site of the modern Bani Nassan (q.v.). The Copts called it Shmûn, and the hieroglyphics Khmunu. The village which is on its site bears the name of Ashmunein. The Greek name Hermopolis is derived from the ibis-formed or ibis-headed local god Thoth or Dhouti, who was identified with the Greek Hermes (q.v.). The city was once very important, but the only remarkable ruin, the portico of a beautiful temple, dating from Ptolemaic times, was destroyed in the middle of the last century. Recently another temple has been discovered there. Another Hermopolis, Hermopolis Parva, is the modern Damanhur in the Delta.

HERMOSILLO, ār'mō-sē'lyō. Capital of the State of Sonora, Mexico, situated on the Rio de Sonora, in a fertile valley 90 miles by rail north from Guaymas (Map: Mexico, C 3). It has a cathedral, a library, and a mint, and is an important trading centre for agricultural products. Population, in 1900, 17,618.

HERNANDEZ DE CÓRDOVA, ār-nān'dāth dā kōr'dō-vä, FRANCISCO. See CÓRDOVA.

HERNANDEZ DE OVIEDO Y VALDES, dā ō'vē-ā'dō ē väl-dās', GONZALO. See OVIEDO Y VALDES.

HERNANI, OU L'HONNEUR CASTILLAN, âr'nä'nē', ōō lō'nēr' kä'stē'yäN' (Fr., Hernani, or Castilian honor). A romantic five-act tragedy in verse, by Victor Hugo. At its first performance in 1830 at the Théâtre Français, the presence of Hugo's partisans in bizarre costumes gave rise to the 'Battle of Hernani,' a series of personal encounters between the adherents of the Classical and the Romantic schools of French playwrights. The play rests on the love of three suitors, Don Carlos, Ruy Gomez, and the bandit Hernani, for Doña Sol. Hernani, on whose head a reward is set, is surprised with Doña Sol by Ruy Gomez, who shelters him from the pursuit of the King on condition that at the blast of a horn Hernani shall give himself up. In the dénouement Hernani is about to wed Doña Sol, when the horn sounds and the lovers kill themselves. The plot is highly improbable and without historical truth, but is redeemed by great richness of imagery and poetic feeling.

HERNDON, hērn'don, WILLIAM HENRY (1818-91). An American lawyer, born in Greensburg, Ky. When he was two years old his parents removed to Illinois. In 1836 he entered Illinois College, but was removed by his father in consequence of the abolition sentiments of the faculty. He studied law, and was admitted to the bar in 1844, when he formed a partnership with Abraham Lincoln, which was dissolved only by the latter's death. In 1855 he was Mayor of Springfield, Ill. In connection with Jesse W. Weik, who assisted in putting into literary form the material he (Herndon) had collected, he published *Herndon's Lincoln: The True Story of a Great Life* (new ed. 1891), which is of especial value for the account it gives of Lincoln's early life and personal habits.

HERNE. A town of Westphalia, Prussia, Germany, 11 miles northeast of Essen by rail. It is the centre of great industrial activity, with coal-mines and manufactures of machinery and gunpowder. It was incorporated in 1897. Population, in 1900, 27,863.

HERNE, JAMES A. (1840-1901). An American actor and playwright. He was born in Troy, N. Y., where after a brief experience 'on the road' he made his appearance, in 1859, with a stock company in *Uncle Tom's Cabin.* Afterwards he played in Baltimore and Washington, and then went to California. He had become a popular actor, both East and West, before he produced his first play, *Hearts of Oak*, in 1878. This was very successful, but his subsequent productions, such as *Drifting Apart* and *Margaret Fleming*, were less fortunate, till in the season of 1892-93 his *Shore Acres* at the Boston Museum made its author famous. It is a rural comedy in which he, as 'Uncle Nat' Berry, presented a character full of honest humor and touching pathos, and the play kept the boards almost without a break for six years. In 1899 he produced *The Rev. Griffith Davenport*, and the following year *Sag Harbor.* Consult Strang, *Famous Actors of the Day in America* (Boston, 1900).

HERNE THE HUNTER. A character in popular tradition, who, it was believed, walked at midnight by an ancient oak in Windsor Forest. In Shakespeare's *Merry Wives of Windsor* (iv., 4), he is described as a spirit, with huge horns on his head, who disturbs the revels of the fairies. He also plays a part in Harrison Ainsworth's romance entitled *Windsor Castle.* Herne's oak, said to have been 650 years old, was blown down in 1863. A young oak was planted on the spot by Queen Victoria.

HERNIA (Lat., rupture). A protrusion, through an abnormal or accidental opening, of any organ from its natural cavity. Although hernia may occur in many parts of the body, the word is usually restricted to signify protrusion of the abdominal viscera. The abdominal viscera are subject to violent pressure from the diaphragm and the muscles of the abdomen. This pressure forces them outward and downward against the walls of the belly; and if at any point these walls are not sufficiently strong to resist this pressure, some portion of the viscera is driven through them, and a hernial tumor is formed. Certain parts of the abdominal walls, especially the inguinal and crural rings, and the umbilicus, being weaker than others, hernia most frequently occurs at these points. In some instances hernia is congenital, as from abnormal deficiency of the walls; in other cases it may arise at any period of life as a result of violent bodily exertion, such as straining in lifting, jumping, etc. Sex, age, and occupation seem to have a marked influence on predisposition to hernia. Men are far more liable (in about the proportion of four to one) to this disease than women, though they are less so to those forms of the affection known as femoral and umbilical hernia.

A hernia is almost always composed of a sac and its contents. The sac is a portion of the peritoneum (q.v.) corresponding to the aperture at which the hernia protrudes. It is pushed forward by the protruding viscus, and forms a pouch. The contents vary greatly, but generally consist of a portion of the small intestine (particularly of the ileum), forming the variety of hernia known as *enterocele.* Omentum is often found in hernial sacs, together with intestine. Besides the viscera, the sac always contains a certain quantity of fluid secreted by its interior. Hernia is divisible (1) into reducible, or returnable into the abdomen, irreducible, and strangulated; and (2) according to its situation, into inguinal, crural, femoral, umbilical, etc. The treatment of *reducible hernia* may be palliative or radical. The palliative treatment consists in the application of a truss (q.v.) to retain the protrusion within the cavity of the abdomen. Each particular kind of hernia requires its special form of truss; and before applying it, the hernia must be reduced by placing the patient on his back, relaxing the muscles by bending the thigh upon the abdomen, and pressing the tumor back in the proper direction. The truss should then be put on, and should be worn during the day. The means that have been contrived to effect a radical cure are too purely surgical for description in these pages. Below the age of puberty, and if the hernia is recent, a radical cure is sometimes effected by wearing the truss for two or three years. In *irreducible hernia* the protruded viscera cannot be returned into the abdomen, but there is no impediment to the passage of their contents or to their circulation. In these cases the patient is often liable to dragging pains in the abdomen and to attacks of vomiting. The treatment consists in avoidance of violent exercise and of constipation, and in wearing a support for the protection of the tumor. Hernia

is said to be *strangulated* when a portion of intestine or omentum that is protruded is so tightly constricted that it not only cannot be returned into the abdomen, but has its circulation arrested. This form is highly dangerous, because, if relief is not speedily afforded, the strangulated part becomes gangrenous. The causes of strangulation are various, but the condition most commonly arises from a sudden violent effort, by which a fresh portion of intestine is driven into a pre-existing hernia, which it distends to such a degree as to produce this complication. The most prominent early symptoms are flatulence, colicky pains, etc. They are succeeded by vomiting first of the contents of the stomach, then of mucus and bile, and lastly of fæcal matters, owing to inverted peristaltic action. If relief is not obtained, the inflammation that commences in the sac extends to the peritoneum, and the ordinary signs of peritonitis appear. After a variable time comes gangrene or mortification of the part, and the patient speedily sinks. When reduction is impossible, prompt surgical intervention is necessary. The hernia is cut down upon and freed from constricting bands with the knife. Where gangrene has set in in the intestine the diseased portion must be cut away and the ends of the intestine reunited.

HERNICI, ĕr-nē'chē. An old Italian people of Latium. Of Sabine connection, they dwelt in the Appenines between the Trerus and Lake Fucinus. They held out long against the Romans, with whom they at length formed an equal alliance in B.C. 486, but to whom they had to yield in B.C. 306. They received in B.C. 241 the rights of Roman citizens. To the north were the Marsi and the Æqui, while the Volsci were on the south. Their capital was Anagnia.

HERNÖSAND, hĕr'nĕ-sånd. The capital of the Län of Wester Norrland, Sweden, situated on the island of Hernö, in the Gulf of Bothnia, about two miles south of the mouth of the Angerman River (Map: Sweden, H 5). It is connected by bridges with the mainland. It has a school of navigation and other educational institutions. Its harbor is good, and it has regular steamship communication with the other coast towns. It was founded in 1584 by John III., became a bishop's see in 1772, and capital of the län in 1778. Population, in 1901, 7890.

HE'RO (Lat., from Gk. Ἡρώ). A priestess of Aphrodite at Sestos. At a festival of Aphrodite she was seen and loved by Leander, a youth of Abydos. She returned his love, and received him in her tower on the Hellespont, which he swam nightly, being guided by her lamp. Venturing the passage on a stormy night, he was drowned and the body washed ashore at the tower, whence Hero at once cast herself that she might be united with her lover in death. The story developed in the romantic poetry of the Alexandrian period, and has come down to us in a work of Musæus and in Ovid. It is represented on some late works of art and on Roman coins of Abydos and Sestos. It is also the subject of poems by Marlowe and Schiller, and a drama, *Des Meeres und der Liebe Wellen*, by Grillparzer.

HERO. A Greek mathematician and physicist. See HERO OF ALEXANDRIA.

HERO. The quiet daughter of Leonato and cousin of the gay Beatrice in Shakespeare's *Much Ado About Nothing*. Don John causes her waiting woman to impersonate her in a moonlight interview with him, and thus causes her lover to reject her at the altar, but on the discovery of the deception the marriage is carried out. The story of the slander to which she is subjected is generally omitted in modern productions.

HERO, or HERON, OF ALEXAN'DRIA. The leading Greek mathematician and physicist of his time. Not only are the dates of his birth and death unknown, but there is great uncertainty as to the century in which he lived. The most recent investigation of the evidence, by Schmidt (1899, work cited below, Bd. 1, p. ix.), leads to the conclusion that he may have lived in the first century A.D., but other writers, who, it must be said, have not considered the question so fully, have usually placed him in the first or even the second century B.C. There is much confusion concerning the works of Hero of Alexandria, there having been no less than eighteen Greek writers of this name. It is, however, fairly certain that he wrote at least thirteen books on mathematics and physics. He seems to have been an Egyptian, and it is certain that his style is not that of a Greek. He contributed little to pure mathematics, his chief work on this subject being the extension of the ancient mathematics so as to allow the consideration of the fourth power of lines. Thus, in his geodesy, γεωδαισία, contained in his Μετρικά, upon which subject he was the only Greek writer, he gives the well-known formula for finding the area of a triangle with sides, a, b, c, and semiperimeter s, $\sqrt{s(s-a)(s-b)(s-c)}$ a formula known by his name. (The proof is given, possibly an interpolation, in his Περὶ διόπτρας.) He seems also to have had some idea of trigonometry, and in his geometry is to be found the first definite use of a trigonometric formula. He asserts in substance, using modern symbols, that if A represents the area of a regular n-gon of side s, and if c be the numerical coefficient by which s^2 must be multiplied to produce A, i.e. so that $A = cs^2$ then must $c = \frac{n}{4} \cot \frac{180^\circ}{n}$. He proceeds to compute c for the values $n = 3, 4, \ldots 12$, with considerable accuracy, but his method is unknown. He could also solve the complete quadratic equation $ax^2 + bx = c$, where a, b, c, are positive, but not the general form. Hero is credited with a number of mechanical inventions, including a contrivance for utilizing the force of steam and a fountain which bears his name. Consult: Martin, "Recherches sur la vie et les ouvrages d'Heron d'Alexandrie," in vol. iv. of *Mémoires présentées par divers savants à l'Académie d'Inscriptions* (Série I., Paris, 1854); Hultsch, *Heronis Alexandrini Geometricorum et Stereometricorum Reliquiæ* (Berlin, 1864); Schmidt, *Heronis Alexandrini Opera quæ Supersunt Omnia* (Leipzig, 1899—).

HEROD, hĕr'od (Gk. Ἡρῴδης, *Hērōdēs*). The family name of a group of rulers in Palestine, derived from that of its most famous member, Herod the Great. The family had its origin in Antipater, an Idumean of honorable stock, whom Alexander Jannæus (B.C. 104-78) made governor of Idumea. The fact that the Idumeans had been subjugated to John Hyrcanus in B.C. 128, and compelled to embrace Judaism, is the only basis for the claim that the members of the

Herodian line were Jews. In his power and influence, and apparently in his official position in Idumea, Antipater was succeeded by his son of the same name (q.v.). The latter, with the sagacity which had become characteristic of the family, made the declining fortunes of the Asmonean rule and the rising fortunes of Rome serve his political interests until the real control of the country of the Jews rested in his hand—a control which he strengthened by appointing his two sons Phasael and Herod governors, respectively in Jerusalem and in Galilee. (1) HEROD THE GREAT. Son of Antipater and Cypros, an Arabian woman; reigned from B.C. 37 to 4. Upon the assassination of Antipater (B.C. 43) there followed a period of intrigue and warfare on the part of the Asmonean Antigonus and the Parthians against the Herodian rule, which resulted in the death of Phasael and the escape of Herod to Rome. There in B.C. 39 he was made King of Judea by Antony, Octavius, and the Senate. It was not, however, until B.C. 37 that he succeeded in putting down the forces opposing him. The first years of his reign (B.C. 37-25) were troublous, owing to the hostility of the Sadducean and Pharisaic parties, and the enmity of the surviving members of the Asmonean house, who secured an ally in Cleopatra of Egypt. Herod ultimately prevailed, partly through murder and confiscation of property, partly through political cleverness and trickery, but mainly through the fall of Antony and Cleopatra before the forces of Octavius. The following years (B.C. 25-13) were prosperous. Herod was free to rule and to indulge his passion for building, the results of which showed themselves in the rehabilitation of such places as Strato's Fortress, and such cities as Samaria, Capharsaba, and Anthedon, renamed by him respectively Cæsarea (q.v.), Sebaste, Antipatris, and Agrippæum. At Jerusalem, Jericho, and Cæsarea he erected theatres, amphitheatres, and hippodromes for the Grecian games established in honor of Augustus. He rebuilt the temple in Jerusalem with the most lavish expenditure of wealth and careful regard for the religious scruples of the people. This munificence was extended even beyond his domains to cities in Syria, Asia Minor, and Greece. Herod also gratified his Hellenizing tastes by inviting and attaching to his Court Greek writers and teachers. With all this he was loyal to the people over whom he ruled, not only bestowing upon them substantial benefits at home, but securing for them large favors in some parts of the Diaspora and significant privileges from Rome. The last years of his reign (B.C. 13-4) were full of misery, occasioned by the ceaseless and complicated political intrigues within his household, which rendered him morbidly suspicious and inflamed his murderous passions to the worst. It was shortly before his death that Jesus was born. On his last visit to Rome Herod obtained consent of Augustus to dispose of his kingdom as he saw fit. A few hours before his death he made a will, in which he gave Judea, including Samaria and Idumea, to Archelaus, with the title of king; Galilee and Perea to Antipas, with the title of tetrarch; and Gaulanitis, Auranitis, Trachonitis, Batanea, and Panias to Philip, with the title of tetrarch. This will was practically confirmed by Augustus, and in spite of disturbances and disorders on the part of the people, who desired to be rid of the Herodian yoke, was ultimately put into effect.—(2) ARCHELAUS, ethnarch of Judea, Idumea, and Samaria. Son of Herod the Great and Malthace, a Samarian woman; ruled from B.C. 4 to A.D. 6. Though given title of king by his father's will, Augustus withheld this from him, substituting that of ethnarch. He was the worst of Herod's surviving sons. Of his reign we have no details; but Josephus describes it as violent and tyrannical. After nine years the Jews made such complaints against Archelaus that Augustus banished him to Vienne in Gaul. This accords with the statement of Matthew ii. 22, that Joseph on his return from Egypt with Mary and the Child Jesus, "When he heard that Archelaus was reigning over Judea in the room of his father Herod, was afraid to go thither, and . . . withdrew into the parts of Galilee."—(3) ANTIPAS (Herod Antipas), tetrarch of Galilee. Son of Herod the Great and the Samaritan Malthace, younger brother of Archelaus; ruled from B.C. 4 to A.D. 37. Though not much is known of his rule, he seems to have been able to govern his country and to have possessed the family passion for building. In Galilee he remade Sepphoris, afterwards called Dio-Cæsarea, and in Perea, Betharamptha, which he named Livias after the wife of Augustus, and in addition reared the magnificent capital which he named Tiberias, for the reigning Emperor. He seems to have had his father's craftiness, though he apparently lacked his diplomacy, as he certainly did his ability in war. The discarding of his first wife, daughter of the Arabian King Aretas, for Herodias, wife of his half-brother Herod Philip (Mark vi. 17; Matt. xiv. 3), not the tetrach Philip, brought on a war with Aretas in which Antipas was routed. Later, through the persuasion of Herodias, he went to Rome and demanded of Caligula that he be favored, as Agrippa I. had just been, with the title of king. He was confronted, however, by charges from Agrippa himself, was deposed, and banished by the Emperor to Lugdunum (Lyons) in Gaul. This Antipas is the 'Herod' most frequently mentioned in the New Testament (Matt. xiv. 1; Luke iii. 1; xiii. 31; Acts xiii. 1 et al.). It was he who imprisoned and beheaded John the Baptist (Mark vi. 14-29), and to whom Jesus was sent by Pilate (Luke xxiii. 7-15).—(4) PHILIP. Son of Herod the Great and Cleopatra, a woman of Jerusalem; ruled from B.C. 4 to A.D. 34. The country over which he ruled was north and east of the Sea of Galilee, consequently outside of strictly Jewish territory and inhabited by a predominantly non-Jewish population. It was owing to this fact that Philip was able to carry out a Hellenizing and Roman policy among his people. He had the family passion for building, and founded on the site of Paneas a city which he named Cæsarea, known as Cæsarea Philippi (q.v.), to distinguish it from the larger city on the coast. He also rebuilt Bethsaida, which he called Julias, in honor of the daughter of Augustus. Of his rule nothing is known beyond what may be inferred from Josephus's characterization of the man, as "a person of moderation and quietness" in the conduct of his life and government. He seems to have possessed none of the Herodian ambition, cruelty, or lust. He was married to Salome, the daughter of Herodias, and died without issue.—(5) AGRIPPA (Herod Agrippa). Son of Aristobulus, Herod the Great's son by Mariamne, granddaughter of Hyrcanus, and Bernice, daughter of Salome,

Herod's sister, and Castobar; ruled from A.D. 37 to 44. His earlier years were spent in Rome, where he fell into spendthrift habits that finally compelled his retirement to Palestine. In the last years of Tiberius's reign he returned to Rome, and succeeded in securing the appointment by the Emperor to the care of his grandson. He had been friendly with Caligula in his early life, and shortly after the latter's accession received from him the tetrarchies of Philip and Lysanias (viz. Abilene) with the title of king, while the Senate added the honorary rank of prætor. In A.D. 40 he obtained the fortified tetrarchy of Antipas; and in the next year, when Claudius came to the throne, he was given by the Emperor, along with the honor of the consular rank, the additional territory of Judea and Samaria, thus finally securing the whole region over which his grandfather had ruled. The next three years constitute the real period of his rule. For the sake of peace he followed a pro-Jewish policy, which showed itself in a personal piety of almost Pharisaic legalism and an official furtherance of the interests of the Jews, which brought them to regard him as a brother and alienated from him the regard of the Roman element in his population and of the Roman troops in his domains. This Jewish favoritism, no doubt, was the cause of his persecution of the Christians (Acts xii. 1-19). The account of his death given by Josephus (*Antiq.* xviii. 6, 7) is in substantial agreement with that in Acts xii. 20-23.—(6) AGRIPPA II. (Herod Agrippa). Son of Agrippa I. and Cypros; ruled from A.D. 50 to about 100. Because of his extreme youth at the time of his father's death, Claudius was persuaded not to give him the succession. The whole of Palestine thus passed under direct Roman rule. In A.D. 50, however, two years after the death of his uncle Herod of Chalcis, he received the kingdom which had thus been vacated. This he surrendered in A.D. 53, receiving in return the former tetrarchy of Philip, together with that of Lysanias and the domains of Varus. In A.D. 56 Nero added to this the cities of Tiberias and Julias in Galilee and Tarichea in Perea, with surrounding lands and villages. Like all his family, he gave himself to building, improving his capital, Cæsarea Philippi, which he renamed Neronias, and architecturally adorning Berytus (Beirut) in Phœnicia. Unlike his father, he gave no special care to the interests of the Jews—manifesting, in fact, a general indifference to the religious questions of his time, though it was in his rule that the Temple at Jerusalem was finished. He tried to combine Hellenism and Judaism, and placed the effigies of the emperors on his coins. He strove to dissuade the Jews from their war with Rome, and manifested his loyalty to the Emperor even after his Galilean cities had deserted him. In return for this, after the war his territory was extended northward, while in A.D. 75 he had conferred upon him the prætorian rank. He left no children; in fact, it is doubtful whether he ever married. As far as record can be obtained, he died in the third year of Trajan's reign, A.D. 100. His rule was a feeble one. It was before this Agrippa and his sister Bernice that Paul was brought by Festus in Cæsarea, on the eve of his deportation to Rome, as narrated in Acts xxv. 13-xxvi. 32.

HEROD AGRIPPA. See HEROD.

HERO'DAS. See HERONDAS.

HERO'DES ATTICUS. See ATTICUS HERODES.

HERO'DIAN (Gk. Ἡρωδιανός, *Hērōdianos*). A Greek historian of the third century A.D. He was a Syrian by birth, but held office under the Roman Government, so that he writes with a practical knowledge of the events which he describes. His history covers the years A.D. 180-238, i.e. from the death of Marcus Aurelius to the accession of Gordianus III. The work was highly valued by later historians, especially the Scriptores Historiæ Augustæ and Johannes Antiochenus, who take long passages from it, and try to imitate its style. The history was first made known to the Western world in the translation of Politianus (1493). The first critical edition was published by Bekker (1826); the best is that of Mendelssohn (Leipzig, 1883). There is an English translation by Hart (London, 1749). Consult Peter, *Die geschichtliche Litteratur über die römische Kaiserzeit*, ii. (Leipzig, 1897).

HERO'DIANS (Gk. Ἡρωδιανοί, *Hērōdianoi*, adherents of Herod, from Ἡρῴδης, *Hērōdēs*, Herod). A party among the Jews, twice mentioned in the New Testament, and both times in connection with the Pharisees: (1) Mark iii. 6, on the occasion of Jesus' healing of the man with the withered hand in the Capernaum synagogue; (2) Mark xii. 13 (cf. Matt. xxii. 16), on the occasion of placing before Jesus the question about tribute to Cæsar. They were evidently not a religious sect, as the Pharisees and the Sadducees; nor the mere Court and family followers of the Herods, but rather a political party, whose object was the reëstablishment of the Herodian kingdom in the spirit of its traditional policy—the union of Judaism with Hellenism. (See HEROD.) Their connection with the Pharisees, consequently, was not due to any sympathy of ideas with them, but to the instinctive conviction that in the spiritual mission of Jesus lay a danger common to them both. They were not necessarily pro-Roman in their feelings; though, in the nature of things, they would be more kindly disposed to the spirit of the pagan government than to that of the old theocracy, as represented by the Pharisees, or of the new Messianism involved in the religion of Jesus. It is probable that they had more in common with the religiously indifferent Sadducees than with any other Jewish party. Upon such a supposition there may be some bearing in the significant interchange of 'Sadducees' and 'Herod' in Jesus' warnings to His disciples as given in the parallels, Mark viii. 15 and Matt. xvi. 6.

HERODIA'NUS, ÆLIUS. A Greek grammarian of the second half of the second century A.D., son of Apollonius Dyscolus. He was born at Alexandria, but afterwards removed to Rome, and there gained the favor of the Emperor Marcus Aurelius, to whom he dedicated his chief work, Καθολικὴ Προσῳδία, called also Μεγάλη Προσῳδία, a treatise on prosody, syntax, and etymology, in about twenty books. Though he is highly praised by later grammarians, including Priscian, who calls him *maximus auctor artis grammaticæ*, only his treatise on monosyllabic words, Περὶ Μονήρους Λέξεως, has been preserved complete. Fragments, however, have been preserved in the citations of other grammarians, and have been edited by Lentz in his *Herodiani Technici Reliquiæ* (3 vols., Leipzig, 1876). Consult: Lehrs, *Herodiani Scripta Tria* (Königs-

berg, 1848); Hilgard, *Excerpta ex Libris Herodiani* (Leipzig, 1887); and Stephen, *De Herodiani Technici Dialectologia* (Strassburg, 1889).

HERO'DIAS. Daughter of Aristobulus (second son of Herod the Great and Mariamne, granddaughter of Hyrcanus) and Bernice, daughter of Salome, Herod's sister. She was twice married, first to her half-uncle, Herod, called in the Gospels Philip (Mark vi. 17; Matt. xiv. 3), the issue of which marriage was a daughter, Salome, who afterwards became the wife of Philip, another half-uncle of her mother. Doubtless, through the real attachment of love, Herodias left her husband for his half-brother, Antipas—a marriage which, because of its illegality according to the Mosaic law, brought upon the latter the outspoken denunciation of John the Baptist, and so led to that prophet's imprisonment and final execution (Mark vi. 17-29; Matt. xiv. 3-12). It was quite possibly the daughter of this second marriage, bearing her mother's name, who danced before Antipas on the occasion of the festival and allured him to the reckless oath that gave Herodias opportunity to accomplish the death of John. The better reading of Mark vi. 22, "his daughter Herodias," is too plain to be otherwise interpreted; while the term by which she is described, "a little maid," would scarcely apply to a girl as old as Salome must have been at that time. It was Herodias's ambition that led her to urge Antipas to his fatal journey to Rome for the securing of the royal title, though her loyal affection for him made her share his exile. See HEROD.

HERODO'TUS (Lat., from Gk. Ἡρόδοτος) (c.484-c.424 B.C.). A Greek historian. He was the son of Lyxes and Rhœo or Dryo, and was born about 484 B.C. at Halicarnassus, an originally Doric colony in Southwestern Asia Minor, at that time ruled by a Queen Artemisia under the sway of the Persians. His uncle, Panyasis, was an epic poet; and it was perhaps through him that Herodotus acquired the comprehensive acquaintance with early Greek literature, especially poetry, which is so conspicuous in his writings. His family was a prominent one, and the uncle was put to death about the year 457 for conspiring against the tyrant Lygdamis. Herodotus went into exile, and is said to have made his temporary home in the island of Samos, an ally of Athens and member of the Confederacy of Delos or the Athenian Empire. Between the years 467 and 464 he is believed to have traveled extensively on the shores of the Black Sea, in Thrace, Scythia, Asia Minor, and the Persian Empire, including Egypt. The precise extent, direction, and starting-points of his travels are matters of inference from his writings and of controversy among scholars. He saw in Egypt the skulls lying on the field of a battle fought in 460. He visited Scythia before the year 454. His travels in Greece, and possibly in Southern Italy, fall much later. Halicarnassus having risen against Lygdamis and joined the Athenian Empire, Herodotus, according to one tradition a leader in the uprising, returned and resumed his citizenship. He was, however, soon attracted to Athens, then, about 447, at the height of the age of Pericles, the centre and focus of Hellenic culture. There, or, as a fanciful later tradition has it, at Olympia, he gave 'author's readings' from his unfinished histories, and won the admiration of the greatest minds of Greece, the personal friendship of the poet Sophocles, and, so the story goes, the more substantial reward of ten talents voted by the people. A well-invented story relates that the boy Thucydides, present at one of these readings, burst into tears from stress of emulous emotion, and that the historian complimented the boy's father on this indication of a generous nature. In the year 444 Herodotus, with many other brilliant men, joined the colony which Pericles was founding at Thurii in Southern Italy. His subsequent life is a blank. It was probably devoted to the completion and the final publication of his history. An allusion to the Propylæa, or entrance to the Acropolis, is supposed to prove that he visited Athens so late as 430. Nothing in his histories implies that he survived the year 424. Tradition placed his tomb at Thurii.

Herodotus was called the father of history by Cicero. This means, if anything, that he was the first to compose an artistic and dramatically unified history, although there were historians before him, the so-called logographers, or story-tellers, who continued in prose the work of the garrulous later epic. (See LOGOGRAPHER.) The only one explicitly named by Herodotus is Hecatæus of Miletus, who traveled in Egypt, is mentioned as a prominent adviser of the Ionians during the Ionic revolt, and is thought by some critics to have been the source of much matter that Herodotus gives out as his own. But Herodotus was the first to grasp firmly a great central international theme, and to work up, in due and artistic subordination to it, a vast mass of legendary, local, antiquarian, geographical, and ethnological lore, derived partly from predecessors, but widely supplemented by his own travels and *inquiry* (the original meaning of *history*). This theme was the invasion of Greece by Xerxes, of which his boyhood had perhaps caught the last echoes in the tales told by his townsfolk of the wondrous exploits of Artemisia at Salamis. He apprehended it as the culmination of the eternal conflict between the East and the West which he conceived as beginning with the Trojan War, and of which we have not yet seen the end. It shaped itself to his imagination in a large, dramatic, and religiously edifying way. Its prologue is the evolution of the free States of Greece, and, in antithesis to them, the history and panorama of the barbarian world of ancient monarchies and outlying peoples. Its dramatic culmination is the overthrow of the myriads of Xerxes by the few thousand Greeks at Salamis, Platæa, and Mycale. Its moral is the lesson of the nemesis that waits upon Hybris—upon the insolence of those who, drunk with power, forget the limits of mortality. "For God abases the mighty ones of earth, and suffers none to think proud thoughts save Himself." There are many theories (none of them verifiable) of the order of composition of the different parts of the history, of the digressions, in which it abounds, and of the retouches by which its allusions were brought down to date. But in the final result the general design is so clear both to Herodotus and to the reader, that, despite the bewildering prodigality of anecdote, digression, retrospect, and description, we never lose our sense of a majestic architectural unity, or fail to feel that we are progressing steadily toward a predetermined goal. The nine books named after the muses, into which later grammarians aptly divided the work, fall into natural groups of symmetry or antithesis

when viewed in connection with the whole. The first three books deal with centuries of time, and the vast barbarian world: (1) The overthrow of the Lydian kingdom of Crœsus, and, in retrospect, the establishment of the Persian monarchy as the heir of the immemorial empires of the East. (2) Egypt in retrospect and description in connection with the Persian Conquest. (3) The consolidation of the Persian Empire under Cambyses and Darius. The last three books are concerned with ten, or, more strictly, three years of conflict on Greek soil, books vii., viii., and ix. being marked respectively by the battles of Thermopylæ, Salamis, and Platæa. The three intervening books at once link and divide the extremes, and trace the progress of Persia and the interlacing of Greek and Persian interests to the point where the struggle became inevitable. (4) The campaigns of Persia, in Scythia and Libya, with vast geographical and ethnological digressions. (5) The subjugation of the north coast of the Ægean—Thrace and Macedon. The beginnings of revolt among the Ionic cities, with anecdotal digressions on Athens and Sparta that prepare us for the rôle to be assumed by those cities. (6) The revolt of the Ionians aided by Athens and Eretria; its suppression; the avenging mission of Mardonius against Eretria and Athens; his defeat at Marathon.

Herodotus, though an artistic, is not a critical historian. A critical history was possible in that age only to a Thucydides describing on the testimony of documents and eye-witnesses a contemporary war between Greeks. The Greeks of the generation of the Persian Wars were too busy making history to write it, and the tradition of the great struggle was already transfigured by legend and local patriotism when he took it up. Nor could he deal scientifically with the dim legends and inextricably crossed traditions of the East which he gathered on the frontiers of the Greek and barbarian worlds. Fortunately, he did not make the attempt. Ignorant of the languages, unable to decipher the records, if he had applied to the tales told him by dragomans, minor priests, commercial travelers, and Greek mercenaries either his own standards of credibility or ours, he would have deprived us not only of many a delightful story, but of much invaluable information. "It is my business to relate what is told me," he declares, "but I am under no obligation to believe it." He does not believe that the Phœnicians got the noonday sun on their right hand in circumnavigating Africa—but he tells us the story. And, wasting no time on vain critical discussions or pretentious philosophies of history, he contrives to tell us more fascinating stories and interesting facts to the page than any other writer in the world. In view of this and his evident good faith, genial simplicity, and earnest piety, we may disregard the critics who impugn his honesty because his account of a crocodile would amuse a naturalist, and his description of Babylon would not satisfy a Baedeker.

The charm of his seemingly simple, artfully artless, naïve, Ionic style has been celebrated by all critics, ancient and modern. Andrew Lang's entertaining parody in his *Letters to Dead Authors*, gives, by exaggeration, a good idea of it to the English reader. Macaulay's essay "On History" contains a picturesque rhetorical characterization.

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HEROES, hē'rōz (Lat. *heros*, from Gk. ἥρως, connected with Lat. *servare*, Skt. *sar*, Av. *har*, to protect). In the older portions of the Homeric poems the heroes are warriors; in the *Odyssey* the word has extended its meaning, and denotes any distinguished character of the stories of the past. In the later time a third meaning prevails, and the 'heroes' are the semi-divine objects of worship. To such heroes the later noble families, or even whole communities, traced their origin, and it seems probable that the original use of the word was to denote the souls of the blessed ancestors. These 'heroes' were commonly regarded as sprung from the union of a god and a mortal. Their cult ritual was like that of the gods, but naturally had closest resemblance to that of the chthonic divinities. Their worship was widespread, and it seems very clear that in the large majority of cases those worshiped in historic times as heroes were originally gods, who had been superseded by the growth of the great personal gods. It was natural that eminent men, who had seemed to possess somewhat of the divine essence, should receive reverence as supernatural beings after death. Such are the cases of Brasidas, Themistocles, and in later times some of the founders of philosophical schools, as Epicurus. From this it seems to have been easy to worship the living, as in the case of Alexander and some of his successors, who were honored as 'savior gods' (*θεοὶ σωτῆρες*). In Thrace the conception of the heroized dead as heavenly horsemen is common, but the word 'hero' has become the name of a mighty god, to whom dedications are frequent. For the best brief account of the growth and character of the hero-worship in Greece, consult: Usener, *Götternamen* (Bonn, 1896); more elaborate, but in their discussion less satisfactory, Rohde, *Psyche* (2d ed., Freiburg, 1898); Deneken, in Roscher, *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1886-90), with full collection of authorities; and Furtwängler, *Sammlung Sabouroff*, vol. i. (Berlin, 1883).

HEROIDES, hē-rō'i-dēz. An early work of Ovid, a collection of twenty fictitious love-letters sent by noble women of the olden time to their estranged husbands or lovers. The theme in all is the same, but their romantic nature and dramatic setting have placed them among the most popular of Ovid's works. The last six

of the epistles are believed to be the work of imitators.

HER'OIN. A derivative of morphine. It is a white, crystalline, neutral, slightly bitter powder. It is only slightly soluble in water, but freely so when a dilute acid is added. The use of the drug in medicine practically dates from 1898, and there is still a diversity of opinion as to its action and value. Its analgesic effect is inferior to that of morphine or codeine, but it may be used as a substitute when these are not well tolerated. It seems to be chiefly of value in allaying cough. For the relief of dyspnœa it is sometimes effectual, having given good results in cases due to asthma, cardiac dilatation, aneurism of the aorta, and uræmia. It has been claimed that heroin is to the respiratory system what digitalis is to the heart. The dose should always be small, and it should be used with the same caution as other derivatives of opium. A single dose of two and one-half grains has been followed by great exhaustion, trembling, diminished temperature, a thready pulse of 140, contraction of the pupil, and impaired vision. Recovery followed the administration of caffeine.

HÉROLD, ā'rō', Louis Joseph Ferdinand (1791-1833). A French dramatic composer, born in Paris. Although his father was a musician, he discouraged his son's musical ambitions, and it was only after his father's death (1802) that the boy was able to follow his natural bent. In 1806 he entered the Paris Conservatory, winning first prize for piano-playing in 1810, and the Prix de Rome in 1812 with his cantata *Mlle. de la Vallière*. After studying in Rome for three years he went to Naples, producing there, in 1815, his first opera, *La gioventù di Enrico Quinto*. His next three or four operas, given in Paris, were successful, but, owing to poor libretti, were followed by a series of failures which for a time discouraged the composer. In 1828 Hérold was elected a member of the Legion of Honor. His best works, *Marie* (1826), *Zampa* (1831), and *Le pré aux clercs* (1832), are compositions of genuine merit, and still hold the boards in France and Germany. Consult Jouvin, *Hérold, sa vie et ses œuvres* (Paris, 1868).

HERON (OF. *hairon, heron*, Fr. *héron*, Prov. *aigron*, heron, from OHG. *heigir*, heron, AS. *higora;* connected with AS. *heagra*, OS. *hreiera*, MHG. *reiger*, Ger. *Reiher*, heron, Skt. *krakana, krakara*, partridge, and Lat. *crocire*, Gk. κρίζειν *krizein*, to screech, Goth. *hrops*, cry, OHG. *hruom, ruom*, Ger. *Ruhm*, fame, AS. *hroc*, Eng. *rook*). A bird of the genus Ardea (and allied genera), of the family Ardeidæ and suborder Herodii. This family includes also bitterns and night-herons. In it the bill is long, compressed, and sharp; the tail short, the legs and the toes long and slender, the wings long. Those peculiar patches of soft, oily feathers called 'powder-down' tracts are always present—three pairs in the true herons, one on the breast, one on the rump, and one under the thighs. In the herons—in which genus are included the species commonly designated egrets (q.v.), which differ only in unimportant particulars of plumage—the bill is slender but strong, forming a compressed and lengthened cone; the plumage is beautiful, but seldom exhibits very gay colors, white, brown, black, and slate-color, finely blended, being generally predominant. Although the sexes usually are alike in color, few birds show greater variety of plumage than the herons, for the breeding plumage is much finer than that of the remainder of the year, and the young are usually very different from the adults. Furthermore, a number of species are dichromatic; that is, some specimens show one type of coloration and other specimens another type, absolutely without regard to age, season, or sex. (See Dichromatism.) In the herons, one of the color phases is generally pure white; the other phase is more or less colored, and is always remarkably different. (For the use of the plumage of certain herons as an ornament of costume and in millinery, which has led to their extinction in some regions, see Aigret.) The body is small in proportion to the length of the neck and limbs; the neck is long, and, except in flight, is usually held curved. In flight the heron carries the neck, head, and long bill in a straight line before the body, and the long legs in like manner stretched out behind. Herons feed mostly on fish, frogs, and other aquatic animals, and may be seen, particularly very early in the morning and late in the evening, standing patiently motionless in some shallow water, at the margin of a lake or stream, or on the seashore, waiting till prey come within reach. In default of their ordinary food, however, herons sometimes prey on young birds, reptiles, and the smaller mammalia. They usually go forth singly in quest of prey, but are mostly gregarious in their nidification. The nests are usually built in trees, of coarse sticks with little lining. The eggs are three or four, in color blue or bluish green, without spots. See Colored Plate of Eggs of Water and Game Birds.

Herons are widely distributed over the globe, but are especially abundant in the tropics and warm temperate zones. Some seventy-five species are known, of which about a dozen occur in the United States.

The great blue heron (*Ardea herodias*) is about four feet in length from the point of the bill to the end of the tail, and nearly six feet across the wings. It is of a delicate gray color on the upper parts, except the quill-feathers, which are black, and the tail, which is deep slate-color. This common heron generally builds its nest in a high tree, and many nests are sometimes to be seen in a single tree. In northern parts of the continent the heron is known only as a summer bird of passage, but it remains in the Southern United States all the year. Its geographical range extends over most parts of the New World north of the equator. Herons were formerly in great esteem for the table, although now disregarded. The common heron (*Ardea cinera*) of Europe is very similar to the great blue heron, but has the tibiæ white instead of chestnut. It is famous as the game which was most eagerly sought in falconry. Other well-known American herons are the little green heron (*Ardea virescens*), which is only about a foot and a half long, the prevailing colors dark green and brown, abundant throughout the United States and a little beyond, both north and south; the night-heron (*Nycticorax nycticorax*, var. *nævius*), a mere variety of the European night-heron, found throughout the United States and Canada. (See Night-Heron.) The white heron (*Ardea egretta*) and the snowy heron (*Ardea candidissima*) are southern species, always pure

white, the former about 60 per cent. larger than the latter; and the reddish egret (*Ardea rufa*), the little blue heron (*Ardea cærulea*), and the great white heron (*Ardea occidentalis*), all of which are dichromatic; the last is the largest American heron, and is about 4½ feet long and 8 feet in extent. The largest known species is the giant heron of Africa (*Ardea Goliath*), which slightly exceeds these figures. Among other herons of the Old World may be mentioned the following: The purple heron (*Ardea purpura*), which is of large size, purplish-blue plumage, and wide distribution (see Colored Plate of WADING BIRDS); the great white heron, or great egret (*Ardea alba*), is most common in Turkey and eastward. It is an extremely beautiful bird, with perfectly white plumage, much of it loose and flowing. The little egret (*Ardea garzetta*) has also white flowing plumage. Consult: Newton, *Dictionary of Birds* (London and New York, 1896); Sclater and Hudson, *Argentine Ornithology* (London, 1888); and American ornithologies.

HE'RON. See HERO OF ALEXANDRIA.

HERON, MATILDA (1830-77). An American actress. She was born near Londonderry, in Ireland, and was brought to the United States by her parents in childhood. She first appeared in Philadelphia in 1851 as Bianca in *Fazio*. Her chief parts were Camille in *La Dame aux Camélias*, and Ulah in *De Soto*. She played in all the principal American cities and visited London in 1861. She was married to Robert Stoepel, a musician, in 1857, but was divorced in 1869. In the latter part of her life she taught elocution in New York City.

HERON'DAS, or **HERO'DAS** (Lat., from Gk. Ἡρώνδας, or Ἡρώδας). A Greek poet of the third century B.C., born, probably, in the island of Cos. Of his mimes or mimiambi, as they are sometimes called, nothing was known before 1890 except a few fragments. In that year, however, an Egyptian papyrus was found which contains seven comparatively complete poems and parts of two others. These are all written in the metre called the choliambus, or lame iambic trimeter. Unlike the works of the earlier iambographers, such as Archilochus and Hipponax, the poems of Herondas are not personal in their satire. They may be described as *genre* pieces descriptive of certain phases of life in the early Alexandrian time, and as such they are extremely interesting. The realism of these pictures is very striking. In them the Alexandrian age lives again in all its hurry and flurry, all its outward brilliancy and spiritual poverty. First publication by Kenyon, *Classical Texts from Papyri in the British Museum* (London, 1891). The latest edition is by Crusius (Leipzig, 1898).

HEROOP'OLIS. See SUCCOTH.

HEROPH'ILUS (Lat., from Gk. Ἡρόφιλος (c.300 B.C.). A famous surgeon of antiquity, born at Chalcedon in Bithynia. He studied medicine under Praxagoras, one of the followers of Hippocrates, and afterwards went to Alexandria in Egypt, where he became famous, and was one of the founders of the medical school in that city. His followers later spread to Pergamum, Laodicea, and elsewhere. Herophilus's greatest services were performed in the field of anatomy. He discovered the nerves and made important observations in connection with the eye. Several names which he gave to different parts of the body are still in use, one such, *tocular Herophili*, recording his own name. He is said to have practiced vivisection upon condemned criminals. His writings were numerous, but we have only fragments thereof.

HERO'S FOUNTAIN.

HERO'S FOUNTAIN (named from its inventor, Hero of Alexandria). A pneumatic apparatus, in which a vertical jet of water is produced by the pressure of condensed air. A simple form of the apparatus constructed of glass tubes is shown in the annexed figure. The column of water in the left-hand tube compresses the air in the lower vessel; this causes an increase of pressure on the surface of the water in the upper cistern, and causes it to gush out at the jet.

HEROS'TRATUS (Lat., from Gk. Ἡρόστρατος). An Ephesian, who, from a desire for future fame, set fire, in B.C. 356, on the very night on which Alexander the Great was born, to the magnificent Temple of Diana at Ephesus; only the walls and a few columns were left standing. Herostratus expiated the deed by a painful death, and the Ephesians passed a decree that his name should never be mentioned. It was revealed by Theopompus.

HER'PES (Lat., from Gk. ἕρπης, *herpēs*, from ἕρπειν, *herpein*, Lat. *serpere*, Skt. *sarp*, to creep). A cutaneous eruption, characterized by spreading or creeping from place to place. The term was formerly applied to several different diseases, including eczema, psoriasis, lichen, and seborrhœa, as well as zona, to which it properly belongs. Zona, or herpes zoster, is a cutaneous disease of trophic origin, occurring as a sequence of various lesions of the nervous system; it is a dermatosis of nervous origin—a fact established by pathologists. The disease is of an acute, inflammatory nature, characterized by a set of vesicles as large as a split pea, occurring in clusters and following the course of a peripheral nerve. The course of the affection is from ten to fourteen days in each locality to which it spreads, each irregular cluster of vesicles going through the process of increase, maturation, and decline, each vesicle drying into a scab. The inflamed areas are exquisitely tender to the touch, sometimes itching at the same time. Soothing and cooling applications should be made, avoiding ointments whose base is grease. Galvanism is of benefit. Appropriate internal treatment for the nerve condition must be employed. Herpes zoster is popularly called 'shingles.'

HER'PETOL'OGY (from Gk. ἑρπετόν, *herpeton*, reptile, from ἕρπειν, *herpein*, to creep + -λογία, *-logia*, account, from λέγειν, *legein*, to say). That branch of natural history which treats of reptiles and formerly included the amphibia. Now, however, the term is restricted to the Reptilia proper, which includes lizards, snakes, turtles, crocodiles, alligators, and various extinct aquatic and terrestrial reptiles. The first

attempt at a systematic arrangement of reptiles was made by Ray (1693), but he did not clearly comprehend their relationships, nor did he give the group a name. Linnæus (1735-68) classed tortoises, lizards, and serpents as amphibia, and recognized two sub-groups, (1) those with and (2) those without feet. He included in this class those forms which we to-day call amphibia, and later he added branchiostegous fishes. Of course, such an arbitrary classification, without any morphological foundation, was soon replaced by others. Linnæus recognized 213 species and 10 genera. Cuvier (1817-29) practically adopted the classification of Brongniart (1799), in which four orders were recognized: (1) Chelonia; (2) Sauria (lizards and crocodiles); (3) Ophidia (serpents and provisionally the cæcilians); and (4) Batrachia, the latter corresponding to our present Amphibia minus the cæcilians. The splendid additions to our knowledge of their anatomical structure, made by such men as Johannes Müller in Germany, Owen and Huxley in England, and Cope in America, and an increased knowledge of the embryological development of some puzzling forms, has greatly added to the accuracy of our classification both of the Reptilia and the Amphibia. The light which has been shed on the relationship of the groups by paleontological researches of the past century particularly has also been of inestimable value in the establishment of our present classification, for which see REPTILE.

HER/PETON (Gk. *ἑρπετόν*, reptile). An extremely rare snake of Southeastern Asia. It belongs to a family (Homolopsidæ) of colubrine viviparous water-snakes, which prey upon fish and crustaceans, and often moor themselves by curling the prehensile tail about some waterside branch or root. This species (*Herpeton tentaculatum*) is peculiar in having two forward-pointing appendages covered with scales on the snout, supposed to be organs of touch. Compare LANGAHA.

HERRERA, ăr-rā'rā, FERNANDO DE (1534-97). A Spanish poet, born at Seville, the head of the so-called Seville school of lyric poetry in the sixteenth century. When advanced in life he took orders. He was master of the Greek, Roman, and Italian literatures, and was a man of prodigious learning. As a poet he ranked so high in the opinion of his contemporaries that they bestowed upon him the appellation of the 'divine.' Like his acknowledged master, Garcilaso de la Vega, he sings chiefly in the foreign Italian strains, and is particularly successful in the *canción* and the *soneto*. His masterpiece is the *canción* (or ode) *Por la vitoria de Lepanto*. Many of his erotic poems are remarkable for tender feeling, and his odes frequently display a lofty enthusiasm; but the expression is sometimes cast in too classical a mold, and consequently wears a certain air of artificiality. Herrera himself prepared for publication a volume of his verse, *Algunas obras* (Seville, 1582), to which additions were made in an edition by Pacheco (1619). The poems are to be found also in Ramón Fernandez, *Poesías castellanas* (1808), and in the *Biblioteca de autores españoles*, xxxii. (Madrid, 1872); selections in Ford, *A Spanish Anthology* (New York, 1901). His chief historical work is the *Relación de la guerra de Chipre y batalla de Lepanto* (1572), and he translated from the Latin of Stapleton a life of Sir Thomas More. In 1580 he published an annotated edition of the poems of Garcilaso. Consult: *Fernando de Herrera, Controversia sobre anotaciones á las obras de Garcilaso de la Vega: Poesías inéditas* (Seville, 1870); Morel-Fatio, *L'hymne sur Lépante* (Paris, 1893); Lasso de la Vega, *Historia de la escuela poética sevillana* (Madrid, 1876); Bourciez, in the *Annales de la Faculté des lettres de Bordeaux* (Bordeaux, 1891).

HERRERA, FRANCISCO DE (1576-1656), called El Viejo (the elder). A Spanish painter of the school of Seville. He was the first to emancipate himself from the Italian manner then dominant in Spain, and to assume the vigorous naturalistic style afterwards adopted by Velasquez (q.v.). He may therefore be regarded as the founder of the new national school of Spain. Herrera was born at Seville in 1576, and studied painting with Luis Fernandez, who painted in the Italian manner. He soon emancipated himself from this master, and founded a school of his own; but his unbearable temper drove away his pupils, among whom was Velazquez, and even his own sons. A carver in bronze, Herrera was accused of counterfeiting money, and in order to avoid arrest he took sanctuary in the Jesuit College at Seville. While there he painted the "Triumph of Saint Hermengild," now in the Museum of Seville —a picture of such merit that when it was seen by Philip IV. on his visit to the city he pardoned the artist. After his release Herrera became more unbearable than ever. His wife left him; his elder son, called El Rubio, died of consumption; and his younger, Herrera el Mozo, robbing his father of his money, fled to Italy. In 1650 the father went to Madrid, where he died in 1656.

His subjects are generally sombre and tragic, and are mostly of a religious nature, although he sometimes painted genre. They contain all the qualities of a great artist; a design grandiose but correct and true to nature, especially in the nudes; a harmonious color, laid on in great masses. He painted both in oils and al fresco, but most of his fresco-work has disappeared. His principal works are at Seville. Among them are the "Last Judgment," in the Church of San Bernardo; four great pictures in the archiepiscopal palace, representing the "Fall of Manna," "Moses Smiting Water from the Rocks," the "Marriage at Cana," and the "Miracle of the Loaves and Fishes;" "Saint Peter," in the Cathedral; and "Saint Basil," in the Museum; "Saint Augustus and Saint Jerome," in the Montpensier Collection, Seville. The Louvre has two excellent examples, "Saint Basil Dictating His Doctrine," and the "Israelites Gathering Manna in the Desert;" the Museum of Dresden, a "Saint Matthew." The frescoes with which he ornamented the façade of the convent of La Merced, at Seville, have perished, as have also those at Madrid. Luckily the artist himself etched a number of the latter, showing great skill in this branch of art, as is further evident from his print, "Saint Peter."

His son, FRANCISCO HERRERA (1622-85), called El Mozo (the younger), after he had fled to Italy, painted pictures of various subjects, especially of fish, the latter with such success that he was called "Il Spagnuolo degli Pesci." In 1656, after his father's death, he returned to Seville. In 1660 he was one of the founders of the academy there, but on account of his jealousy of Murillo (q.v.),

who was made president, while Herrera was vice-president, he went to Madrid in 1661. He became Court painter to Philip IV., and master of the royal works under Charles II. In this office he figured as an architect, assisting in the renovation of the Cathedral of Saragossa. His work as a painter was brilliant, but manneristic. His works include the "Four Doctors of the Church Adoring the Host," Museum of Seville; the "Immaculate Conception," and "Saint Hermengild," now in the Prado Museum; and the frescoes of the Chapel of Our Lady of Atocha, "The Ascension of Mary," his chief work. Consult: Bermudes, *Diccionario de los mas illustros profesores* (Madrid, 1800); Stirling Maxwell, *Annals of the Artists of Spain* (London, 1848).

HERRERA, José Joaquin de (1792-1854). A Mexican general, born at Jalapa. He rebelled with Iturbide (1821), but opposed him when he was made Emperor. Herrera was Minister of War; President of the Supreme Court; was President for three months and a half in 1845; was Santa Anna's lieutenant in the war with the United States of America; and was President again (1848-51).

HERRESHOFF, hĕr'rĕs-hŏf, John B. (1841—). An American naval architect, born in Bristol, R. I., and a brother of Nathaniel Herreshoff. He is a descendant of John Brown who headed the attack on the *Gaspée*, and early showed both inventive ability and love of the sea. Although he became blind at fifteen, he built up and managed the business of the Herreshoff Manufacturing Company, which succeeded Edward Burgess as designer of the defenders of the *America* cup, and many stories are told of his wonderful grasp of detail and of his perfect freedom of movement in shop and on board ship.

HERRESHOFF, Nathaniel Greene (1848—). An American naval architect, born at Bristol, R. I. He was educated at the Massachusetts Institute of Technology, and made a special technical study of engineering in the Corliss Works at Providence, R. I., where he assisted in the construction of the large engine which furnished motive power for all machinery at the Philadelphia Exposition of 1876. He became superintendent of the Herreshoff Manufacturing Company, boat-builders, at Bristol, R. I., and designed numerous torpedo-boats and yachts. Among the high-speed torpedo-boats designed by him for the United States Government were the *Lightning* and the *Cushing*. His reputation in connection with racing yachts dates mainly from the triumphs of the *Gloriana* in 1891. The great success of the three craft built for contests in defense of the *America's* cup, the *Vigilant*, *Defender*, and *Columbia*, placed him among the foremost of his profession. He introduced many innovations in the architecture of racing yachts, and invented a coil boiler for use on steam vessels built by the Herreshoff Company.

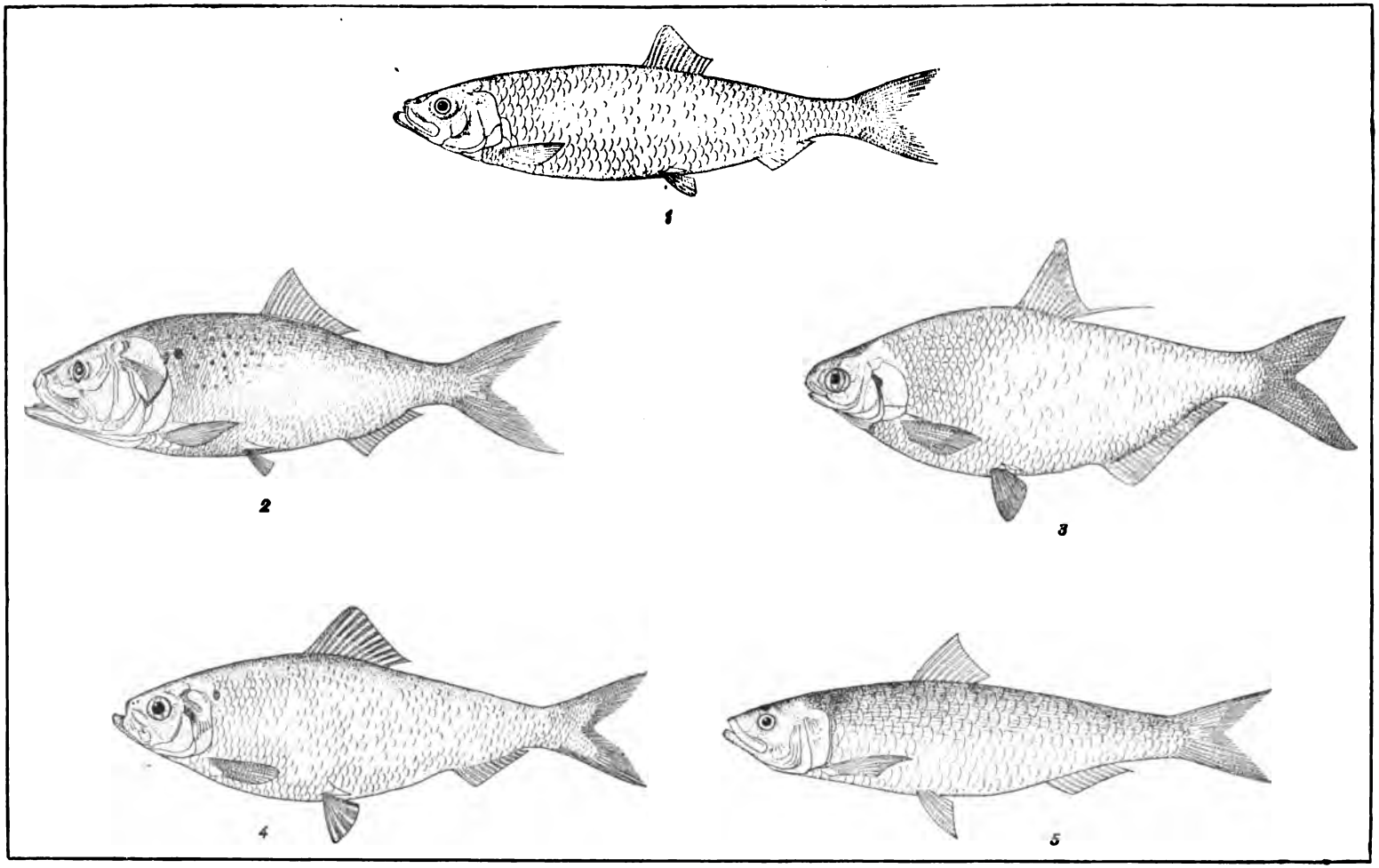
HERRICK, Edward Claudius (1811-62). An American meteorologist, born in New Haven, Conn. He was librarian at Yale College from 1843 to 1858, and treasurer from 1852 until his death. He made noteworthy contributions to the knowledge of meteorology, meteoric showers, the Aurora Borealis, and the zodiacal light. He was likewise an entomologist of distinction, and devoted nine years to the study of the Hessian fly and its parasites. His reputation is one of the treasures of Yale College.

HERRICK, Robert (1591-1674). An English poet, born in London. He was educated at Cambridge, and in 1629 was presented to the Vicarage of Dean Prior, Devonshire. Ejected from his parish by the Long Parliament in 1647, he repaired to London. In 1648 appeared a collection of his poems, in two parts, bound together, bearing the titles *Hesperides* and *Noble Numbers*. Some of these poems, however, had been finding their way into print ever since 1635. On the restoration of Charles II. he was reinstated in his old living, where he died. His poems, which are mostly lyrical, are graceful and melodious, and show much fine fancy. They vary in subject from amatory verses, pagan in tone, to pieces of deep religious feeling. Such songs as "Cherry Ripe" and "Gather Ye Rosebuds While Ye May," are universally known. They and scores of others are exquisite in sentiment and admirable in form. Though duly appreciated in his own time, Herrick was neglected for more than a hundred years after his death. Rediscovered in the nineteenth century, he has steadily grown in favor. There are editions of his poems by Hazlitt (London, 1869), Grosart (ib., 1876), Palgrave (selections, ib., 1877), Pollard, with critical essay by Swinburne (ib., 1891), and an essay by Gosse in *Seventeenth Century Studies* (ib., 1883).

HERRIG, hĕr'rĭk, Hans (1845-92). A German poet and dramatist, born in Brunswick. He studied law at Berlin and Göttingen, and at first was employed in the Berlin city court, but after 1872 devoted himself entirely to literature, was editor of the *Deutsches Tageblatt* from 1881 to 1888, and wrote many plays that attained wide popularity. His *Festspiel*, written for the Luther Jubilee in 1883, was especially successful. His dramas, which are more distinguished for elegance and force of diction than for positive dramatic skill, comprise: *Alexander der Grosse* (1872); *Kaiser Friedrich der Rotbart* (1873); *Jerusalem* (1874); *Der Kurprinz* (1876); *Konradin* (1881); *Harald der Wiking* (1881), which was set to music by Andreas Hallen; *Drei Operndichtungen* (1881); *Nero* (1883); *Columbus* (1887); and *Christnacht* (1887). His other writings are: *Die Schweine* (1876); *Mären und Geschichten* (1879); *Der dicke König* (1885); *Die Meininger, ihre Gastspiele und deren Bedeutung für das deutsche Theater* (1879); *Luxustheater und Volksbühne* (1886); *Ueber christliche Volksschauspiele* (1891); and *Das Kaiserbuch* (1891).

HERRING (AS. *hæring*, OHG. *harinc*, Ger. *Hering*, herring, from AS. *here*, OHG. *hari*, *heri*, Ger. *Heer*, army; in allusion to the shoals in which the fish moves). A fish of the family Clupeidæ, belonging to the genus Clupea, very closely related to the shads and sardines. Herring are soft-rayed fishes, with a compressed body and rather large cycloid scales. The head is naked, and the caudal fin is forked. They occur in all the northern seas, and make periodic migrations from the deeper waters to the shore for the purposes of spawning. In the more northern regions this occurs during the spring and early summer; in the more southern regions, in July to December. The average yield of eggs is about 30,000 to the fish, with a maximum of about 55,000. They are laid in shallow waters and are

HERRING AND SHAD



1. COMMON HERRING (Clupea harengus).
2. MENHADEN (Brevoortia tyrannus).
3. MUD or HICKORY SHAD (Dorosoma cepedianum).
4. ALEWIFE (Pomolobus æstivalis).
5. PILCHARD (Clupea pilchardus).

slightly glutinous, sticking in clumps to rocks, etc., on the bottom. The young herring probably remain on the shallow spawning beds all the year. At this period of spawning they swim in great schools, and are taken in vast numbers for commercial purposes. The herring fisheries are very extensive both in Europe and America. The estimated annual catch is 3,000,000,000, weighing one-half that many pounds. They are largely smoked, salted, and canned. The young in certain regions are canned as sardines. Fresh herring are much used as bait for cod and other fishes taken by line. See FISHERIES.

Herring live on minute crustaceans and larval forms of a great variety of animals, which they strain out of the water, and are themselves preyed upon to an enormous extent by cod, haddock, sharks, and other fishes, and by sea-birds.

The common herring (*Clupea harengus*) frequents both sides of the Atlantic southward to the thirty-seventh parallel. It attains a maximum length of about 17 inches, the usual average being about 12 inches. The California herring (*Clupea Pallasi*) strongly resembles the Atlantic one in form and habit, and is about equally abundant and an important food-fish. There are other less valuable species, belonging to this or a related genus. Thus the various species of alewife (q.v.) are known as 'herrings,' with distinguishing adjectives. The 'lake' or 'Michigan herring,' however, is an entirely unrelated form, being a salmonoid (see CISCO), although greatly resembling the common herring in form and general appearance. Consult, for an extensive natural history of the herring family, Goode, *Fishery Industries*, Section I. (Washington, 1884). See Plate of HERRING AND SHAD.

HERRING, JOHN FREDERICK (1795-1865). An English animal painter, born in Surrey. He was for many years a coachman, and during this time and afterwards devoted himself to painting pictures of horses. His racing and coaching pictures have often been lithographed. The "York Stage," the "Mail Coach," and the "Mail Change" are spirited representations of methods of traveling in the early days of the last century. He also did a series of portraits of the Derby and St. Leger winners. His genre picture, "A Frugal Meal," is in the National Gallery, London.

HERRING-GULL. See GULL.

HERRING-HOG. A porpoise; especially, in New England, the common small harbor porpoise, also called 'puffing pig.' See PORPOISE.

HERRINGS, BATTLE OF THE. See FASTOLF, Sir JOHN.

HERR'MANN, ALEXANDER (1844-96). An American prestidigitateur, born in Paris. After public performances in various European cities from 1856, he appeared in 1861 in the United States, and in the same year was naturalized. He traveled professionally all over the world, even to the Far East, the home of the sleight-of-hand art, where he was received with amazement. In 1874 he made his first transcontinental tour of the United States. As a master of pure sleight-of-hand, and as a performer who united the entertaining with the mystifying, he has perhaps never been surpassed.

HERRMANN, hĕr'mân, or **HEERMANS**, hār'mâns, or **HARMAN**, hār'mân, AUGUSTINE (1605-86). An American colonist, active chiefly in the affairs of New Netherlands, and afterwards in those of Maryland. He was born in Prague, Bohemia, and after receiving an excellent training in modern languages and mercantile life, entered the service of the Dutch West India Company. It is said that he came to Virginia in 1629, and that he was the original founder of the tobacco trade of that colony. Having settled in New Amsterdam in 1643, he began to take an important share in the civic life of the Dutch settlements, and was of much service in regulating the relations of New Netherlands with Rhode Island and Maryland. Having been sent to Maryland in 1659 to uphold the rights of New Netherlands as against the claim of Lord Baltimore to the Delaware River, he presented the case of his colony with great force, and the State of Delaware is believed to have owed its existence to the arguments established on that occasion. He later obtained from Lord Baltimore a charter to found Cecil town and county in Maryland, and induced some New Amsterdam people to go there with him. Having made a valuable map of Maryland and Virginia, he received land grants amounting in all to 30,000 acres, with manorial privileges. He was given the title of Lord of Bohemia Manor, became a member of the Governor's Council, a justice of Baltimore County, and in 1678 was made a commissioner to treat with the Indians. His descendants were lords of Bohemia Manor until 1735.

HERRMANN, hĕr'mân, ERNST ADOLF (1812-84). A German historian, born at Kämmerswalde. He studied at Dorpat, and at Berlin under Ranke, and then lived in Dorpat (1837-39) and in Dresden. In 1847 he became docent at Jena, then professor of history there, and afterwards (1857) at Marburg. His work was mostly on the history of Russia; especially important was his completion of Strahl's *Geschichte des russischen Staates* (1846-66). Among his other writings are: *Beiträge zur Geschichte des russischen Reichs* (1843); *Die österreichisch-preussische Allianz vom 7. Februar 1792 und die zweite Teilung Polens* (1861), which was an attack on Sybel; and *Peter der Grosse und der Zarewitsch Alexei* (1880).

HERRNHUT, hĕrn'hōōt. A small town in the Kingdom of Saxony, situated on the southern slope of the Hutberg, 11 miles from Zittau (Map: Germany, F 3). It is noted throughout Germany as the central seat of the Moravian Brotherhood. The town has manufactures of linen, furniture, etc., the products of Herrnhut being famous all over Germany. The community was founded in 1722 by a colony of persecuted Moravians, some of whom were descended from the old Bohemian and Moravian Brethren. In coming into Saxony they were sheltered and protected by the pious Count Zinzendorf, to whom Herrnhut belonged. Population, in 1900, 1242, including 830 Moravians.

HER'RON, FRANCIS JAY (1837—). An American soldier. He was born in Pittsburg, Pa.; graduated at the Western University of Pennsylvania in 1853, and after 1856 engaged in business in Iowa. He served in Iowa volunteer regiments in the Civil War, becoming brigadier-general of volunteers in July, 1862, for a time commanding the Army of the Frontier, and being made major-general of volunteers in November, 1862. At Vicksburg he commanded the left wing

of the investing forces, and at the close of the war received the surrender of the Confederate forces west of the Mississippi. He resigned in 1865, entered on the practice of law in New Orleans, was United States marshal of the District of Louisiana from 1867 to 1869, and was Secretary of State of Louisiana in 1872-73. He subsequently practiced law in New York City.

HERRON, George Davis (1862—). An American clergyman and writer, born in Montezuma, Md., and educated at Ripon College, Wisconsin. He held Congregational pastorates at Lake City, Minn., and Burlington, Iowa, and in 1893 became professor of applied Christianity in Iowa College. Opposition to his teachings led him to resign in 1900, and he then initiated a social crusade in Chicago and New York, founded the *Social Crusader*, and lectured upon "The Economics of the Kingdom of Heaven" and similar topics, chiefly advocating a transformation of the present economic order into conformity with the Christian principle of the brotherhood of men. He aroused great controversy throughout religious circles generally in 1901 by his separation from his wife, his second marriage, and his published theories regarding a free marriage relation. At a meeting of the Iowa Congregational Council he was deposed from membership. His principal writings are: *The Larger Christ* (1891); *The Call of the Cross* (1892); *A Plea for the Gospel* (1892); *The New Redemption* (1893); *The Christian Society* (1894); *The Christian State* (1895); *Between Cæsar and Jesus* (1899).

HERSCHEL, hĕr'shel, Caroline Lucretia (1750-1848). A German-English astronomer, sister of Sir William Herschel. She lived in Hanover till 1772, when she came to England to live with her brother at Bath. When he turned astronomer, she became his constant helper, and on his being appointed private astronomer to George III. acted as his assistant in the famous observatory at Slough, receiving a small salary from the King. She found time for a series of independent observations with a small Newtonian telescope made for her by her brother. Her special occupation was to scan the heavens for comets, seven of which she discovered, in regard to five of which she has the credit of priority of discovery; and several remarkable nebulæ and clusters of stars included in her brother's catalogues were described from her original observations. In 1798 she published *A Catalogue of Stars taken from Mr. Flamsteed's Observations*, etc. This work was published at the expense of the Royal Society, and contained 561 stars omitted in the British catalogue. She lived with her brother during the whole of his career, and on his death, in 1822, returned to her native country. In 1828 the Royal Society conferred on her their gold medal for completing the catalogue of nebulæ and clusters of stars observed by her brother. She was afterwards chosen an honorary member of the Royal Society. Consult: Mary C. Herschel, *Memoir and Correspondence of Caroline Herschel* (London, 1876); Clerke, *The Herschels and Modern Astronomy* (London, 1895).

HERSCHEL, Sir John Frederick William (1792-1871). An eminent English astronomer, the only son of the astronomer William Herschel. He was born at Slough, near Windsor, March 7, 1792, and was educated at Saint John's College, Cambridge. His first publication was *A Collection of Examples of the Application of the Calculus of Finite Differences* (1820). In 1822 he applied himself especially to astronomy, using his father's methods and instruments in observing the heavens. For a time he worked with Sir James South in reëxamining the nebulæ and clusters of stars described in his father's catalogues. The results of the reëxamination were given in 1833 to the Royal Society in the form of a catalogue. The catalogue contained observations on 525 nebulæ and clusters of stars not noticed by his father, and on a great number of double stars—in all, between 3000 and 4000. His "Treatise on Sound" appeared in the *Encyclopædia Metropolitana* in 1830, and his "Treatise on the Theory of Light" in the same work in 1831, in which year also appeared in Lardner's *Cyclopædia* his "Preliminary Discourse on the Study of Natural Philosophy." In 1836 appeared his "Treatise on Astronomy," in Lardner's *Cyclopædia*. At this time Herschel was at the Cape of Good Hope, where he arrived in January, 1834, with the intention of completing the survey of the sidereal heavens by examining the Southern Hemisphere as he had done the Northern. Here he established his observatory at a place called Feldhausen, six miles from Table Bay. On March 5, 1834, he commenced his observations, which were embodied in his *Results of Astronomical Observations Made During 1834-38 at the Cape of Good Hope; Being a Completion of a Telescopic Survey of the Whole Surface of the Visible Heavens, Commenced in 1825* (1847). On his return to England, in 1838, honors were showered on him. He got the Royal Society's gold medal in 1826; he now was made a D.C.L. of Oxford, was created a baronet, succeeded the Duke of Sussex as president of the Royal Society, and in 1848 he became president of the Royal Astronomical Society. In 1849 he published his *Outlines of Astronomy*. In 1850 he was appointed master of the mint. This office, on account of ill health, he resigned in 1855. Consult Clerke, *The Herschels and Modern Astronomy* (London, 1895). For a list of his contributions, consult the Royal Society's great catalogue.

HERSCHEL, Sir William (1738-1822). An eminent English astronomer. He was born at Hanover, Germany, November 15, 1738. The son of a musician, he was educated specially as a professional musician. In 1757 he went to England, where he became a teacher of music in the town of Leeds, from which he went to Halifax as organist, and subsequently (1766) in the same capacity to Bath. Here he would seem to have first turned his attention to astronomy. Wanting a telescope, and unable to afford a reflector, he made one for himself—a Newtonian, of five feet focal length—and with this applied himself to study the heavens. In 1781 he made his first discovery, a new planet, which at first he took for a comet. It was detected by an exhaustive process of surveying the heavens, which Herschel was the first to follow, taking the stars in regular series, and examining them in all their groups through the same instrument. The result of his discovery was his appointment to be private astronomer to George III., with a salary of £200 a year. He then went to live at Slough, near Windsor, where, assisted by his sister Caro-

line (q.v.), he continued his researches. He was knighted by George III., and made a D.C.L. by the University of Oxford; he became rich, partly through his wife's jointure, and partly through selling mirrors for reflecting telescopes. He died at Slough, August 25, 1822.

Herschel contributed sixty-nine papers to the *Philosophical Transactions* between the years 1780 and 1815, and to the first volume of *Memoirs of the Astronomical Society* he contributed a paper, "On the Places of 145 New Double Stars." He greatly added to our knowledge of the solar system; he discovered Uranus and six satellites, and two satellites of Saturn. Besides this, he determined the period of rotation of Saturn and that of Venus, the existence of the motions of binary stars, the first revelation of systems besides our own. He threw new light on the Milky Way and the constitution of nebulæ, and, in fact, was the first to give the human mind any conception of the immensity of the universe. When in 1780 he began his researches, less than 150 nebulæ were known, but as a result of his observations the number increased to nearly 2500, and through him the nebulæ acquired a new importance in the universe. He advanced, in the earlier period of his researches, the theory that the nebulæ were clusters of stars, the component stars being too faint, on account of their immense distance, to be seen separately. For the explanation of some of the nebulæ, among them the nebulæ of Orion, he, however, reverted to the old theory, that the nebulæ were masses composed of a shining fluid of a nature unknown to us. His catalogue of double stars, nebulæ, etc., and tables of the comparative brightness of stars, and his researches in regard to light and heat, would of themselves entitle him to the first rank as an astronomer and physicist. He erected a monster reflecting telescope, as it was then considered, of 40 feet focal length and 4-foot apertures. It was begun in 1785 and finished in 1789, on August 28th of which year he, by means of it, detected the sixth satellite of Saturn, and on the 17th of September a seventh. Consult Holden, *Sir William Herschel: His Life and Works* (New York, 1881).

HERSCHELL, Farrer, Lord (1837-99). An English lawyer and politician. After completing his education at Bonn and University College, London, he entered at the bar in 1860, and in twelve years was Queen's counsel. He was recorder of Carlisle in 1873-80, member of Parliament for Durham (1874-85), Solicitor-General under Gladstone (1880), and was knighted the same year. He was raised to the peerage six years later and made Lord Chancellor. He was president of the royal commission to inquire into the proceedings of the Metropolitan Board of Works (1888), and once more Lord Chancellor in 1892. He died in Washington, D. C., while serving as chairman of the Anglo-American Joint High Commission.

HERSENT, ăr'săn', Louis (1777-1860). A French historical painter, born in Paris. He studied under Regnault and David, and won the Prix de Rome in 1797. In 1817 he attracted some attention by his "Daphnis et Chloë." His best picture, "L'abdication de Gustave Wasa" (1819), painted shortly afterwards, was destroyed. Several of his works are at Versailles. After 1824 he painted principally portraits, such as those of the Duc d'Angoulême, Louis Philippe, and Queen Amélie. Hersent is an excellent representative of the classic school of David.

HERSFELD, hĕrs'fĕlt. An ancient town in the Prussian Province of Hesse-Nassau, situated on the Fulda, 23 miles by rail from Fulda (Map: Prussia, C 3). It still retains a portion of its old fortifications, and contains an old church dating from the thirteenth century; the ruins of a collegiate church, originally built in the eleventh and twelfth centuries, and destroyed by the French in 1761; the remains of the Benedictine Abbey of Hersfeld; and an old Rathaus. There are manufactures of cloth, cotton goods, and leather. The Abbey of Hersfeld, founded in 770, by Lullus, Archbishop of Mainz, enjoyed great renown through the Middle Ages. Population, in 1890, 6758; in 1900, 7908.

HERSTAL, hĕr'stăl, or **HERISTALL.** A manufacturing and mining place in the Province of Liège, Belgium, extending along the left bank of the Meuse for about three miles immediately below the city of Liège, of which it may be considered a suburb (Map: Belgium, D 4). It has extensive metal-works and coal-mines in the vicinity; its population is made up chiefly of the workingmen employed in the mills and mines. Some ruins still exist of the Castle of Herstal, the birthplace of Pepin le Gros (father of Charles Martel, and great-grandfather of Charlemagne), from which he has his title of Pepin of Herstal. Population, in 1890, 13,877; in 1900, 18,195.

HERTEL, hĕr'tel, Albert (1843—). A German painter, born in Berlin. He studied at the Berlin Academy, where he became professor in 1875, and of which he was elected a member in 1901. His landscapes are notable for style and fine coloring; among them are: "The Via Flaminia" (1872); "Olive Harvest in Capri" (1872); "After the Storm on the Coast of Genoa" (1878) and "Northern Coast Scene with Fishermen Returning" (1883), both in the National Gallery, Berlin; "Road Between Rapallo and Santa Margherita" (1892, bought by Emperor William II.); and "View in the Roman Campagna" (1896). He also painted decorative subjects.

HERTEL DE ROUVILLE, ăr'tĕl' de rōō'vĕl', Francis (1643-1722). A Canadian soldier, born in Three Rivers, Maurice County, Quebec. As a woodsman and Indian fighter he was widely known for valor and resourcefulness. Captured by the Iroquois in 1681, he bore various tortures with such fortitude that, instead of being put to death, he was adopted by the tribe. After a time, however, he escaped from the Indians and rejoined his comrades. Acting as one of Frontenac's lieutenants in 1690, he ravaged settlements in the lower part of Maine, escaped by adroitness from the greatly superior force of the English colonists, and united with the band attacking Falmouth, now Portland, where his strategy aided in the speedy capture of the village. Louis XIV. promised to reward him with letters of nobility, which he did not receive, however, until twenty-six years afterwards.

HERTER, Albert (1871—). An American figure painter, born in New York City. He studied at the Art Students' League there and at Corman's, and under J. P. Laurens in Paris. Afterwards he traveled in Japan, and was influ-

enced by Japanese art. His work has fine decorative qualities, and his color is rich and well handled. He received honorable mention at the Salon of 1890, and a bronze medal at the Paris Exposition of 1900.

HERTER, Ernst Gustav (1846—). A German sculptor, born in Berlin. He studied at the Berlin Academy, and as a pupil of August Fischer, Bläser, and Albert Wolff, was elected a member of the Academy in 1885, and obtained a professorship there in 1889. His work is careful in execution, but often formal and undistinctive. Among examples of it may be cited such imitations of the antique as "Alexander the Great Studying" (1876) and "The Wounded Achilles" (1879), both in the National Gallery at Berlin; "Moses Breaking the Tables of the Law" (1881); a statue of Helmholtz in the grounds of the Berlin University (1899); a fountain commemorative of Heine in New York; a statue of William I. at Holtenau (1900); and various decorations for public structures.

HERT'FORD. The capital of Hertfordshire, England, a municipal borough and market-town on the Lea, 26 miles north of London by rail (Map: England, F 5). The fourteenth-century Church of All Saints, destroyed by fire in 1891, has been replaced by a fine Perpendicular edifice; the shirė hall and corn exchange are the chief of several important public buildings. The town has a preparatory branch of Christ's Hospital, a grammar school, and several charity schools. It owns the water-supply, markets, and a free public library, and school of art. Its industries and trade are chiefly agricultural. The old castle, of which traces remain, was built about 905. The present castle is of the time of James I., and was the temporary home of Haileybury College when its present buildings were being erected, two miles to the southeast. Domesday Book records Hertford as a borough, and it received its charter in 1544 from Queen Mary. Population, in 1891, 9000; in 1901, 9300.

HERTFORD, Marquis of. See Seymour, William.

HERT'FORDSHIRE, or **HERTS.** An inland county of England, bounded on the east by Essex, on the south by Middlesex, on the west by Buckingham and Bedford, and on the north by Cambridge (Map: England, F 5). Area, 635 square miles. Population, in 1891, 220,162; in 1901, 250,350. The surface presents a pleasing succession of finely wooded hill and fertile valley. The chief elevations are those of the chalk downs, a branch of the Chiltern Hills, which skirt the north of the county. The principal rivers are the Lee and the Colne, both affluents of the Thames. Agriculture is the chief industry, over three-fourths of the total area being cultivated. Immense quantities of hay and straw are sold, and throughout the county there are numerous gardens and orchards, the fruit of which is sent to the London market. Great quantities of malt are made in the county. Ware is the chief seat of the malting trade in the kingdom. Paper and straw-plait are extensively manufactured in the west and south. Capital, Hertford.

HERTHA, hĕr'tȧ, **HER'THUS,** or **ÆR'THA** (Goth. *airþa*, OHG. *erda*, Ger. *Erde*, AS. *eorþe*, Eng. *earth;* connected with OHG. *erō*, earth, Gk. ἔραζε, *eraze*, on the earth, and perhaps with Lat. *arvum*, field, *arare*, Gk. ἀροῦν, *aroun*, OChurch Slav. *orati*, Goth. *arjan*, OHG. *erian*, to plow). A deity of the ancient Germans. Tacitus states that she was worshiped with great solemnity by the Suevi, and that her temple stood in an island of the ocean, where her service was performed by a single priest. On great occasions which were regulated by this priest, the covered chariot of the goddess was drawn forth from the sanctuary by sacred cows and led in triumph throughout the country. Those districts through which the chariot passed were held to be peculiarly favored, peace was always proclaimed, and the occasion celebrated by universal merrymaking, until the priest declared that it was the will of the goddess to return to her shrine. Her image was then washed in a sacred spring, and all who witnessed the ceremony of the ablution were drowned. The island of Rügen was long thought to be identical with the sacred island of Hertha, but the same honor has been claimed for Helgoland and Zetland.

HERTOGENBOSCH, hĕr-tō'gen-bŏs', or **HERZOGENBOSCH.** The capital of the Dutch Province of North Brabant. See Bois-le-Duc.

HERTWIG, hĕrt'vĭk, Oskar (1849—). A German embryologist, born at Friedberg. He studied medicine in Jena under Haeckel and Gegenbaur, and at Zurich and Bonn. In 1878 he was made professor at Jena, and in 1888 professor of anatomy in Berlin. He studied with Haeckel and with his brother, Richard Hertwig, at Lesina on the Adriatic in 1871, in Corsica and Villefranche in 1875, and afterwards with his brother in Messina and Naples. He is one of the most influential embryologists of his time. The following are the most important of his publications: *Beiträge zur Kenntnis der Bildung, Befruchtung und Theilung des tierischen Eies* (1876), an epoch-making work, in that in it is established the fact that fertilization consists of the conjugation of the two equivalent sexual cells; *Studien zur Blättertheorie* (with R. Hertwig, 1879-83); *Die Cölomtheorie; Versuch einer Erklärung des mittleren Keimblattes* (with R. Hertwig, 1881); *Entwicklung des mittleren Keimblattes der Wirbelthiere* (with R. Hertwig, 1883); *Das Problem der Befruchtung und der Isotropie des Eies, eine Theorie des Vererbung* (1884); *Vergleich der Ei- und Samenbildung bei Nematoden* (1890); *Lehrbuch der Entwicklungsgeschichte des Menschen und der Wirbelthiere* (1886), translated into English by Edward L. Mark as *Textbook of Embryology* (1892); *Die Zelle und die Gewebe* (1892 and 1898); *Urmund und Spina Bifida* (1892); *Ueber den Werth der ersten Furchungszellen für die Organbildung des Embryos* (1893); and *Zeit und Streitfragen der Biologie* (1894).

HERTWIG, Richard (1850—). A German zoölogist, born at Friedberg. He studied medicine in Jena under Haeckel and Gegenbaur, and also in Zurich and Bonn. In 1874 he became privat-docent, and in 1881 professor extraordinarius in Jena. He was made professor of zoölogy in 1881 at Königsberg, and in 1885 at Munich. He studied with his brother, Oskar Hertwig, and with Haeckel on the Adriatic at Lesina in 1871 and in Corsica and Villefranche in 1875, and later with his brother in Messina and Naples. His publications include: *Zur Histologie der Radiolarien* (1876); *Studien zur Blätter-*

theorie (with O. Hertwig, 1879-83); *Die Cölomtheorie, Versuch einer Erklärung des mittleren Keimblattes* (with O. Hertwig, 1881); *Die Aktinien der Challenger Expedition* (1882); *Ueber Kernstruktur und ihre Bedeutung für Zellteilung und Befruchtung* (1888); *Ueber die Konjugation der Infusorien* (1889); *Ueber Befruchtung und Conjugation* (1892); *Lehrbuch der Zoologie* (1893); *Kerntheilung, Richtungskörperbildung und Befruchtung von Actinosphærium Eichhorni* (1898).

HERTZ, hĕrts, HEINRICH (1857-94). A German physicist, born at Hamburg. He studied at first to become a civil engineer, but forsook this profession for the study of mathematics and pure science, which he pursued at Munich and Berlin, becoming Helmholtz's assistant at the latter university in 1880. In 1883 Hertz became privat-docent at Kiel, and two years later was called to the Polytechnic Institute at Karlsruhe as professor of physics. His earlier experiments with electro-magnetic waves were performed during his occupancy of this professorship, and made for Hertz such a reputation that he was in 1889 called to the important chair of physics at Bonn, previously occupied by Clausius. To Hertz is due the realization and detection of the electro-magnetic waves which Maxwell had discovered in his theoretical consideration of the nature of electricity. Hertz found that waves produced by the spark of an electrical machine could be received by a circular loop of wire, and was able to show the reflection, refraction, diffraction, and polarization of the waves. The first paper describing these wonderful discoveries was published in 1887 and the series continued for several years in *Wiedermann's Annalen*. In 1890 was published *Ueber die Beziehungen zwischen Licht und Electricität*, while his *Gesammelte Werke* were published in Leipzig the year after his death. English translations entitled *Electric Waves*, by D. E. Jones, with a preface by Lord Kelvin (1893), and *Miscellaneous Papers*, by D. E. Jones and G. A. Schott, with an introduction by Philipp Lenard (1896), have been published. Consult "Biographical Sketch," in *Popular Science Monthly* (New York, 1894), reprinted in *Smithsonian Report* (Washington, 1894).

HERTZ, HENRIK (1798-1870). A Danish dramatist, born in Copenhagen. He continued the literary impulse of the generation of Oehlenschläger, Heilberg, and, more immediately, Baggesen. A Jew, early orphaned, afterwards Christianized and brought up in a literary atmosphere for the law, he abandoned this gradually for the drama (*Buchardt and His Family*, 1827; *Love and Policy; Cupid's Strokes of Genius*, 1830), and for satiric criticism in Baggesen's vein (*Letters of a Ghost; Poetic Epistles from Paradise*, 1830), with cutting attacks on the early work of Hans Andersen, that created a deep impression. Continuing dramatic work, Hertz fell into the romantic movement in *Svend Dyring's House* (1838), and gained cosmopolitan recognition for *King René's Daughter* (1845), a charming bit of Provençal chivalric romance from the last "Court of Love," beautiful even in its translations (Englished by Theodore Martin). A tragedy, *Ninon* (1848), is also noteworthy. He was also an editor and poet. His *Dramas* are collected in eighteen volumes (1854-73), his *Poems* in four (1851-62).

HERTZ, MARTIN JULIUS (1818-95). A German classical scholar. He was born at Hamburg, and after studying at Berlin and Bonn, was appointed professor ordinary of classical philology at Greifswald in 1855. He was called to a similar chair at Breslau in 1862, and remained there until 1893, when he retired. He is celebrated chiefly for his text edition (2 vols., 1853; 2d ed. 1886), and critical edition (2 vols., 1883-85) of Aulus Gellius. Of his other works, the best known are his *Karl Lachmann. Eine Biographie* (1851); his critical edition of Priscian's *Institutiones Grammaticæ* in Keil's *Grammatici Latini*, vols. ii. and iii. (1855-59); and his recensions of Livy (4 vols., 1857-63) and of Horace (1892).

HERTZ, WILHELM (1835-1902). A German poet, born in Stuttgart. His university studies were prosecuted at Tübingen, and during residence there he was encouraged in Germanic researches by Uhland, and wrote the major portion of his *Gedichte* (1859). In 1858 he became a member of the literary group at Munich that numbered Lingg, Heyse, and Geibel, to whose *Dichterbuch* (1862) he was an original contributor. From 1869 until his death he was professor of German language and literature in the Munich Technical Institute. His poetic talent was genuine, and of much refinement. His intention was directed notably to rendering into the modern language the Middle High German poets, of whose thought and spirit he was a skillful interpreter. In thus continuing the work of familiarizing the mediæval literature, inaugurated by Simrock, he translated the *Tristan* (1877; 3d ed. 1901) and Wolfram von Eschenbach's *Parzival* (1898). The epic *Lanzelot und Ginevra* (1860; done into English by Bruce, London, 1865), and the collection *Gesammelte Dichtungen* (1900) comprise his chief original verse. He wrote also a number of important volumes in literary research—*Der Werwolf* (1862); *Deutsche Sage im Elsass* (1872); *Aristoteles in den Alexanderdichtungen des Mittelalters* (1890); and others.

HERTZBERG, hĕrts'bĕrk, EWALD FRIEDRICH, Count (1725-95). A Prussian statesman and historian, born at Lottin, near Neustettin. He occupied various positions under the Prussian Government during the reigns of Frederick the Great and Frederick William II. He was one of the guiding spirits in the diplomacy of the Seven Years' War, and signed the treaty of Hubertsburg (February 15, 1763). He wrote a number of works of historical character, of which the most famous is his *Mémoire raisonné* (1756), based on dispatches between the Courts of Vienna and Dresden, in which he justifies the Prussian invasion of Saxony.

HERTZBERG, GUSTAV FRIEDRICH (1826—). A German historian and archæologist. He was born at Halle, and from 1843 to 1848 studied in the university there and at Leipzig. He became privat-docent of history at Halle in 1851, and taught also in a gymnasium until 1855. In 1858 he became editor of the *Preussisches Wochenblatt*. In 1860 he was appointed professor of history at Halle. Among his writings are: *Alkibiades, der Staatsmann und Feldherr* (1853); *Das Leben des Königs Agesilaos II. von Sparta* (1856); *Geschichte Griechenlands unter der Herrschaft der Römer* (1866-75); *Geschichte der Perserkriege*

nach den Quellen erzählt (1877); *Geschichte Griechenlands vom Absterben des antiken Lebens bis zur Gegenwart* (1876-79); *Rom und König Pyrrhos* (1871); *Die Feldzüge der Römer in Deutschland* (1872); *Geschichte von Hellas und Rom* (1879-80); *Geschichte des römischen Kaiserreichs* (1880-82); *Geschichte der Byzantiner und des Osmanischen Reichs* (1882-84); *Geschichte der Stadt Halle* (1889-93); and *Kurze Uebersicht über die Geschichte der Universität Halle* (1894).

HERTZKA, hĕrts'kȧ, THEODOR (1845—). An Austrian political economist, born at Pest. He studied at Vienna and at Pest, was editor of the economics section of the *Neue Freie Presse* of Vienna from 1872 to 1879, and in the latter year established the *Wiener Allgemeine Zeitung*, which he edited until 1886. His earlier volumes, such as *Die Gesetze der Handels- und Socialpolitik* (1880), recommend for Austria free trade and a gold-standard currency. In his *Gesetze der sozialen Entwicklung* (1886), he promulgated ideas of social reform which he extended in *Freiland, ein soziales Zukunftsbild* (1890, 10th ed. 1896), the description of a communistic Utopia located in Central Africa. His summons to the formation of such a colony resulted in the organization of nearly a thousand unions for the realization of that object, general direction of the enterprise being assigned to a central committee. An attempt toward the execution of the plans was made in 1893, but failed. The *Reise nach Freiland* (1893; Nos. 3051-62 of Reclam's *Universal-bibliothek*) was an amplification by Hertzka of the previous volume.

HERULI, hĕ-rōō'lī, or **ERULI**. A savage, undisciplined, and warlike tribe of Germanic stock that appears frequently in history from the third to the sixth century A.D. We first hear of them as settled north of the Black Sea at about the middle of the third century, and joining in the marauding expeditions of the Goths on the eastern confines of the Roman Empire. In the following century they were subjugated by Hermanrich, King of the Ostrogoths, and later still allied themselves with the Huns, and fought in the battles of Attila. (See ATTILA.) By this time their main body had moved to the west, and was settled in the middle basin of the Danube in close proximity to the Gepidæ, with whom they formed a sort of loose alliance. They joined in large numbers the army of Odoacer and helped to overthrow the Western Empire in 476. Their Danubian kingdom was destroyed by the Lombards in the sixth century, and the race was dispersed, soon disappearing from view. Most of them had been converted to Christianity under the Emperor Justinian. Consult: Aschbach, *Geschichte der Heruler und Gepiden* (Frankfurt, 1835); and Hodgkin, *Italy and Her Invaders* (Oxford, 1880-99).

HERVAS Y PANDURO, ȧr-vȧs' ē pȧn-dōō'rō, LORENZO (1735-1809). A Jesuit priest and celebrated philologist, born at Cuenca, Spain. He entered the Society of Jesus at Madrid; studied in the Jesuit College at Alcalá de Henares, devoting himself especially to linguistics and architecture; taught in the Royal College in Madrid, and at Murcia in the college of his Order. Soon after he went to America as a missionary, but in 1767, by the expulsion of his society, he was driven to Rome, where he studied mathematics, physics, and afterwards linguistics. In 1799 he returned to Barcelona and after a few months there to his native town. But in 1803 or 1804 he again went to Rome, and Pius VII. made him librarian of the Quirinal, where hard work hastened his death. He may be called the founder of comparative philology in Spain and Italy, because of his *Catálogo de las lenguas conocidas;* the *Vocabulario poliglota;* an *Ensayo práctico de las lenguas;* and *Orígen, formación, mecanismo, y armonía de los idiomas.* He wrote both in Italian and Spanish. His most famous work was *Idea del' Universo* (1778-87), a huge treatise on cosmography. He wrote: *La escuela española de sordo-mudos ó arte para enseñarles á escribir y hablar el idioma español* (1795), which was followed by other educational works for deaf-mutes; *Descripción de los archivos de la corona de Aragón en Barcelona,* etc. (1801); and the following unedited works: *Historia de la escritura; Paleografía universal; Moral de Confucio;* and *Historia de las primeras colonias de América.*

HERVÉ, ȧr'vȧ', AIMÉ MARIE EDOUARD (1835-99). A French journalist, born at Saint Denis, Réunion Island. He was successively editor of the *Courrier du Dimanche* (1863); *Le Temps* (1864); *L'Epoque* (1865); after which the Government censorship silenced him in France till, in 1867, he, with J. J. Weiss, founded *Le Journal de Paris.* On Weiss's withdrawal he edited that paper alone until 1873, when he founded *Soleil,* which he conducted with great ability. He was elected to the Academy in 1886. Hervé was a supporter of a liberal constitutional monarchy, and wrote in this connection a history of liberal ideas in England, *Une page d'histoire contemporaine* (1869).

HERVÉ (properly FLORIMOND RONGER) (1825-92). A French musical composer, librettist, and comedian. He was born at Houdain, near Arras, went to Paris when a child, studied vocal and instrumental music under Saint-Roch, and was for eight years organist of Saint-Eustache. He made his début as a composer with a light opera, *Don Quichotte* (1848), and in 1851 was made leader of the Palais-Royal orchestra. Three years afterwards he assumed the direction of the Folies-concertantes on the Temple Boulevard, and became literally man of all work, as he wrote the score and the words, delivered both, led the orchestra, painted and shifted scenery. His first great success was in his original rôle of *Le compositeur toqué,* and he produced a number of light operas, such as *L'œil crevé* (1867) and *Le petit Faust* (1869), performances not lacking in melody, imagination, and originality. Hervé was the originator of French opera bouffe, but his work was afterwards overshadowed by that of Offenbach.

HERVÉ, RIEL. The hero of Browning's poem of the same name (1867). He was a Breton sailor, who, in 1692, guided the French fleet safely into the port of Saint-Malo after the battle of La Hague, and asked only a day's holiday as a reward.

HERVEY, hĕr'vĭ, ELEANOR LOUISE MONTAGU (1811—). An English poet, wife of Thomas Kibble Hervey, the poet. When but fourteen years of age, she began writing verses and tales for the different annuals and 'keepsakes' of her time, but her most ambitious attempt was a dramatic poem in six acts called *The Landgrave*

(1839). She also published an autobiographical novel and a complete edition of her husband's poems (1866).

HERVEY, JAMES (1714-58). A clergyman of the Church of England. He was born at Hardingstone, near Northampton, February 26, 1714, educated at Northampton grammar school and Oxford, where he came under the influence of John Wesley, and for some time manifested inclination toward his theological opinions; but ultimately he adopted a thoroughly Calvinistic creed, and resolved to retain his connection with the Established Church. In 1743 he became curate to his father at Weston Favell, near Hardingstone, and succeeded him in 1752. His works have slight literary or theological value, but rapidly became popular. His earliest work, *Meditations and Contemplations* (1745-47), comprising *Meditations Among the Tombs, Reflections in a Flower Garden, A Descant on Creation*, and *Contemplation on the Night and Starry Heavens*, passed through fourteen editions in as many years. *Theron and Aspasio* (1755), which was equally well received, called forth some adverse criticism, even from the Calvinists, on account of tendencies which were considered to lead to Antinomianism, and was strongly objected to by Wesley. His *Works* appeared in six volumes (Edinburgh, 1769, later edition, 1834). He died at Weston Favell, December 25, 1758.

HERVEY, JOHN, Lord Hervey of Ickworth (1696-1743). An English politician, the eldest son of John, first Earl of Bristol. He was educated at Cambridge and afterwards traveled abroad. After his return to England he frequented the Court of the Prince of Wales at Richmond, and in 1720 married Mary Lepell, maid of honor to the Princess. He entered the House of Commons in 1727 as member for Bury Saint Edmunds, and at first opposed Walpole, though he was brought over by a pension, the office of vice-chamberlain (1730), and a seat in the House of Lords (1733). In 1740 he replaced Lord Godolphin as Lord Privy Seal, and held this office until Walpole's fall from power in 1742.

Hervey was an intimate friend of the Queen, and had a good deal of influence at Court. He was a man of doubtful morals, and no religion, but intellectually by no means justified Pope's bitter epithets of Lord 'Fanny,' 'Sporus,' and 'Narcissus.' The wordy quarrel between Hervey and the poet was probably concerning Lady Mary Wortley Montagu, to whom the former was friendly for many years. During his political career Hervey wrote a number of vigorous controversial pamphlets. His *Memoirs* were not published until 1848. They are ably written, in a cynical style throughout, and contain valuable information about the inner Court life of his time.

HERVEY-SAINT-DENYS, ȧr'vȧ' sȧN' denē', MARIE JEAN LÉON, Marquis d' (1823-92). A French historian and Orientalist, born in Paris. He studied Eastern languages in the College of France, and in 1867 was sent as commissioner-general to China, the country in whose literature and history he became a specialist. In 1874 he was made professor of Chinese in the College of France, and four years afterwards was elected a member of the Académie des Inscriptions et Belles-Lettres. His first publications were translations from the Spanish; but after the publication of his *Recherches sur l'agriculture des Chinois* (1851), he rendered invaluable aid to students of Chinese literature by his translations of the native prose and poetry, ending with six novels translated from the Chinese in 1892.

HERVIEU, ȧr'vyē', PAUL ERNEST (1857—). A French author, born at Neuilly-sur-Seine. He studied at the Lycée Condorcet, was admitted to the bar in 1877, and in 1879 became connected with the secretary's office of the presidency of the Council. In 1881 he was appointed secretary to the French Legation in Mexico, from which post he resigned in the same year. His first literary work was done, with some success, as a contributor to numerous periodicals, under the pseudonym 'Eliacin.' He afterwards collected a series of essays, first published in the *Gaulois*, as *La bêtise humaine* (1884). His books, involved in manner, but frequently praised for their skillful character-drawing, include: *Les yeux verts et les yeux bleux* (1886); *L'inconnu* (1887); *Deux plaisanteries* (1888); *L'exorcisée* (1891); *Peints par eux-mêmes* (1893); *L'armature* (1895); *Le petit duc* (1896); and *Amitié* (1900). Among the best known of his dramas are: *Les tenailles* (1894); *La loi de l'homme* (1897); and *La course de flambeau* (1900). In 1900 he was elected to the French Academy.

HERVIEUX, ȧr'vyē', AUGUSTE LÉOPOLD (1831—). A French advocate and author. He was born at Elbeuf; was educated at the Lyceum of Rouen, and studied law in Paris, where he afterwards had some important cases. He was elected municipal councilor for the Saint Vincent De Paul District in 1884, and retired to private life in 1890. His writings are mainly upon literary subjects, such as: *Premiers essais poétiques* (1853); *Mémoires d'une femme du monde* (1860); *Poésies complètes* (1866); *Théâtre complet* (1867); *Les déclassés* (1882); *Les fabulistes latins depuis le siècle d'Auguste jusqu'à la fin du moyen âge* (1883-90); *Harmonies intimes* (1889); *Etapes amoureuses d'un sonnetiste* (1889); *Des pécules du fils de famille dans la législation romaine* (1890). Between 1860 and 1870 he wrote under the nom-de-plume 'Saint-Amand.'

HERVILLY, ȧr'vē'yē', MARIE ERNEST D' (1839—). A French poet, romancer, and playwright, born in Paris. He was educated for civil engineering, but left his railroad appointment and his overseeing of bridges and highways to go into journalism. Thence he emerged as a poet with such work as *La lanterne en vers de couleur* (1868), and *Bêtes à Paris* (1886), while he made his name as a novelist with *Mesdames les parisiennes* (1875) and *La dame d'Entremont* (1884), after which he wrote acceptably for young people—*Jack-le-Gal et ses contes* (1891), for example. He wrote also a number of one-act comedies in verse that have met with favorable receptions, such as: *Le magister* at the Théâtre Français, *Le bibelot* at the Palais-Royal, in 1877, and *Molière en prison* at the Odéon, 1886.

HERWARTH VON BITTENFELD, hĕr'värt fŏn bĭt'ten-fĕlt, KARL EBERHARD (1796-1884). A Prussian general. He was born at Grosswerther in Prussia, and entered the army in 1811. He gained his first laurels in the War of Liberation, especially in the battle of Leipzig. In 1848 he commanded the First Regiment of

the Guards. During the war with Denmark in 1864 he acquired fame through his daring crossing of the Sound and capture of the Isle of Alsen. In the campaign of 1866 he was in command of the right wing of the army which advanced into Bohemia. He bore the brunt of the fighting at Hühnerwasser and Münchengrätz, and contributed materially to the victory of Sadowa. On the outbreak of the war of 1870 he was appointed Governor of the Rhenish Provinces, and in the next year he was raised to the rank of general-field-marshal.

HERWEGH, hĕr'vĀK, GEORG (1817-75). A German poet. He was born at Stuttgart; was educated there and at Maulbronn, forsook theology, which he had begun to study, for literature, and returned to Stuttgart, where he coöperated in Lewald's *Europa*. In 1841 he was living in Switzerland and published *Gedichte eines Lebendigen* (last ed. 1896), political poetry full of the unrest, the dissatisfaction with the existing conditions, and the uncertainty as to what should take its place, that marked the period. These fervent effusions became immensely popular, so that when, after a short trip to Paris, Herwegh journeyed through Germany in 1842, he was greeted with enthusiasm everywhere. King Friedrich Wilhelm IV. gave him an audience, and assured him that he liked nothing better than an energetic opposition. But the young man overstepped all the bounds of conventionality in a letter to the King, and was hurried out of Prussia. At Zürich he found no pleasant reception, and he took up his abode in Paris, and wrote a second volume of *Gedichte eines Lebendigen* (1844). In this his republican tendencies were more plain than ever, but his inspiration seemed weaker. He translated all of Lamartine into German (1843-44). After the Revolution of February, 1848, Herwegh made several attempts to carry out his republican ideas by invading Baden at the head of a legion of German and French workingmen, but was defeated by the Württemberg troops, and escaped only through the bravery of his wife. Thereafter he lived in retirement in Paris, and later in Zürich and at Lichtenthal, near Baden-Baden. The most important work of his later years was the translation of many of Shakespeare's plays. Consult Marcel Herwegh, *Briefe von und an Georg Herwegh* (Zurich, 1896).

HERZ, hĕrts, HENRI (1806-88). A French pianist, born in Vienna. He studied music under Hünten at Coblenz and at the Paris Conservatory, where he won first prize for piano-playing. He made a number of tours which were highly successful; in Germany, with the violinist Lafont (1831); in London, appearing with Moscheles and Cramer (1834); in the United States, Mexico, and the West Indies (1845-51). From 1842 to 1874 he was professor of piano-playing at the Paris Conservatory. He founded a piano factory, and in 1855 his instruments received first prize at the Paris Exhibition. Herz's compositions were confessedly written to catch the popular fancy, and, though they succeeded, have little permanent value. His best works were *Etudes*, and exercises for the piano. He published *Mes voyages en Amérique* (1866), a series of letters describing his American tour.

HERZ, HENRIETTE (1764-1847). A German woman, distinguished for her rare beauty and cultivation, as well as by her relations to many of the most distinguished men of her time. She was born in Berlin, the daughter of a Jewish physician, Benjamin de Lamos, and at fifteen years of age became the wife of Markus Herz, a rich and elderly physician. Her home became the centre of the literary life of Berlin, and such men as the Humboldts, Friedrich and August Wilhelm Schlegel, Fichte, Varnhagen von Ense and his wife Rachel, Schleiermacher, and Börne were her intimate friends. She was left a widow in 1803, and became a Christian in 1817. Consult Fürst, *Henriette Herz: Ihr Leben und ihre Erinnerungen* (Berlin, 1850).

HERZEGOVINA, hĕr'tsâ-gô-vē'nâ. The smaller of the two Ottoman provinces occupied by Austria-Hungary, in accordance with the treaty of 1878 (Map: Austria-Hungary, F 5). It forms part of Bosnia in the wider sense. It is bounded by Bosnia proper on the north, by Montenegro on the east, and Dalmatia on the southwest. Its area is 3530 square miles. In the formation of its surface it resembles Bosnia (q.v.). It is generally somewhat barren, and is mountainous, having a number of peaks exceeding 7000 feet in height, the highest being the Maglić on the eastern boundary, which rises about 7850 feet above the sea. The eastern part is especially barren and rocky, in contrast with the part adjoining Bosnia and Dalmatia, which is fertile, and invites the cultivation of the vine, tobacco, and southern fruits. In this latter district is found the largest river, the Narenta, whose valley forms the characteristic feature of the region. Administratively Herzegovina is a dependency of Bosnia, and forms (within reduced limits) the district of Mostar. There are no official figures for the population, but its number may be set down at approximately 200,000. The great bulk of the inhabitants are Slavs. The capital is Mostar (q.v.), which is connected by rail with Serajevo, the Bosnian capital.

Herzegovina was originally a part of Dalmatia and was occupied by a Slavic population in the seventh century. The most important of the mediæval principalities of the region was that of Zachlum or Chulm, which in the fourteenth century was annexed to Bosnia. Regaining its independence, Herzegovina was erected into a dukedom by the Emperor Frederick III. in 1440. (Hence the name Herzegovina, from Ger. *Herzog*, Slav. *herceg*, duke.) About 1463 the country became tributary to the Turks, and twenty years later was completely subject to them, remaining for more than two centuries afterwards a battlefield between Christians and Mohammedans. In 1875 a serious insurrection, arising from the Turkish oppression of its Christian inhabitants, broke out in Herzegovina, which rapidly spread into Bosnia, and was supported by Montenegro and Servia. This ultimately led to the war of 1877-78 between Russia and Turkey. The Berlin Congress of 1878 determined that Herzegovina, like Bosnia, should be occupied by Austria-Hungary. The Mohammedan inhabitants rose against the Austrian army of occupation, and were subdued only after a desperate resistance. The introduction of a new recruiting law was the occasion for an insurrection in 1881-82. The Austro-Hungarian Government has done much to promote the welfare of the region. See BOSNIA.

HERZEN, hĕrts'en, ALEXANDER IVANOVITCH (1812-70). A Russian publicist and author, born

at Moscow. He was the illegitimate child of a rich nobleman, Ivan Alexeyevitch Yakovlyeff. He received the fashionable French education of the time, and while at school became a great admirer of the contemporary French socialists. Arrested in 1834 with his comrades, he was sent to Perm and then to Viatka, where he held a position in the Governor's office. Transferred to Vladimir, he married, bringing his bride secretly from Moscow. In 1840 he was allowed to return to Moscow. A close study of Hegel, whose teachings were then in the ascendency, brought him to conclusions quite opposite to those of most of his friends. Under the influence of the doctrines of Proudhon, Cabet, and Louis Blanc, he became a rabid Westerner as distinguished from the Slavophils. He resigned his Government position in 1842, and left Russia in 1847, after having published, under the pseudonym of 'Iskander,' two works on philosophy as well as several novels. He settled in Paris, was in full sympathy with the events of 1848, although not actively engaged in them, and later was on intimate terms with Proudhon, Garibaldi, as well as with many revolutionists in France, Italy, and Switzerland, and carried on a systematic agitation against the absolutist Government of Russia. Forced by the police to leave Paris, he was naturalized in Switzerland, and, founding a free press in London, published after 1857 his weekly *Kolokol* ("The Bell"). From 1864 to 1867 he published it at Geneva, and moved to Paris in 1869, where he soon died of pneumonia. His literary activity began as early as 1830. His works are strikingly brilliant, characterized by depth of thought and artistic form. His best-known novel, *Who Is to Blame?* deals with the questions of freedom of feelings, family relations, and woman's position in wedlock. The dominant idea is that it is futile to seek happiness by locking one's self up within the narrow family interests away from society and the world. A great admirer of Western civilization, he was completely disappointed in it when viewing it at close range, and was disgusted with the mercantilism of the *bourgeoisie*, but saw a bright future for the working classes, and expected much from the regenerative power of Russia, with her communistic village system of the *mir*. These ideas he embodied in his *Vom andern Ufer* (1850; published in Russian, 1855; in French, 1870); and in his *Letters from France and Italy*, in which he gives a keen analysis of the causes that brought on the revolutionary events of the time. He was a freethinker in the broadest sense of the word, hence his negative attitude toward all parties and creeds. His influence was overwhelming, the greatest secrets of the State and the Imperial household immediately finding their way into his paper, a copy of which was very often placed in the Emperor's room. But his popularity was undermined by his advocacy of the Polish rebellion, he having for a long time stubbornly refused to lend any assistance, until finally persuaded by his friend Bakunin (q.v.). The circulation of the *Kolokol*, from over 3000 fell to about 500, and Herzen finally stopped its publication. Besides the works mentioned, the following are among his best: *Dilettantism in Science* (1842); *Letters on the Study of Nature* (1845-46); *From the Memoirs of Doctor Krupoff* (1847); *Recollections of My Travels* (1848); *On the Development of Revolutionary Ideas in Russia* (1851); *Baptized Property* (1853), or "Serfism"; *Prison and Exile* (1854); *My Exile* (1855); *Interrupted Tales* (1856); *France or England* (1858); *The Old World and Russia;* and *The New Phase of Russian Literature* (1864). His collected works in Russian were published in ten volumes at Geneva (1875-85). *Who Is to Blame?* was published at Saint Petersburg in 1891, his correspondence with his friends in the *Monthly Russian Thought* in 1890. In French his works appeared as follows: *Mémoires*, vols. i.-iii. (Paris, 1860-62); *Récits et nouvelles* (ib., 1873). The *Kolokol* appeared at Brussels in 1863-65, under the title *Cloche*. For a biography, consult: Eckhardt, in *Jungrussisch und Altlivländisch* (Leipzig, 1871); and Sperber, *Die sozialpolitischen Ideen A. Herzens* (Leipzig, 1894).

HERZLIEB, hĕrts'lēb, MINNA (1789-1865). A friend of Goethe, who addressed to her several of his sonnets, and in his *Wahlverwandtschaften* is supposed to have represented her under the name *Ottilie*. Consult Gädertz, *Goethes Minchen* (Bremen, 1888).

HERZOG, hĕr'tsōg, EDUARD (1841—). First bishop of the Old-Catholic Church of Switzerland. He was born at Schongau, Switzerland, August 1, 1841. He studied theology at Tübingen and Freiburg; was ordained priest in the Roman Catholic Church, 1867, and was professor of exegesis in the theological seminary at Lucerne (1868-72). He joined the Old Catholic organization (1872), and was pastor of Old Catholic churches at Krefeld, Germany (1873), and at Olten, Switzerland (1874), and professor of New Testament exegesis in the Old Catholic faculty at the University of Bern. He was called to be bishop by the national synod in 1876. He has written many polemical and controversial articles.

HERZOG, ERNST VON (1834—). A German classical philologist, born at Esslingen. He was appointed a professor in the University of Tübingen in 1867. His publications relate chiefly to the constitutional history of Athens and Rome. The most important among them are: *Galliæ Narbonensis Historia* (Leipzig, 1864); *Geschichte und System der römischen Staatsverfassung* (ib., 1884-91); *Zur Verwaltungsgeschichte des attischen Staats* (Tübingen, 1897).

HERZOG, HANS (1819-94). A Swiss general, born at Aarau, and educated there. His enforced military service in 1839 interested him in the art of war; he volunteered in the Württemberg artillery in 1846; and in 1860 was appointed by the Federal Council chief of the Swiss artillery. He introduced new arms for both infantry and artillery. At the beginning of the Franco-Prussian War he was put in command of nearly forty thousand men to guard the Swiss frontier, and vigorously opposed the disbanding of more than half this force in August, 1870. At the beginning of 1871 he commanded at the French frontier, and entered into a convention with General Clinchant at Verrières by which Bourbaki's army was allowed to cross into Swiss territory on laying down its arms. His experiences of this year made him more eager than ever in his attempts to better the condition of the army in his old post of chief of artillery. He died at Aarau. Consult Bluntschli, *Karl Johann Herzog* (Zurich, 1895).

HERZOG, JOHANN JAKOB (1805-82). A religious editor and scholar. He was born at Basel, September 12, 1805. He studied at Basel and Berlin, and filled the position of professor of historical theology at Lausanne, Halle, and Erlangen. He retired in 1877, and died at Erlangen, September 30, 1882. He was a voluminous writer, and published a sketch of Calvin (1843), a life of Œcolampadius (1843), works on the Waldenses (1848 and 1853), and *Abriss der gesamten Kirchengeschichte* (1876-87; 2d ed. by Koffmann, 1890-92). His greatest work was the religious encyclopædia known as *Real-Encyclopädie für protestantische Theologie und Kirche* (22 vols., Gotha, 1853-68; 3d ed. by A. Hauck, 1896 et seq.; 12th vol. 1902), of which he was editor and to which he contributed 529 articles.

HERZOG, KARL JOSEPH BENJAMIN (1827-1902). A German statesman, born at Brieg and educated at Breslau. He was assistant in the ministerial Department of Commerce (1859) and representative of the North German Federation at the Paris Exposition (1867); in 1871 he was a member of the commission on the government of Alsace and Lorraine, and later (1876) became Assistant Secretary of State in the department for these provinces, and (1879) Secretary of State in their first Ministry, from which he resigned a year later because of his opposition to the policy of Von Manteuffel. He traveled in America (1881-82), and wrote *Reisebriefe aus Amerika* (1884).

HERZOGENBERG, hĕr-tsō'gen-bĕrk, HEINRICH VON (1843—). An Austrian musician, born at Gratz. He studied at the Vienna Conservatory (1862-64), and in 1874, at Leipzig, founded the Bach-Verein in conjunction with Spitta, Holstein, and Volkland. In 1875 he succeeded the latter as its director. He was professor of composition at the Berlin 'Hochschule für Musik' (1885-92); and also a member of the Akademie, and president of the 'Meisterschule' for composition. His compositions include: The oratorio, *Die Geburt Christi;* a symphonic poem, *Odysseus;* two symphonies; and many psalms for chorus and orchestra, and instrumental pieces.

HERZOG ERNST, hĕr'tsōg ĕrnst. A poem of the twelfth century of Bavarian origin, but of unknown authorship. Its subject is the exploits of Ernst of Swabia in the Orient during his banishment.

HESEKIEL, hā-zā'kē-ĕl, GEORG LUDWIG (1819-74). A German novelist, born at Halle, the son of Friedrich Hesekiel, a religious poet, and educated at Halle, Jena, and Berlin. He was editor of *Die Rosen* at Altenburg (1846), of the *Patriotischer Hausfreund* at Zeitz (1848), of the Berlin *Kreuzzeitung* (1849), and of the *Berliner Revue* (1855); but he is best known for his poems and novels, which are marked by a distinctly conservative and monarchical patriotism. Among the former are: *Gedichte eines Royalisten* (1841); *Zwischen Sumpf und Sand* (1863); *Aus dem Dänenkrieg* (1864); *Neue Gedichte* (1866); and *Gegen die Franzosen* (1870). His novels include: *Das liebe Dorel* (1851); *Vor Jena* (1859); *Von Jena nach Königsberg* (1860); *Stille vor dem Sturm* (1862); *Unter dem Eisenzahn* (1864); *Refugiert und emigriert* (1869); *Graf d'Anethan d'Entrague* (3d ed. 1861); *Von Turgot bis Babeuf* (2d ed. 1873); and *Lilienbanner und Tricolore* (1859). He also wrote *Das Buch vom Grafen Bismarck* (3d ed. 1873).

HESEKIEL, LUDOVICA (1847-89). A German novelist, daughter of the above, born at Altenburg. She early entered journalism, and in literature devoted herself to historical fiction and to biography. She married Wilhelm Johnsen, pastor at Neustadt, in 1887. Among her novels the most important are: *Eine brandenburgische Hofjungfer* (1868); *Von Brandenburg zu Bismarck* (1873); *Unterm Sparrenschild* (3d ed. 1893); *Deutsche Träumer* (2d ed. 1897); *Prinz Wilhelm* (2d ed. 1897); *Jesus meine Zuversicht* (3d ed. 1894); *Des Kaisers Gast* (3d ed. 1894); and *Andernach und Clairveaux* (1889). She also wrote the sketches *Barackenleben* (1872), and the biographies, *Elisabeth Luise* (1881), *Agnes Fürstin Reuss jüngerer Linie* (1887), and *Augusta-Kaiserin-Königin* (1890).

HE'SIOD (Gk. *Ἡσίοδος, Hēsiodos*). After Homer, the earliest Greek poet whose works have survived. The date at which he lived is uncertain. Herodotus regarded him as contemporary with Homer, and dated both of these at 400 years before his own day, i.e. in the middle of the ninth century B.C. Ephorus thought him older than Homer; the Parian Marble (q.v.) also takes this view and makes him thirty years the elder; but the Alexandrians, Eratosthenes, and Aristarchus, held that the treatment of the myths and the geographical knowledge shown in Hesiod's works proved him to be younger. Modern criticism has shown clearly that the Hesiodic works exhibit a knowledge of the *Iliad* and *Odyssey* in their present Ionic dialect, and in very much their present form; on the other hand, it is certain that Hesiod's *Works and Days* were known to Simonides and Archilochus, so that we may safely place Hesiod in the second half of the eighth century, or perhaps about B.C. 700.

Our knowledge of his life is derived almost solely from his poems; the ancient scholars had no better source of information. From notices in his *Works and Days*, and other scattered sources, we learn that his father, under stress of poverty, came to Bœotia as an emigrant from Cyme, an Æolian town in Asia Minor, and settled in the petty village of Ascra beneath Mount Helicon. Here probably Hesiod was born. In his youth he watched the sheep on Helicon. At his father's death his brother Perses succeeded in cheating him of his proper inheritance by corrupting the judges; but later, this unjust brother was reduced to such poverty that he was forced to appeal for aid to Hesiod. Under the impulse of his homely muse, Hesiod, like other early bards, became a wandering singer, visiting not simply the cities of his native Bœotia, but also traveling to the west past Delphi, until he reached Naupactus in Ozolian Locris. Tradition says that the Delphic oracle had warned him that he was destined to die in the shrine of the Nemean Zeus; but the poet in the course of his travels came to Œneon in Locris, quite unaware that here also was a temple of the god whose sacred precinct he was to avoid. In this town he is reported to have met his death at the hands of two brothers who without foundation suspected him of wronging their sister. The tradition may well have this truth, that Hesiod died in Locris. At Naupactus a school of Hesiodic poetry developed, one product of which was the

genealogical poem *Ναυπάκτια*, fragments of which are embodied in the Scholia to Apollonius Rhodius. In later times a grave of Hesiod was to be seen in the market-place at Orchomenus, to which tradition said the poet's bones had been removed at the command of the Delphic Oracle.

Hesiod was the founder of Greek didactic poetry, as Homer of epic song. The following works are extant under his name: *Works and Days* (*Ἔργα καὶ Ἡμέραι*) in 828 verses, which the Bœotian tradition on Helicon regarded as his only genuine work. The first part of its name (*Works*) comes from the directions for various kinds of labor which it contains; the second (*Days*) is due to the calendar it gives, showing the days of the month on which certain tasks should be performed. The poem in its present form no doubt contains some later additions, but scholars are not agreed as to the extent of these interpolations. The *Theogony* (*Θεογονία*) in 1022 verses is an attempt to bring Greek mythology into an ordered system, and to incorporate into the ranks of the older divinities the new gods from abroad, which were not known to the Homeric poems. In it theosophic and cosmogonic speculations are combined with ancient hymns and accounts of cults. Under the epic form Hesiod gives a history of the creation and of the generations of the gods; the close of the poem contains a list of the daughters of Zeus, who bore sons to mortals. We have to regret the loss of the *Catalogue of Women* (*Γυναικῶν Κατάλογος*), which gave a list of the mortal women who had become the mothers of heroes, and some account of these heroes' exploits. The poem was divided into five books, of which probably the last two bore the special title *Ὁποῖαι* from the fact that each division began with *ἢ οἵη*, 'or such a woman.' The extant *Shield of Hercules* (*Ἀσπὶς Ἡρακλέους*) in 480 verses borrowed its introduction from the fourth book of the preceding work. The greater part of the poem is occupied with an account of the shield of Hercules, which is an inferior imitation of the description of Achilles's shield in the *Iliad*. There were a number of other Hesiodic poems in antiquity; of these only scanty fragments are left. The *Contest Between Homer and Hesiod* (*Ὁμήρου καὶ Ἡσιόδου Ἀγών*) usually printed with Hesiod's works is a product of the time of Hadrian.

Hesiod exhibits none of the splendid imagination and vivid power of Homer; his verses are filled with sayings and homely precepts; they offer a calendar and a mythology for the common people. But the form is the same as that of the Homeric poems and the dialect on the whole shows little divergence. Hesiod was, however, highly prized for his moral precepts, and the poems played an important part in Greek education. Their influence, especially that of the *Works and Days*, was not confined to Bœotia and Locris, where a Hesiodic school developed, but extended to Ionia, and can be seen in the development of iambic poetry. The poems formed the subject of learned comment from the Alexandrian Age to the Byzantine period. The best editions are by Lennep (Amsterdam, 1843); Schömann (Berlin, 1869); Flach (Berlin, 1874); Göttling-Flach (Leipzig, 1878); Rzach (Leipzig, 1884); Sittl (Athens, 1890). There are translations of the *Works and Days* by Chapman (London, 1858); of the entire poems by Elton (2d ed., London, 1832), and by Banks (London, 1892). Consult also: Fick, *Hesiod's Gedichte* (Göttingen, 1887); Grote's *Greece*, vols. i. and ii. passim (5th ed., London, 1888); and the histories of Greek literature.

HESPE'RIA (Lat., from Gk. *Ἑσπερία*, from *ἑσπέρα*, *hespera*, *ἕσπερος*, *hesperos*, west, Lat. *vesper*, evening; probably connected ultimately with OHG. *westan*, Ger. *Westen*, Eng. *west*, and with Gk. *ἄστυ*, *asty*, city, Skt. *vāstu*, house, from *vas*, to dwell). The land of the west, a term applied by the ancient Greek poets to Italy, and by the Roman writers sometimes to Italy and sometimes to the Iberian Peninsula.

HESPERIDES, hĕs-pĕr'ĭ-dēz (Lat., from Gk. *Ἑσπερίδες*, *Hesperides*, *from ἑσπέρα*, *hespera*, evening). In the earliest version, the daughters of Night, who on an island far beyond the western ocean guard with the dragon Ladon the golden apples, symbol of love and fruitfulness, which Gæa produced as a wedding gift for Zeus and Hera. The number and names varied, but the common version seems to have known three, Ægle, Erythea, and Hesperethusa. Later genealogists represented them as daughters of Atlas, who was also localized in the far West. With the aid of Atlas Hercules secured three of the apples for Eurystheus, but they were restored by Athena.

HESPERIDES. The title of the collection of Robert Herrick's poems published in 1648. It contains his most charming lyrics and the larger part of his work, filling two volumes of the fine edition by Grosart (1876).

HES'PERIS. See DAME'S-VIOLET.

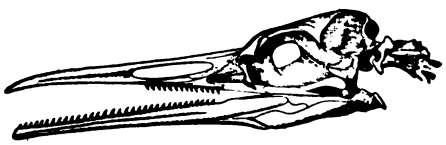
HESPERORNIS, hĕs'pēr-ôr'nĭs (Neo-Lat., from Gk. *ἕσπερος*, *hesperos*, west + *ὄρνις*, *ornis*, bird). A primitive, flightless, toothed sea-bird, found fossil in the Middle Cretaceous shales of western Kansas, and, excepting Archæopteryx, the oldest bird known. The first skeleton was discovered in 1871 by Prof. O. C. Marsh, near the Smoky Hill River, in marine deposits of yellow chalk and calcareous shales, and was named *Hesperornis regalis*. Several other species have since become known; and Enaliornis, of the Upper Greensand of Cambridge, England, appears to be a closely allied form. It was a large, well-feathered water-bird, having the general habits

THE HESPERORNIS.

After a drawing by Joseph Gleeson, representing an ideal figure, in the attitude of swimming; based upon skeletons in the National Museum.

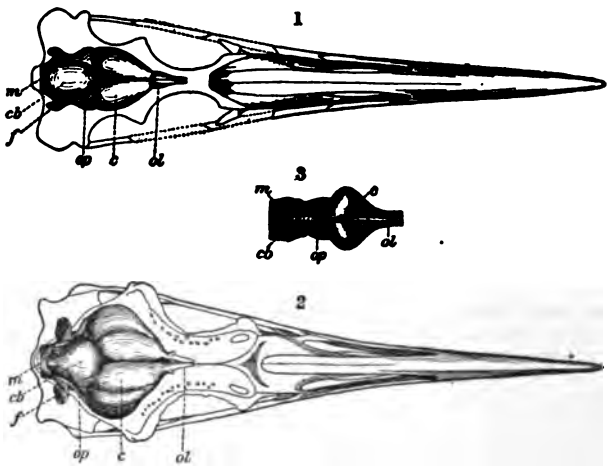
of a loon, perhaps, ranging the open sea, and scrambling upon land only for breeding. Its food was mainly fishes, which it pursued by swimming and diving, for it had no wings. There is reason to believe that this winglessness was

due to degeneracy from fully winged ancestors. Hesperornis was more than five feet in length, and if its ancestors were equally bulky their wings were quite too large to use under water, but would be folded close against the body when the bird dived or swam. This constant disuse, as the race became more and more exclusively aquatic, would permit the wings to dwindle. By the time the wings were small enough to be of use as paddles under water, as modern auks use theirs, the muscles had become too feeble to move them in so dense a medium, and so degeneration continued until only a remnant of humerus remained. Correlative with this was a constant growth and strengthening of the legs, which became of great size (though the bones remained hollow, like those of an aërial bird) and so twisted as to turn edgewise when the foot was brought forward after each stroke, thus offering least resistance to the water. The original skeleton set up by Marsh, and depicted in his *Odontornithes*, stood erect like a penguin. When an attempt was made at the National Museum to mount another skeleton in a swimming attitude, it was discovered that this position required an altogether novel arrangement of the legs, such as is shown in the accompanying sketch of a restoration based by Lucas (see above) upon this skeleton. It appears that the legs of this bird must have stood out almost at right angles, and have acted like a pair of oars.



SKULL AND TOOTHED BEAK OF HESPERORNIS REGALIS.

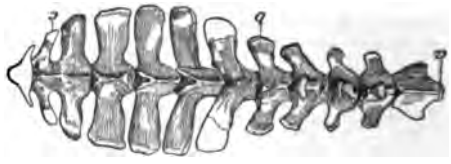
To this most powerful apparatus for swimming and chase was added the best of means for seizing and holding the agile, slippery, and often bone-incased prey, in the form of a long neck, capable of rapid flexure and thrust, and long slender jaws, armed with sharp recurved teeth resembling those of reptiles. They were set in a common alveolar groove (hálcodont dentition)—



COMPARISON OF SKULLS AND BRAINS.

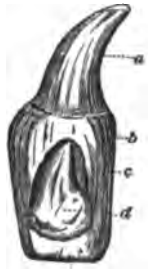
1. Skull and brain-cavity of *Hesperornis regalis*, from above. 2. Skull and brain-cavity of modern loon. 3. Cast of brain-cavity of a young alligator: *ol*, olfactory lobes; *c*, cerebral hemispheres; *op*, optic lobes; *cb*, cerebellum; *f*, flocculi; *m*, medulla. (After Marsh.)

a fact which differentiates Hesperornis from the higher Ichthyornis and its relatives, whose teeth were implanted in separate sockets (thecodont). (See ODONTORNITHES.) In the upper jaw the teeth were confined to the maxillary bone alone, but in the lower jaw they extended to the tip of the ramus. As this lower jaw was united in front only by a cartilage, as a serpent's, and had on each side a joint which admitted of some elbow-like motion, the power of swallowing was very extensive. The skull, though shaped like that of a loon, had many struthious characters, and the brain was distinctly reptilian in form, and only about one-third as large as that of a modern loon. The skeleton as a whole closely approximates that of modern birds. The vertebræ resemble those of a loon. The shoulder-girdle, in its original structure, as well as in its degeneracy, and the sternum, which has no keel, are ostrich-like; and it is in the pelvic arch more than elsewhere that traces of reptilian ancestry are evident. The tail contained 12 vertebræ—more than are or have been possessed by any other known bird since Archæopteryx; and they were solid, firmly locked together and winged, so that the outline of the caudal skeleton is spatulate. This, with the evidently strong musculature, would give great power, similar to that of a beaver's tail, and doubtless the organ was an important aid in swimming, by a sculling motion, as well as in steering and controlling progress.



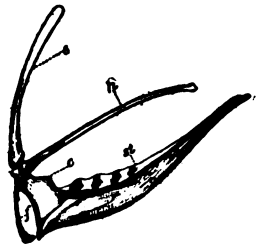
BONES OF THE TAIL.

Caudal vertebræ of *Hesperornis regalis*, seen from above: *a*, anterior convex face of first caudal; *b*, tranverse process.



A TOOTH OF HESPERORNIS.

a, crown; *b*, root; *c*, absorbed cavity in the root, containing a young tooth (*d*).



SHOULDER-GIRDLE.

Hesperornis regalis: *s*, scapula; *h*, humerus; *f*, clavicle, or furculum; *c*, coracoid; *st*, sternum.

Whether it bore quill-feathers in pairs, as did the long tail of Archæopteryx, is not known. The legs and feet resemble those of a grebe on a large scale, and it is fair to suppose that they were externally lobed in a similar way. The feathers on the legs, at least, as is known from impressions in the rocks, were soft and rather scanty.

Hesperornis survived for a long period, during which the interior of North America was a shallow sea, stretching from the Alleghanies to the Rocky Mountains, broken by little except the island summits of the Ozark Hills. Professor Marsh says that apparently there was an absence of enemies in the air to be feared by this great diver, since it was more than a match for the huge but toothless pterodactyls, which hovered over the waters in great numbers. The warm sea teemed with fishes and other food; but it also teemed with great swimming lizards (mososaurs), turtles a dozen feet in length, and large predaceous fishes. As the gradual rise of the land toward the close of the Cretaceous epoch more and more inclosed the sea and modified conditions, the struggle for life became too hard for many of its denizens, and Hesperornis was among those which early succumbed. With it disappeared forever a primitive type of bird life, for this branch of the avine stock seems to have terminated without leaving any descendants.

BIBLIOGRAPHY. The fullest descriptions and illustrations of Hesperornis are contained in Marsh, *Odontornithes: A Monograph of the Extinct Toothed Birds of North America* (Washington, 1880). Consult, also: Cope, *Cretaceous Vertebrates of the West* (Washington, 1877); Williston, various papers in the *Annual Reports of the University Geological Survey of Kansas* (Lawrence); Lucas, *Animals of the Past* (New York, 1901); Newton, *Dictionary of Birds* (New York, 1896). See BIRD; FOSSIL; ICHTHYORNIS; ODONTORNITHES.

HESPERUS (Lat., from Gk. Ἕσπερος). The name given by the Greeks to the evening star Venus. He is the son of Astræus, or Cephalos, and Eos, and the father of the Hesperides. As the morning star he is called Phosphorus (Lucifer).

HESPERUS. A surname given to the Green Knight, Sir Pertolope, in the legend of King Arthur. With his three brothers he guarded the approaches of Castle Perilous. In Tennyson's *Idylls of the King* he is called the 'Evening Star,' but his famous combat takes place at dawn.

HESS, HEINRICH, Freiherr von (1788-1870). An Austrian general, born in Vienna. He entered the army in 1805, distinguished himself at Wagram, and served in the campaigns of 1813 and 1814. In 1815 he was employed in the War Department, but soon returned to active service, and in 1821 was in the army of occupation in Piedmont. Transferred to the General Staff in 1831, he served in Lombardy, where he greatly improved the organization of the army. Hess was promoted to the rank of brigadier-general in 1834, and to be field-marshal-lieutenant in 1842. In 1849 his ability as quartermaster-general was recognized by Radetzky, as contributing largely to the success of the campaign in Italy. During operations in the East (1854-55), Hess commanded the observation corps in Galicia and Transylvania. In 1859 he was sent to Italy, and was involved in the Emperor's defeat at Solferino, but for his part in the truce of Villafranca was made field-marshal. Two years afterwards he was named a member of the House of Lords for life.

HESS, HEINRICH VON (1798-1863). A German painter, born at Düsseldorf. He studied with his father, Karl Ernst Christoph Hess (1755-1828), an engraver, born at Darmstadt. He attracted attention at an early age, and was sent to Italy in 1821 to complete his studies. In 1828 he was made professor at the Munich Academy, and in 1849 director of all the galleries in the city. The frescoes in the Basilica of Saint Boniface, twenty-two scenes from the life of that saint, in the execution of which he was assisted by Koch and Schraudolph, and those in the Church of All Saints (both in Munich), are probably his best works. He also produced other notable frescoes and many cartoons for windows. His oil paintings include: "Saint Luke," "Christmas Eve," and "Faith, Hope, and Charity." One of his best portraits is that of Thorwaldsen.

HESS, JOHANN (1490-1547). A German preacher of the Reformation, born at Nuremberg, and educated at Leipzig and Wittenberg. He returned to Wittenberg (1520), after acting as secretary to the Bishop of Breslau and traveling in Italy, where he came under the influence of the humanists. Strongly influenced by Luther and Melanchthon, he went back to Breslau, and did much for the spread of the Reformation there. Consult Köstlin, "Johann Hess, der Breslauer Reformator," in the *Zeitschrift des Vereins für Geschichte und Altertum Schlesiens*, vols. vi., xii. (Breslau, 1893-99).

HESS, hĕs'se, JOHANN JAKOB (1741-1828). A Swiss theologian, born at Zurich, where he became deacon (1777) and (1795) superintendent of the churches in the canton. He wrote original studies on the life of Christ: *Geschichte der drei letzten Lebensjahre Jesu* (1768-73); *Jugendgeschichte Jesu* (1773); and, including these, *Lebensgeschichte Jesu* (8th ed. 1822-23). Consult: Escher, *Johann Jakob Hess* (Zurich, 1837), and Zimmermann, *Die Zürcher Kirche von der Reformation bis zum dritten Reformationsjubiläum* (Zurich, 1877-78).

HESS, KARL ADOLF (1769-1849). A German animal painter and etcher, born in Dresden. He was a pupil of Kloss, traveled in Hungary, Russia, and Turkey, and afterwards became professor at the Vienna Academy. He is noted for his pictures of horses, and his drawings and sketches of those subjects are also prized.

HESS, PETER VON (1792-1871). A German battle painter, born at Düsseldorf. He was the son of Karl Ernst Christoph von Hess, the engraver, and the brother of Heinrich von Hess. He studied under his father, and then in the Munich Academy, and was with the German Army in the campaign of 1813-15. His first large picture was the "Battle of Arcis-sur-Aube" (1817). Afterwards he was appointed painter to the Bavarian Court. In 1839 he went to Russia, and painted two pictures from scenes in the War of 1812 for the Emperor Nicholas. His other works include some genre pictures; a series of oil sketches for the Munich 'Hofgarten,' representing Greek stories; "The Entrance of King Otho into Nauplia;" "Saint Leonard's Festival

in Bavaria;" "Plundering Cossacks;" "A Marketing Scene;" and a "Surprise;" all minutely painted and of good color.—His brother KARL (1801-74), born at Düsseldorf, was an animal, landscape, and genre painter. Notable works by him are: "On Lake Starnberg" (1835); "A Tyrolese Landscape" and "Cattle in a Pasture" (1822), both in the National Gallery, Berlin. He was also an engraver.

HESS, RICHARD (1835—). A noted German forester. He was born at Gotha, studied at Aschaffenburg and at Göttingen, and at the age of twenty-three entered the forestry service at Gotha. In 1868 he was appointed director of the Academic Institute of Forestry at the University of Giessen, where he also occupied a chair as one of the professors. His chief book is *Der Forstchutz* (Leipzig, 1876-78; 3d ed., 2 vols., 1896-99). Among his numerous other writings may be mentioned: *Grundriss zu Vorlesungen über Forstbenutzung und Forsttechnologie* (2d ed. Berlin, 1901); *Der akademische Forstgarten bei Giessen als Demonstrations und Versuchsfeld* (2d ed. Giessen, 1890); *Die Eigenschaften und das forstliche Verhalten der wichtigern in Deutschland vorkommenden Holzarten* (2d ed. Berlin, 1895); *Encyklopädie und Methodologie der Forstwissenschaft* (Nordlingen, 1885-92).

HESSE, hĕs (Ger. *Hessen*). A former landgraviate of Germany. The region was occupied in early times by the *Catti* or *Chatti* (German *Katten*). Their first appearance in history is in A.D. 15, when Germanicus destroyed their principal settlement, Mattium, the site of the present villages of Grosse and Klein Maden, near Gudensberg, in the Prussian district of Cassel. In the course of time the Catti became merged in the Frankish tribes, who, when they migrated into Gaul, left Hesse uninhabited, whereupon the Saxons took possession. The Carolingians ruled the country by means of counts, and the power soon became hereditary in one family, the head of this family being elected in 911 King of Germany as Conrad I. After his death and that of his brother Eberhard, the country fell into many divisions, until in 1137 Count Louis I. of Thuringia married the daughter of Count Geiss IV. of Gudensberg, who belonged to the most powerful family in Hesse, and soon thereafter the Hessian nobles accepted Louis as their overlord; but the Thuringian line of landgraves died out in 1247, with Heinrich Raspe, the opponent of Frederick II. In 1263, after a long contest, Sophia, niece of Heinrich Raspe, obtained full possession of Hesse, and from her son and successor, Henry I., surnamed the Child (died 1308), all the various branches of the Hessian family still trace their descent. His descendants added many valuable territories to their old patrimony. After the possessions of the house had been for a time divided, William II., in 1500, was in complete control of all Hessian territories, to which he added Homburg, and in 1509 his five-year-old son, Philip the Magnanimous, succeeded him. He was declared of age in 1518, and thereafter played a very prominent rôle in German affairs, and to some extent in Europe, being a leader in the German Reformation. (See PHILIP THE MAGNANIMOUS and LUTHER.) Philip, on his death, in 1567, divided his territory among his four sons. The eldest, William IV., obtained half of the Hessian domains, with Cassel for his residence; Louis, a fourth part, with Marburg; Philip, an eighth part, with Rheinfels; and George, an eighth part, with Darmstadt. The death of Philip and Louis left all the Hessian dominions in the two main lines of Hesse-Cassel and Hesse-Darmstadt. See HESSE (grand duchy); HESSE-CASSEL.

HESSE. A grand duchy of Germany, the eighth German State in size, lying between latitudes 49° 24′ and 50° 50′ N. and longitudes 7° 51′ and 9° 39′ E., consisting of two main divisions and eleven small exclaves. The northern main division, called the Province of Upper Hesse (*Oberhessen*), lies in the Prussian Province of Hesse-Nassau, and the southern between Prussia, Bavaria, Baden, and the Bavarian Palatinate (Map: Germany, C 4). Area, 2965 square miles. The Rhine traverses for about 55 miles the southern division of the duchy, which consists of the provinces of Rhine-Hesse and Starkenburg. Five of the exclaves border on, or are inclosed by, Baden and Württemberg. The remainder of the exclaves are within Prussian territory.

PHYSICAL FEATURES AND CLIMATE. The surface consists of level, hilly, and mountainous sections. Upper Hesse is mountainous, and is identified with the basaltic Vogelsberg, situated in the east, and rising to a height of about 2500 feet. From this group radiate spurs and outliers west and north through the province, leaving in the south the Wetterau, an extensive, undulating, and arable tract of Upper Hesse. Into the southwestern part of the province extends the northern end of the Taunus, about 2000 feet high. The eastern half of Starkenburg is also mountainous, being occupied by the Odenwald Range, with four peaks reaching about 2300 feet—Krähberg, Hardberg, etc. The western part is in the Rhine valley proper, and in the north lies the low region bordering on the Main. Rhine-Hesse is mostly in the Rhine plain. The western part of this province consists of a rolling country of hills. The Hardt Mountains enter on the southwest, but their highest point (the Eichelberg) has an altitude of only about 1050 feet. The Rhine and the Main form the north border of the southern division of Hesse. The whole grand duchy, except the Vogelsberg district, belongs to the Rhine basin. The Neckar barely reaches Hesse on the south. Other Rhine tributaries from the right are the Lahn, the Weschnitz, and the Modau. On the left the Rhine receives the Selz and Nahe. To the Weser basin section of Upper Hesse belong the Fulda and the Schwalm.

The climate differs somewhat in the two main divisions of the duchy, being rather raw and cold in most of the northern part, while the southern division (except the Odenwald) and the Wetterau have the mild climate of Southern Germany. The mean annual temperature in Darmstadt is 49° F.—in summer 65°, in winter 29.7°; average rainfall, 33 inches. There are several mineral springs and salt-water baths in Hesse; namely, at Salzhausen, Bad Nauheim, etc.

INDUSTRIES. The principal industry is agriculture, the soil being for the most part well adapted for farming. The land is divided into small holdings, as shown by the fact that out of the 133,840 holdings in the year 1895, over

59,000 contained less than 2½ acres each, and only about 9400 holdings contained over 25 acres each. Over 64 per cent. of the area is under cultivation. There is 31 per cent. in forest, more than one-third of which is State property. The forests constitute an important source of income-producing wealth. About one-half of the total area is arable, and one-eighth is in meadows and pastures. Rye, barley, wheat, and oats are cultivated. Hay and potatoes are produced in large quantities, and fruit is extensively grown. The cultivation of the vine, together with the production of fine wines, is a very important industry, not only in Rhine-Hesse, but on the slopes of the Odenwald. There were about 82,500 acres in sugar-beets and turnips in 1900. Agriculture is promoted actively by a Government board of agriculture at Darmstadt, by numerous associations, and excellent agricultural schools which instruct in all branches of farming, fruit-growing, etc. Fishing and hunting yield well commercially. Stock-raising as a separate industry can hardly be said to exist. In 1900 there were 59,091 horses, 330,679 cattle, 82,360 sheep, 124,790 goats, and 312,899 hogs.

The mining region of Hesse is found chiefly in the northern part, and produces coal, iron, and salt. In 1900 the mined minerals amounted to $474,000, and salt $125,000. The total of these products, together with those of the smelting-works and foundries, was about $2,525,000, the persons engaged numbering 3737. Peat is an important output, and Hainstadt-am-Main exports famous clays. The manufacturing industries are generally in a prosperous condition. Hesse is known for its manufactures of leather and leather goods. Other chief manufacturing products are tobacco and cigars, metal articles, paper, sugar, chemicals, spirits, etc. There were five sugar-factories in 1901. The province has many handicraft schools and courts of trade.

Commerce and Transportation. The trade of Hesse is of considerable importance, and is favored by many organizations and industrial banks, as well as by the central position of the grand duchy and the excellent transportation facilities. The exports consist mainly of agricultural and manufactured products; the chief imports are raw and half-finished materials. The river commerce is extensive, including much Belgian and Dutch trade. There are over 700 miles of railway, nearly all owned by Hesse, Prussia, and Baden.

Government and Finance. The government is that of a hereditary constitutional monarchy. The Grand Duke is very largely dependent on the civil list, which amounts to about $300,000. The Constitution was adopted in 1820, and has been repeatedly modified. The executive power lies in a responsible Ministry of three members, who are the heads of the departments of the Interior, Justice, and Finance. The Minister of the Interior is president of the Ministry, and is the Minister of Foreign Affairs and of the Ducal House. The legislative power is represented by two Chambers. The Upper Chamber is composed of all the princes of the reigning house, the heads of several noble families, the Roman Catholic bishop, a Protestant church dignitary, the chancellor of the University of Giessen, the representatives of the landed nobility, and not over twelve life members nominated by the Grand Duke. The Lower Chamber consists of ten members elected by the large municipalities and forty members returned by the small towns and rural communities. The members of the Lower Chamber are elected indirectly for six years. The Chambers meet each year. The three provinces are divided into eighteen circles. The provinces and circles have local councils elected by a restricted suffrage. The duchy is represented by three members in the German Bundesrat, and returns nine members to the Reichstag. The budget for 1901-02 was estimated at about $20,000,000. The chief items of revenue are from public domains, lottery, Imperial customs, and direct taxes. The chief articles of expenditure are for the Department of the Interior, lottery, service of the debt, and contributions of the Empire. The public debt amounted in 1901 to about $74,000,000, nearly all incurred for railways.

Population and Religion. The population was 992,833 in 1890 and 1,119,893 in 1900, showing an increase of nearly 13 per cent. for the decade. Hesse ranks seventh as to population among the German States. Number of inhabitants per square mile, 377.7. Emigrants are few. Darmstadt (q.v.) is the capital; the largest city, Mainz; other large towns are Offenbach and Worms. Over 65 per cent. of the inhabitants are Protestants. The Grand Duke is Protestant, and is the head of the Evangelical Church (embracing the Lutheran and the Reformed). It is governed by a synod and a consistory. The seat of the Roman Catholic bishop is at Mainz. The State contributes to both the leading faiths. This item was $120,000 in 1900.

Educational and Other Institutions. Education is free, compulsory, and maintained partly by the Government and partly by the communes. Secondary education was represented in 1900-01 by 29 gymnasia and 'real' schools, 5 high schools for girls, and 48 private schools. Advanced elementary schools—high schools and middle schools—numbered 34, and there were 902 'continuation schools' (*Fortbildungsschulen*), for scholars leaving the elementary schools. Higher education is supplied by the University of Giessen, and also by the Technical School of Darmstadt. The latter has about 1500 students. Both institutions are supported in part by the State. There are, in addition, not only the industrial schools, but numerous special institutions, as, for instance, a merchants' school and an ivory-carving school. The important libraries and museums number three each. Hesse has a State fire-insurance company, and institutions or pensions or insurance funds for all classes of needy, ill, or otherwise unfortunate persons, including indigent ladies of the nobility. In this respect Hesse is one of the most highly organized commonwealths in the world.

History. (See preceding article.) The line of Hesse-Darmstadt, the second main branch of the House of Hesse, is derived from George I., the fourth son of Philip the Magnanimous, Landgrave of Hesse, who, on the death of his father in 1567, obtained the Principality of Katzenelenbogen, with the town of Darmstadt for his residence, and received in 1583, on the death of his brother Philip without heirs, a third of the patrimony of the latter. (See Hesse-Cassel.) At his death, in 1596, he was succeeded in the greater part of his possessions by his eldest son, Louis V. (1596-1626), while another son,

Frederick, became the founder of the Hesse-Homburg line. Louis V. acquired a portion of Upper Hesse, and is noted as the founder of the University of Giessen (1607). His son, George II. (1626-61), and grandson, Louis VI. (1661-78) did much to promote learning and the arts. Under Ernest Louis (1678-1739) the country was laid waste by the French armies. The finances became disorganized, and Louis VIII., who succeeded and ruled until 1768, did little to mend them. Louis IX. (1768-90) was a wise and able ruler, a patron of art and letters. As a result of the French Revolutionary wars, under Louis X. (1790-1830), Hesse-Darmstadt changed its boundaries materially, on the whole to its gain. Louis X. joined the Confederation of the Rhine in 1806, and assumed the title of Grand Duke as such (Louis I.). At the Congress of Vienna (1814-15) he was obliged to make large cessions of territory to Prussia and Bavaria, receiving, however, by way of indemnification, a large district on the Rhine, including the towns of Worms and Mainz, in right of which he assumed the traditional title of Rhenish Grand Duke. At this time Hesse-Darmstadt became a member of the German Confederation. In 1820 Louis promulgated a constitution establishing a parliamentary form of government. He instituted various reforms and joined the Zollverein (q.v.) in 1828. The reactionary policy of Louis II. (1830-48) evoked a strong opposition in the Landtag, but the Grand Duke finally succeeded in subordinating the Chambers to his will. The February Revolution of 1848 in France, however, lent renewed strength to the Liberal Party. In answer to the popular demand for constitutional reform, the heir to the throne was named co-regent with the King; Gagern, the great leader and apostle of German unity, was made Minister of the Interior; and a far-reaching programme of reform adopted, many features of which were carried out only to be abrogated in the reaction which followed the revolutionary wave of 1848-49. Louis III. succeeded his father in 1848. His chief adviser, Dalwigk, was a bitter enemy of Prussia, and in 1866 Hesse-Darmstadt sided with Austria against the former. The Grand Duke made a vain appeal to Napoleon III., of whom he was a personal friend, for assistance. The Hessians were defeated at Laufach, July 13th, and Prussian troops occupied the grand duchy. The Grand Duke was forced to cede some territory, including the recently acquired Hesse-Homburg, to pay a heavy war indemnity, to receive a garrison in Mainz, and to enter into an offensive and defensive alliance with Prussia. The Hessian troops played a conspicuous part in the war against France, and Hesse-Darmstadt became a part of the new German Empire. Louis IV. (1877-92) did much to restore the finances and increase the prosperity of the duchy. He was succeeded by his son, Ernest Louis.

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HESSE, hĕs'se, ADOLPH FRIEDRICH (1809-63). A German organist and musical composer, born at Breslau. He displayed such marked ability while studying piano, organ, and composition there, that the city fathers gave him financial assistance to continue his musical education at Weimar, where he was a pupil of Hummel, and also came under the influence of Rinck and Spohr. For the last thirty-two years of his life he was organist of Saint Bernard's Church, Breslau, directed the symphony concerts of the town, and made occasional professional tours to Paris, London, and elsewhere. Of his large variety of compositions, the most important are for the organ, and a complete edition of them was edited by Dr. Steggall.

HESSE, ĕs, ALEXANDRE (1806-79). A French historical painter, born in Paris. He was the pupil of his uncle, Auguste Hesse (1795-1869), an historical and religious painter of some note. He succeeded Ingres in the Institute (1867). His pictures are Venetian in coloring, and well composed. One of the more notable works is "Pisani's Triumph" (1847), in the Luxembourg.

HESSE, hĕs'se, OTTO (1811-74). A German mathematician. He was born in Königsberg, and studied and taught there from 1840 to 1856. After that he held professorships of mathematics, successively, at Halle, Heidelberg, and in the Polytechnic School at Munich. He was a disciple of Jacobi, and contributed chiefly to geometry and the theory of determinants. His important mathematical works include: *Vorlesungen über die analytische Geometrie des Raumes* (1861; 3d ed. 1876); *Vorlesungen aus der analytischen Geometrie der geraden Linie, des Punktes und des Kreises* (1865; 3d ed. 1881); *Vier Vorlesungen aus der analytischen Geometrie* (1866; completed in 1874); *Die Determinanten, elementar behandelt* (1871); *Die vier Species* (1872). A list of his memoirs may be found in the *Catalogue of Scientific Papers of the Royal Society of London*, vols. iii. and vii. The name of Hesse is connected with an important determinant form known as the Hessian, or Hessian covariant, which is of great value in the study of curved lines and surfaces. (See DETERMINANTS.) An edition of his works was published by the Bavarian Academy of Sciences (München, 1897). Consult Noether, "Otto Hesse," in the *Zeitschrift für Mathematik und Physik*, vol. XX. (Leipzig, 1875).

HESSE-CASSEL, or ELECTORAL HESSE (Ger. *Hessen-Kassel*, hĕs'sen kă'sel). A former landgraviate, later electorate, of Germany, forming at present the District of Cassel (q.v.) in the Prussian Province of Hesse-Nassau.

HISTORY. The House of Hesse-Cassel, representing the elder line of the House of Hesse, was founded by William IV., the Wise, the eldest of the four sons of Philip the Magnanimous (1509-67). (See HESSE.) William, who ruled as Landgrave from 1567 to 1592, was a good administrator, and left a well-consolidated little principality to his son Maurice, who resigned the government in 1627 to his son, William V., and died in retirement five years later.

William (1627-37) fought on the side of Sweden during the Thirty Years' War, for which he was put under the ban of the Empire. His two brothers, Hermann and Ernest, founded the lines of Hesse-Rothenburg and Hesse-Rheinfels. In 1637, on the death of William V., Amelia Elizabeth, his widow, assumed the regency for their young son, William VI., and ruled with vigor and ability. In the Peace of Westphalia (1648) the greater part of Schaumburg and the Principality of Hersfeld were acquired. William VI. died in 1663, and was succeeded by his sons, William VII. (1663-70) and Charles I. (1670-1730). The latter inaugurated the practice, continued by his successors, of hiring out Hessian soldiers to fight in the service of foreign princes, by which the finances of the State were considerably augmented at the expense of the welfare of the people. On the death of Charles, his son Frederick I., who in 1720 had become King of Sweden, in right of his wife, the Princess Ulrike Eleonore, sister of Charles XII., resigned the government of his Hessian territories to his brother William VIII., who succeeded him as Landgrave in 1751, and ruled until 1760. He fought under the British and Hanoverian flag in the Seven Years' War, and gained considerable military renown for himself and his troops. Frederick II. (1760-85) kept up a splendid court on the subsidies received from the British Government for the services of the Hessians who fought against the Americans in the War of Independence, and expended much of his treasures in the patronage of art and in the erection of public edifices. Frederick, who had become a convert to the Roman Church, was succeeded by William IX. (1785-1821), who reigned as William I. after his elevation to the rank of Elector in 1803. This prince frequently shifted sides during the French wars. In 1806, at the time of Prussia's struggle against Napoleon, he remained neutral, but Napoleon, nevertheless, seized his electorate, which was incorporated in the newly formed Kingdom of Westphalia (1807). In 1813, after the defeat of Napoleon at Leipzig, William returned to his dominions and began to restore the old order of things as far as he could, while he sought to recover the State lands that had been sold during his exile, and appealed so strongly for indemnification that he obtained various important concessions at the Congress of Vienna, although he failed to secure the title of King. In accordance with a promise which he had made on his restoration, he summoned a body of jurists to construct a constitution; but no sooner was the draft completed than he refused to abide by it. His death, in 1821, was regarded as a fortunate event. But his son and successor, William II. (1821-47), by his narrow policy, increased the rapidly growing disorders of the State, while his prodigality toward his mistress, the Countess of Reichenbach, rendered him peculiarly unpopular with his subjects. In 1831 William was compelled to promulgate a constitution. At the same time his son, Frederick William, was appointed co-regent. The history of the sixteen years' regency of Prince Frederick William exhibited a retrogressive policy, pursued at first under the guidance of Hassenpflug (q.v.), which left Hesse far behind other German States in material prosperity. The death of the old ruler occurred at Frankfort in 1847. The revolutionary movement of 1848 extorted from Frederick William I. (1847-66) many liberal promises of reform, some of which were redeemed; but in 1850, after revoking many of his pledges, he summoned again the obnoxious reactionist Hassenpflug to govern the country. The Elector and his Minister resorted to the most arbitrary measures to force the excited people to submission, and Hassenpflug persuaded the sovereign that his personal safety would be endangered if he remained longer among his subjects, and Prince and Minister fled from Cassel to Wilhelmsbad. Hassenpflug appealed for federal intervention, and Austrian and Bavarian troops entered the country. The friends of liberal government looked to Prussia for support. On November 2, 1850, a Prussian army entered Hesse-Cassel; but the Prussian King was timid, and the war was principally limited to angry protocols. External force was now applied to quell all opposition to the despotic sway of Frederick William, who in 1852 returned to Cassel. A new constitution was promulgated, which in no way satisfied the people, whose conduct throughout the trying crisis had been marked by forbearance and moderation. But the policy of the Government remained unchanged. Not until 1862, after much agitation and powerful pressure from Prussia, was the Prince forced to accede to the Constitution of 1831. After this concession, however, he still ruled in such a way as to paralyze the political activities of the country. In the Seven Years' War of 1866 Hesse-Cassel sided with Austria. A Prussian army entered the principality, June 16, 1866, and Frederick William was taken prisoner and conveyed to Stettin, where he remained till September 17th. Three days later Hesse-Cassel was incorporated with Prussia. The deposed Prince died January 6, 1875, leaving no direct heir.

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HESSE-DARMSTADT. See HESSE.

HESSE-HOMBURG, hôm'bŏŏrk (Ger. *Hessen-Homburg*). Formerly a landgraviate, containing about 106 square miles, composed of the District of Homburg vor der Höhe on the right of the Rhine, and that of Meisenheim on the left. It has belonged to Prussia since 1866, and is now a part of Hesse-Nassau and of the Rhine Province. The landgraviate was an integral part of Hesse-Darmstadt till it was transferred in accordance with the disposition made by the Landgrave George I. (died 1596) to that Prince's youngest son, Frederick I., in 1622. It constituted a part of Hesse-Darmstadt from 1806 till the Congress of Vienna (1815), when its independence was restored and its territory augmented by the addition of Meisenheim. The opening of the springs and baths at Homburg in 1833 proved an unexpected source of wealth to the State, and after the addition of gambling saloons, the establishment constituted a very important branch of the revenue. Attempts were more than once made by the Diet to put down the gambling-tables; but whenever the pressure of Federal intervention was removed, gambling was always

resumed with fresh spirit, and the system continued till 1872. In March, 1866, on the death, without heirs, of the last landgrave Ferdinand, who had succeeded his brother Gustavus Augustus, in 1848, the landgraviate fell to Hesse-Darmstadt, but remained united with that duchy only a few months, being ceded to Prussia on September 3, 1866.

HESSE-NASSAU, näs'sou (Ger. *Hessen-Nassau*). A province of Prussia, the southwestern part of the kingdom, lying between the Rhine and the Weser, and composed chiefly of the larger portions of Hesse-Cassel, Nassau, and Hesse-Homburg. It also contains the city of Frankfort (q.v.) (Map: Germany, C 3). The main body of the province is bordered by the Rhine Province, Westphalia, Waldeck, Hanover, and Prussian Saxony, Saxe-Weimar-Eisenach, Bavaria, and Hesse, and incloses the Hessian Province of Upper Hesse. Among the several exclaves that belong to Hesse-Nassau are the countship of Schaumburg and the Thuringian district in which Schmalkalden is situated. Area, 6000 square miles.

Topography. The province is generally an elevated region. In the south are the rich valleys of the Main and Rhine; in the north lies the Weser Valley; but as a whole the province belongs to the mountain region of Middle Germany, and consists of high, rolling districts broken by peaks and rather prominent spurs and outliers. In the east are the Kaufunger Wald and portions of the Rhöngebirge, Vogelsberg, and Spessart. The Westerwald is in the west, and the important Taunus range in the extreme southwest. The western part of the province is traversed by the Lahn, an affluent of the Rhine. In the northeast are the Fulda and the Werra, which unite to form the Weser. The climate is mild and generally even.

Industries. The principal occupations are agriculture and its allied industries. Of the total area, about 40 per cent. is under crops and gardens, about the same proportion is in forests, and the remainder is chiefly in meadow and pasture. Most of the land is distributed into small holdings. According to the industrial census of 1895 there were 212,349 holdings ranging from less than 5 acres to 50 acres, and 4743 holdings of over 50 acres each. The chief agricultural products are rye, wheat, potatoes, flax, oats, and hay (including clover and alfalfa). Tobacco and beans are cultivated to a considerable extent. Among the well-known wines of the province are the Johannisberger, Hochheim, and Rüdesheim. The forests are among the most extensive of Prussia, and belong mostly to the State and the communities. The trees are conifers, oaks, and beeches. The commercial yield of the forest is large. They abound in game, and the streams are rich in fish. Live-stock raising is not carried on extensively as a separate industry. In 1900 there were 85,170 horses, 587,802 cattle, 304,499 sheep, 556,233 swine, and 171,959 goats.

The mineral deposits are important, principally iron and coal. Of the former about 400,000 tons are obtained annually; of the latter, over 600,000 tons. Hesse-Nassau is one of the leading iron producers among the Prussian provinces. There are some deposits of zinc, lead, and copper. Good clay is found. The mineral springs and health resorts of the province are both numerous and famous, including those of Homburg, Wiesbaden, Ems, Schwalbach, and Selters. Several of the waters, especially the Selters, are exported extensively to all parts of the civilized world.

The manufacturing industries, with some exceptions, are on a small scale. The industrial census of 1895 gives the total number of establishments at 128,888, employing 344,502 hands. This number includes 58,664 establishments employing no help, and 42,865 establishments employing from one to five hands each. The chief manufactured products are cotton and woolen goods, tobacco, cigars, and sugar. Also worthy of mention are the exports of marble, dressed stone, and burnt clay, and wooden wares, leather, and jewelry. There were 347 distilleries in operation in 1901. The province has important fairs and markets, especially horse markets, and the trade and manufacturing interests are furthered by means of numerous chambers of commerce. The banks of Frankfort, the financial centre of this part of Germany, are celebrated for their strength and the extensive scope of their undertakings. The transportation facilities are fully adequate to the needs of the province. The railways are mostly controlled by the State. The splendid roads and natural waterways aid very materially in the distribution of products. The commerce is concentrated largely in Frankfort, Cassel, and Wiesbaden. Other important business towns are Hanau and Fulda.

Government and Education. Administratively Hesse-Nassau is divided into the two districts of Cassel and Wiesbaden, subdivided into 24 and 18 circles, respectively. The former district is about twice the size of the latter, but has less population, Frankfort being included in the latter. Cassel (q.v.) is the capital. The province is represented in the Prussian Landtag by 26 Deputies in the Lower Chamber and by 21 members in the House of Lords. The highest educational institution is the University of Marburg, founded in 1527. There are an agricultural school at Weilburg, a farmers' association at Cassel, and an agriculture and forestry association at Wiesbaden. There are also several unions for bee and bird raising and gardening.

Population. The population was 1,664,426 in 1890, and 1,897,310 in 1900, showing an increase of 14 per cent. for the decade. Population per square mile, 313.1. Emigrants, in 1900, 605. About 70 per cent. of the inhabitants are Protestant. For the history of Hesse-Nassau, see Hesse-Cassel; Hesse-Homburg; Nassau.

HESSE-WARTEGG, vär'tĕg, Ernst von (1851—). An Austrian traveler, born in Vienna. His travels covered most of the habitable globe. He married Minnie Hauck, the opera singer, in 1881. He wrote, among many books of travel: *Prairiefahrten* (1878); *Tausend und ein Tag im Occident* (1896); *Chicago* (1892); *Curiosa aus der neuen Welt* (1893); *Korea* (1895); *China und Japan* (2d ed. 1900); *Schan-tung und Deutsch-China* (1898); *Siam* (1899); and *Samoa, Bismarckarchipel und Neuguinea* (1902).

HESSHU'SIUS, Tilemann (1527-88). A German Lutheran theologian, born at Wesel, and educated at Wittenberg, Oxford, and Paris. From his post as lecturer of New Testament exegesis in Wittenberg, he went to Goslar (1553), then to Rostock (1556), to Heidelberg as professor of theology (1558), and then preached at Bremen, and (1560) at Magdeburg. But

here, too, his love of strife and his extreme orthodoxy, and his absolute opposition to Crypto-Calvinism or to any form of Lutheranism less rugged than his own, brought him into trouble. He had to leave Magdeburg, and, driven from one town to another, settled at Neuburg in 1565 as Court preacher. From there he went to Jena, but in 1573 left Brunswick and became Bishop of Samland at Königsberg. Four years later he was forced to retire from this office, and became professor at Helmstedt. Hesshusius wrote: *Von Amt und Gewalt der Pfarrherren* (last ed., by Schütz, 1854); *De Cera Ecclesia et ejus Auctoritate* (1572); *Antidotum contra Dogma M. Flaccii, quod Peccatum Originis Sit Substantia* (1572); and *Assertatio Testamenti Christi* (1574). Consult: Wilkens, *Tilemann Hesshusius* (Leipzig, 1860); and Helmolt, *Tilemann Hesshus und seine sieben Exilia* (Leipzig, 1859).

HESSIAN FLY. A dipterous insect (*Cecidomyia destructor*), which, from the damage which the larva does to wheat in North America, and also to some extent in Europe, has become one of the most widely known of insects. It is dark in color, nearly black, with dusky wings and pale brown legs. While distinctively a wheat insect, it will breed also in barley and rye. Over a large part of the wheat area of the United States there are two principal broods, namely, a spring brood and a fall brood. There are, however, supplemental broods both in spring and fall, particularly in the southern wheat areas; but in the extreme northern area of the spring wheat belt there may be only a single generation. Each generation is represented by four distinct states, namely, egg, larva or 'maggot,' pupa or 'flaxseed,' and the mature winged insect. The eggs are very minute and slender, white in color, and are usually deposited in irregular rows of three to five or more on the upper surface of the leaf. Sometimes they are thrust beneath the sheaf of the leaf on the lower joints. The whitish maggots hatch and crawl down to the base of the sheath, developing on the substance of the stalk, causing a distortion or enlargement of the stalk at the point of attack. In a few weeks the larva contracts into a flaxseed-like object, which is the puparium. With the spring brood the insect remains in the flaxseed state during midsummer, giving out the perfect insect usually in September. With the fall brood, the insect passes the winter in the flaxseed state at the base of the winter wheat.

The best remedies are the late planting of winter wheat or the early planting of a narrow strip in which the flies will lay their eggs and which may afterwards be plowed under, the bulk of the crop being planted late. The copious and prompt use of fertilizers enables the wheat to tiller sufficiently to yield a partial crop even when badly attacked. The burning of the stubble, the destruction of volunteer wheat, and the growth of resistant varieties are all recommended.

Bibliography. Osborn, *The Hessian Fly in the United States* (Department of Agriculture, Washington, 1898); *The Hessian Fly in Wheat* (Pennsylvania Department of Agriculture, Harrisburg, 1890); Lugger, *The Hessian Fly* (Minnesota Agricultural Experimental Station, Saint Paul, 1899); Webster, *Bulletin 107* (Ohio Agricultural Experimental Station, Columbus, 1898).

HES'TIA. See Vesta.

HES'TON AND ISLE'WORTH. A suburban municipality of London, England, on the Thames, 12 miles southwest of Saint Paul's (Map: London, E 4). Market gardening is carried on, and it is a favorite residential place of London merchants. Population, in 1891, 26,000; in 1901, 30,800.

HESYCHASTS, hĕs'ĭ-kăsts (from Gk. ἡσυχαστής, *hēsychastēs*, quietist, from ἡσυχάζειν, *hēsychazein*, to be quiet, from ἡσυχος, *hēsychos*, quiet). Mystics of the Greek Church, and particularly the monks of Mount Athos (q.v.). In all probability mysticism never entirely died out among the Oriental monastic bodies; but the mystics attracted an unusual share of attention, not only at home but in the Western Church, in the earlier half of the fourteenth century. A Basilian monk, named Barlaam (q.v.), in the course of a visit to the monasteries of Greece, observed several practices and doctrines which he considered reprehensible. The monks of Mount Athos especially provoked his reprobation and ridicule. Believing that in the soul lay a hidden divine light, which it was the office of contemplation to evoke, they withdrew at stated times to a retired place, seated themselves on the earth, and fixed their eyes steadfastly on the navel (whence the sobriquet by which they were known, ὀμφαλόψυχοι, navel-souls); and they averred that, after the allotted time of contemplation, a kind of heavenly light beamed forth upon them from the soul (whose seat, they held, was in that region), and filled them with ecstasy and supernatural delight. They declared that this light was the glory of God Himself, and they connected it in some unexplained way with the light which appeared at the transfiguration of the Lord. Barlaam denounced these notions as fanatical and superstitious. On the other hand, they were explained and defended by Gregory Palamas, the Archbishop of Thessalonica; and in order to settle the controversy, a council was held in Constantinople in 1341 which terminated in the triumph of Palamas and the monks. The controversy afterwards turned upon the nature of the light supposed to emanate from the soul in this state of contemplation. Other councils were called, one of which, in 1351, again pronounced in favor of the monks, through the influence, it was said, of the Court and of John Cantacuzenus, who was a patron of the Hesychasts. But the public voice was hostile to the sect, and on the retirement of their patron Cantacuzenus, who, in 1355, became a monk, they fell into obscurity. Consult: Stein, *Studien über die Hesychasten des XIV. Jahrhunderts* (Vienna, 1874); Holl, *Enthusiasmus und Bussgewalt bei dem griechischen Mönchtum* (Leipzig, 1898).

HESYCHIUS, hĕ-sĭk'ĭ-ŭs (Lat., from Gk. Ἡσύχιος). A Greek grammarian of Alexandria, probably belonging to the fifth century A.D. He was the author of a Greek lexicon taken partly from earlier works of a similar character, with the addition of new words and examples from the writings of poets, orators, historians, and physicians. Its value is very great, as it helps us to the correct readings in many texts, and contains no little information concerning the Greek dialects. The best edition is that of Schmidt (4 vols., Jena, 1858-68).

HESYCHIUS. According to Jerome, publisher of an edition of the New Testament, and also a revision of the Septuagint. He is generally identified with a Hesychius said by Eusebius to have been Bishop of Alexandria, and to have died a martyr during the Galerian persecution, about 311.

HESYCHIUS OF MILE'TUS (fl. probably c.550 A.D.). A Greek chronicler, surnamed The Illustrious (*ὁ Ἰλλούστριος*). We hear of three works of his: (1) A universal history in six books, beginning with the Assyrian King Belus, and coming down to the reign of the Byzantine Emperor Anastasius (518), of which a part of the sixth book, covering the history of Constantinople from the earliest times to the reign of Constantine (324), has been preserved under the title *Πάτρια Κωνσταντινουπόλεως*. (2) A history of the reign of Justin (518-527) and the earlier years of Justinian (527-565), now lost. (3) A biographical dictionary of Greek writers (*Ὀνοματολόγος ἢ πίναξ τῶν ἐν παιδείᾳ ὀνομαστῶν*), which was extensively excerpted by Photius and Suidas (qq.v.). The fragments of his works are collected by Müller, *Fragmenta Historicorum Græcorum*, iv. (Paris, 1841-70). An attempt to 'recover' Hesychius from Suidas and other excerpters has been made by Flach, *Hesychii Milesii Onomatologi quæ Supersunt* (Leipzig, 1882).

HETÆ'RÆ (Neo-Lat., from Gk. *ἑταῖρα, hetaira*, fem. of *ἑταῖρος, hetairos*, comrade, companion; connected with *ἕτης, hetēs*, kinsman). In ancient Greek society women of more or less unconventional life. They were apt to be slaves or foreigners, and, skillful in dance or music, gave private or public entertainments. As, under the Athenian law, only a citizen's daughter could marry a citizen, many of these women, often of otherwise excellent character, were constrained, if they desired companionship, to accept concubinage. Some—for example, Aspasia, the instructor of Socrates and the friend of Pericles—were highly accomplished, and exerted great and wholesome influence upon State policy. Others, like Leontium, Phryne, Thais, and Theodota, while possessed of personal grace and charm, and more or less intellectual distinction, were more properly courtesans. The various words for women of irregular life should be sharply distinguished. *Hetæra*, like *concubina*, implies fidelity to a single man, and such relation may well have been a true marriage. *Meretrix, pornē*, and *scortum* signify a quite different thing—the harlot or prostitute. There was still another class represented by the words *pallakē, pallakis*, and *pellex*, signifying a mistress kept by a man already married. In the New Attic comedy the hetæræ are a conspicuous feature of the plot, and the *Letters* of Alciphron find in this their source, as do also Lucian's *Conversations of Hetæræ*.

HETÆRIA PHILIKE, hĕt'ā-rē'ā fē-lē'kē (Gk. *ἑταιρία φιλική*). A secret society of Greek sympathizers, founded in 1814, to liberate Greece from Turkish rule. Under the leadership of Prince Alexander Ypsilanti it brought about the Greek War of Independence in 1821.

HETCHEL. See HECKLE.

HETEROCŒ'LA (Neo-Lat. nom. pl., from Gk. *ἕτερος, heteros*, other + *κοῖλος, koilos*, hollow). One of the two orders of calcareous sponges, including those in which the endoderm is composed of flagellate collared cells. In the other order, Homocœla, collared cells are restricted to flagellate chambers, and flattened cells compose the remainder of the endoderm. See SPONGE.

HETEROCYST (from Gk. *ἕτερος, heteros*, other + *κύστις, kystis*, bag). A term applied to certain cells, empty or with watery contents, found in the filaments of blue-green algæ. See ALGÆ and CYANOPHYCEÆ.

HETEROGAMY (from Gk. *ἕτερος, heteros*, other + *γάμος, gamos*, marriage). A condition in plants, contrasted with isogamy (q.v.), in which the pairing sex-cells (gametes) are differentiated into sperms and eggs. Most plants are heterogamous in this sense. The term is also used when two kinds of flowers exist on the same plant; as, for example, in certain Compositæ, where the development of stamens and pistils differs in the disk and the ray flowers. See FERTILIZATION.

HETEROGENESIS (Neo-Lat., from Gk. *ἕτερος, heteros*, other + *γένεσις, genesis*, generation, from *γίγνεσθαι, gignesthai*, Skt. *jan*, to be born). A term bearing various meanings and relations. (1) The equivalent of abiogenesis or spontaneous generation. (See BIOGENESIS.) (2) A mode of reproduction in which the parent produces offspring unlike itself, as opposed to *homogenesis*, or the production of offspring like the parent or parents. See ALTERNATION OF GENERATIONS.

HETEROGONY. See PARTHENOGENESIS.

HETEROPHORIA (Neo-Lat., from Gk. *ἕτερος, heteros*, other + *-φορία, -phoria*, carriage, from *φέρειν, pherein*, to carry), or INSUFFICIENCY. A condition in which the eyes are only prevented from deviating by constant muscular effort. Exophoria is the term applied to the tendency of an eye to look outward while the other is fixed upon an object; esophoria, to the tendency to deviate inward. The trouble is due to relative weakness of an eye-muscle, the result of some error of refraction or in persons generally run down. In severe cases there are headache, pain in the eyes, occasional double vision, blurring of point, and irritability of the eyelids. The difficulty is treated by attention to the general health and correction of errors of refraction by eyeglasses. Exercise of the weak eye-muscles is also employed.

HETEROPHYLLY (from Gk. *ἕτερος, heteros*, other + *φύλλον, phyllon*, leaf). That condition in which there are two or more forms of leaf on the same plant, a condition particularly well shown in amphibious plants in which the water leaf is finely divided, but the air leaf is entire and compact. See LEAF.

HETEROPODA (Neo-Lat. nom. pl., from Gk. *ἑτερόπους, heteropous*, having uneven feet, from *ἕτερος, heteros*, other + *πούς, pous*, foot). A suborder of small pelagic pectinibranchiate Gastropoda (q.v.). They swarm at night at the surface of the ocean and swim rapidly about with their backs downward and their ventral surfaces uppermost. Their bodies are small, delicate, and often transparent, with well-demarcated heads, and well-developed sense, circulatory, breathing, and reproductive organs. The foot is compressed to form peculiar blade-like swimming organs. Most heteropods are naked, but some genera, among them Atlanta, Carinaria,

and Oxygyrus, have delicate involute shells. These resemble in some respects those of certain fossil Bellerophons of Paleozoic age, and the resemblance has led many authors to include the Bellerophontidæ with the Heteropoda in spite of their larger size, and heavier and thicker shells. See BELLEROPHON; GASTROPODA.

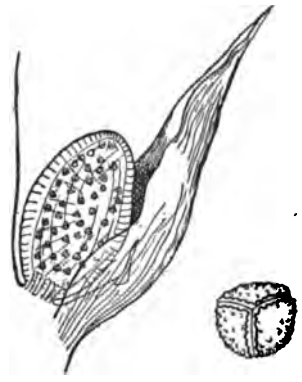
HETEROPTERA (from Gk. ἕτερος, *heteros*, other + πτερόν, *pteron*, wing). A suborder of the Hemiptera, including the 'true' bugs, characterized by dissimilarity in the wings. The proximal half of the anterior pair of wings is thickened, much like those of beetles. The suborder includes a number of aquatic forms, some of which occur out at sea hundreds of miles from land. The water-boatman (*Corixa undulata*), with a pair of oar-like legs, the large water-bug or 'electric-light bug' (*Belostoma Americanum*), and the long-legged water-striders are, perhaps, the best known of the aquatic forms. The bedbug, redbug, chinch-bug, squash-bug, and stink-bugs (qq.v.) are other familiar and important Heteroptera. See HEMIPTERA; HOMOPTERA.

HETEROSPORY (from Gk. ἕτερος, *heteros*, other + σπόρος, *sporos*, seed). The production, by plants, of two kinds of sexless spores. Heterospory is one of the most important phenomena in connection with the evolution of the plant kingdom, since through it the seed has appeared, and since a clear conception of flowering plants is impossible without some knowledge of the beginnings of heterospory. The phenomenon appears first, and in its simplest form, among certain of the fern-plants (Pteridophytes), and is universal among the seed-plants (spermatophytes). To understand the significance of heterospory it will be necessary to read the article on ALTERNATION OF GENERATIONS, since this deals with the two kinds of spores produced by the sexless generation (sporophyte).

HETEROSPORY.

Megasporangium of a club-moss containing four megaspores.

In ordinary ferns the spores are alike, and in germination each one produces a sexual plant (gametophyte), which bears both the male and the female sex organs. Such a condition is called 'homospory' (q.v.) or 'isospory,' which means in each case 'spores similar.' Very gradually the spores begin to differ in size, until presently some become very much larger than others. The large spores are called 'megaspores' and the small ones 'microspores.' More important than the fact of difference in size, however, is the other fact that the microspores produce sexual plants which bear only male organs, and the megaspores sexual plants which bear only female organs. There is a very definite relation between the amount of nutrition and the appearance of the female organs, so that the larger and hence better-nourished spore is expected to produce a female plant. In consequence of heterospory, therefore, the sexual plants become distinctly male and female. The unfortunate thing is that the sexual character has often been applied to the microspores and the megaspores, which are simply the sexless spores of a sporophyte, which necessarily produce gametophytes.



HETEROSPORY.

Microsporangium of a club-moss containing numerous microspores.

When spores become thus differentiated in size and in product, the spore-cases (sporangia) are also differentiated, so that certain sporangia produce only microspores, and others produce only megaspores. The former were naturally called 'microsporangia' and the latter 'megasporangia.' These sporangia are ordinarily produced upon leaf-like structures, and later the leaves bearing sporangia become differentiated in the same way, so that certain leaves bear only microsporangia and other leaves only megasporangia. Naturally the former were called 'microsporophylls' and the latter 'megasporophylls.' These names are used in connection with those fern-plants which are heterosporous, as the water-ferns, the little club-mosses (Selaginella), and the quillworts (Isoetes). Among the seed-plants (flowering plants), however, the corresponding structures already possessed names long in use, and not to be discarded. It is important, however, to know the structures among the seed-plants that correspond to those among the heterosporous fern-plants. It is found that the stamen (q.v.) of a flowering plant is a microsporophyll, that its pollen-sacs are microsporangia, and that the pollen-grain is a miscrospore. The interesting conclusion is reached, therefore, that the pollen-grain is a sexless spore, a conclusion quite contrary to the general impression that it is a male cell, and that the stamen is a male organ. It is found that the carpel (q.v.) of a flowering plant, which organizes the ovary, style, and stigma, is a megasporophyll; that the ovules are megasporangia; and that the so-called embryo-sac is a single large unshed megaspore. It follows, therefore, that the ovule is by no

means the egg or ovule structure which its name would imply, but the spore-case (sporangium) of a sexless plant.

An important further fact in connection with heterospory is that upon its development the sexual plants (gametophytes) become very much reduced in size, for the most part not escaping from within the spores which produce them. As a consequence, the male plant or generation in a flowering plant is contained entirely within the pollen-grain; and the female plant or generation is completely inclosed within the ovule. For further development of the subject in connection with the evolution of the seed, see SEED.

HET'MAN. See ATAMAN.

HETTINGER, hĕt'tĭng-ĕr, FRANZ (1819-90). A German Catholic theologian, born at Aschaffenburg, and educated at Würzburg and at the German College in Rome. In 1847 he returned to Würzburg as assistant in the theological seminary, and nine years afterwards he became professor in the university. Hettinger wrote: *Apologie des Christentums* (8th ed. 1899-1900); *Lehrbuch der Fundamentaltheologie* (2d ed. 1888); *Timotheus. Briefe an einen jungen Theologen;* and many studies on Dante, of which the most important is *Die göttliche Komödie nach ihrem wesentlichen Inhalt und Charakter dargestellt* (2d ed. 1889). Consult the biography by Kaufmann (Frankfurt, 1891).

HETTNER, hĕt'nĕr, ALFRED (1859—). A German geographer, son of Hermann Hettner. He was born at Dresden, studied at Halle, Bonn, and Strassburg, and was professor of geography at Leipzig, Tübingen, and Heidelberg. He made two expeditions to South America — to Colombia (1882) and to Peru and Bolivia (1888) — and in 1895 became an editor of the *Geographische Zeitschrift,* for which he wrote on anthropology and geographical methodology. He published: *Gebirgsbau und Oberflächengestalt der Sächsischen Schweiz* (1887); *Reisen in der columbianischen Anden* (1888); *Die Cordillere von Bogota* (1892); and the text in Spamer's *Atlas* (1896, 2d ed. 1900).

HETTNER, HERMANN THEODOR (1821-82). A German literary and art critic, born at Leisersdorf (Silesia). He had traveled extensively and become known through various volumes on literary and critical subjects before he was made professor of æsthetics at the University of Jena (1851). Afterwards he became director of the cabinet of antiquities in Dresden (1855), and professor of the history of art in the Academy of Fine Arts. In 1868 he was appointed director of the Historical Museum. His most important work is *Litteraturgeschichte des achtzehnten Jahrhunderts* (1856-70; parts 1 and 2, 5th ed. 1894; part 3, 4th ed. 1893-94). He also wrote *Die romantische Schule in ihrem innern Zusammenhange mit Goethe und Schiller* (1850); *Griechische Reiseskizzen* (1853); *Das königliche Museum der Gipsabgüsse zu Dresden* (4th ed. 1881); and *Italienische Studien: Zur Geschichte der Renaissance* (1879).

HET'TON. A town in the County of Durham, England, five and one-half miles northeast of Durham (Map: England, D 3). The mining of extensive coal deposits in the vicinity constitutes its principal industry. Population, in 1891, 12,700; in 1901, 13,670.

HETZEL, ā'tsĕl', PIERRE JULES (1814-86). A French publisher and littérateur, born at Chartres. From 1835 he was associated with Paulin, the French publisher, and afterwards took part in politics as a Republican. After the Revolution of 1848 he was chief of a department in the Ministry of Foreign Affairs and Secretary-General of the Provisional Government. After the coup d'état he was exiled and lived in Brussels until the amnesty of 1859. During the time he published a series of French classics. Upon his return to France he published, among other volumes, the romances of Jules Verne. He had founded, with M. J. Macé, a *Magasin d'éducation et de récréation* (1854), which was very successful, and his best claim to general interest, although his stories for children have always been popular. Under the pseudonym of P. J. Stahl he wrote *Les nouvelles et seules aventures de Tom Pouce* (1843); *L'esprit des femmes, et les femmes d'esprit* (1855); and other volumes.

HETZER, hĕts'ĕr, LUDWIG. See HÄTZER, LUDWIG.

HEUBERGER, hoi'bĕrK-ĕr, RICHARD (1850—). An Austrian composer, born at Gratz. By profession a civil engineer, he did not take up music seriously until 1876. Two years later he became conductor of the Vienna Singakademie. He composed much instrumental music, and the operas *Abenteuer einer Neujahrsnacht* (1886); *Manuel Venegas* (1889), which was rewritten as the grand opera *Mirjam, oder das Maifest* (1894); and several ballets and operettas.

HEUBNER, hoib'nĕr, OTTO (1843—). A German physician, born at Mühltroff, son of the revolutionist Otto Leonhard Heubner (1812-93). The son studied at Leipzig and Vienna, was long connected with the former university, and in 1894 went to Berlin as professor and manager of the clinic for children. Among his writings are: *Die luetische Erkrankung der Hirnarterien* (1874); *Die experimentelle Diphtherie* (1883, which received the prize offered by the Empress Augusta); *Klinische Studien über die Behandlung der Diphtherie mit dem Behringschen Heilserum* (1895); and *Syphilis im Kindesalter* (1896).

HEUCHERA, hū'kê-rà. See ALUM ROOT.

HEUGLIN, hoi'glĭn, THEODOR VON (1824-76). A German traveler and ornithologist, born at Hirschlanden, Württemberg. From 1850 to 1865 he spent most of his time in Africa. While attached to the Austrian consulate at Khartum, he visited Dongola and Abyssinia, and afterwards described his travels in a volume entitled *Reisen in Nordostafrika* (1857). Next he visited the White Nile, the Sudan, and the west coast of the Red Sea, and in 1861 set out with a party for the interior of Africa to determine the fate of the explorer Eduard Vogel. After other expeditions he returned to Europe with rare collections, and published several valuable scientific works, including: *Ornithologie Nordostafrikas* (1869-75), and *Reise in das Gebiet der westlichen Zuflüsse des weissen Nil* (1869). Journeys which he made in 1870 and 1871 to Spitzenberg and Nova Zembla he described in *Reisen nach dem Nordpolarmeere* (1872-74).

HEUMANN, hoi'mân, CHRISTOPH AUGUST (1681-1764). A German scholar. He was born at Allstedt, studied at Jena, and in 1717 became

head of the academy at Göttingen. He contributed largely to the growth of this school and to its change to a university. In the university he was made professor of the history of literature (1734), and of theology (1745). His great works, *Acta Philosophorum* (last ed. 1717-24), and *Conspectus Reipublicæ Literariæ* (last ed. 1791-97), by the use of the analytical system, founded modern German literary history. He also translated, with a commentary, the New Testament (1750-63). Consult the life by Cassius (Cassel, 1768).

HEUMANN VON TEUTSCHENBRUNN, fôn toit'shen-brōōn, JOHANN (1711-60). A German jurist and writer on diplomacy, born at Muggendorf in Bavaria, and educated at Altdorf, where in 1740 he became professor. The first jurist to approach the study of diplomacy in a scientific manner, he wrote: *Commentarii de Re Diplomatica Imperatorum ac Regum Germaniæ* (1745-53); *Exercitationes Juris Universi* (1749-57); *Initia Juris Politiæ Germaniæ* (1757); and *Geist der Gesetze der Deutschen* (1761).

HEUN, hoin, KARL GOTTLIEB SAMUEL (1771-1854). A German novelist, known under the pseudonym H. Clauren, born at Dobrilugk, and educated at Leipzig and Göttingen. He became in 1792 secretary in the departments of Mining and Foundries in Westphalia, but he left the Prussian service in 1801 to become manager of an estate near Posen. Ten years later he returned to Berlin, received a place in a bureau of the Chancellor Hardenberg, and in 1820 became editor of the *Preussische Staatszeitung.* Heun is best known by the first line of a poem on the War of Liberation, *Der König rief, und alle, alle kamen,* which has become proverbial. His novels, realistic but full of false sentiment and of doubtful morality, are no longer read in Germany. They include: *Erzählungen* (1819-20); *Die graue Stube,* and *Mimili* (1824); and *Scherz und Ernst* (1820-28). Heun also wrote some dramas, which were collected, *Lustspiele* (2d ed. 1827). A collection of all his works appeared at Leipzig in twenty-five volumes (1851).

HEVEA, hē'vē-ȧ. A genus of about ten species of trees, natives of tropical South America, of the natural order Euphorbiaceæ, characterized by trifoliate leaves, loose panicles or corollaless flowers, and a trivalved capsular fruit. The species, especially *Hevea Braziliensis,* furnish the highest grade of South American india-rubber. The seeds are eaten by birds, but are considered poisonous to man and other animals unless boiled, a process which makes them edible.

HEVE'LIUS, HEVEL, hȧ'vĕl, or **HEWELKE,** hȧ-vĕl'ke, JOHANNES (1611-87). One of the most celebrated astronomers of the seventeenth century. He was born and died at Danzig. In 1641 he erected an observatory in his own house, furnished it with large telescopes constructed by himself, and devoted himself to astronomical observations. He was the first astronomer, with the exception of Gassendi, to observe a transit of Mercury (Gassendi's observation was made in 1631, that of Hevelius in 1661); and it is now generally conceded that he ranks next to Flamsteed among the astronomers of his day. Toward the end of his life he opposed the notion of using telescopic sights for astronomical instruments of precision, believing that the old method of observing through pin-holes, etc., was superior. Halley (q.v.) was at one time sent to Danzig by the Royal Society of London to examine into this question, and the controversy was decided against him. Hevelius's observatory and library perished by fire in 1679. His extant works include the following: *Selenographia, seu Descriptio Lunæ* (1647); *De Natura Saturni* (1656); *Cometographia* (1668); *Machina Cœlestis* (1673); *Prodromus Astronomiæ* (1690). His letters were published in 1683. Consult Seidemann, *Johannes Hevelius* (Zittau, 1864).

HEVESI, hĕ'vĕ-shē, LUDWIG (1843—). A German-Hungarian journalist and humorist, sometimes writing under the pseudonym of *Onkel Tom.* He was born at Heves, studied classical philology and medicine at Vienna, and entered journalism in 1865. In the following year he became one of the editors of the *Pester Lloyd;* then helped launch the Hungarian journal *Borsszem Jankó;* from 1871 to 1874 edited the Vienna juvenile *Kleine Leute;* and in 1875 became the art and dramatic critic of the *Fremdenblatt.* He writes mainly in German. His works include the humorous sketches of travel and collections of stories: *Sie sollen ihn nicht haben* (1871); *Des Schneidergesellen Andreas Jelky Abenteuer in vier Weltteilen* (1875); *Auf der Sonnensite* (1886); *Buch der Laune* (1890); *Ein englischer September* (1891); *Regenbogen* (1892); *Von Kalau bis Säkkingen* (1893); *Glückliche Reisen* (1895); *Die Althofleute* (1897); *Blaue Fernen, neue Reisebilder* (1897); *Das bunte Buch. Humoresken* (1898); *Wiener Totentanz* (1899); *Der zerbrochene Franz nebst andern Humoresken* (1900); and *MacEck's sonderbare Reisen* (1901); the biographies, *Zerline Gabillon* (1894) and *Wilhelm Junker* (1896); and in Hungarian, *Karczképek* (1876), descriptive of life in Budapest.

HEWES, hūz, JOSEPH (1730-79). A signer of the Declaration of Independence, born at Kingston, N. J. He was educated at Princeton, and then went to Philadelphia, where he engaged in business. About 1760 he settled in Edenton, N. C., and was soon afterwards elected to the Legislative Assembly. In 1774 he was elected to the Continental Congress, of which, with the exception of a brief period when he declined to serve, he continued a member until his death, signing the Declaration of Independence in 1776.

HEWIT, hū'ĭt, AUGUSTINE FRANCIS (1820-97). An American Roman Catholic clergyman, superior of the Paulist Fathers. He was born in Connecticut, the son of Nathaniel Hewit, and was baptized as Nathaniel Augustus. He graduated at Amherst in 1839; entered the Congregational ministry in 1842, but a year later joined the Episcopal Church. In 1846 he was received into the Roman Catholic Church, and in 1850 entered the Redemptorists. He joined Fathers Hecker, Walworth, and other members of that Order in founding, in 1858, the Congregation of Saint Paul the Apostle, and was made professor of theology, philosophy, and Holy Scriptures in their seminary. On the death of Father Hecker he became superior of the Paulists. He edited the *Catholic World* (1869-74), and was a regular contributor to the *American Catholic Quarterly Review.* Among his works are: *Reasons for Submitting to the Catholic Church* (1846); *Problems of the Age* (1868); and *The King's Highway, or the Catholic Church the Way of Salvation* (1874).

He received the degree of D.D. from Amherst College in 1874.

HEWITSON, William Chapman (1806-78). An English naturalist, born at Newcastle-upon-Tyne. He practiced land-surveying until a bequest from a deceased relative gave him the means and the leisure to study the natural sciences. He gave great attention first to the Coleoptera and Lepidoptera of Great Britain, then to the study of birds' eggs, and devoted the last years of his life to the diurnal Lepidoptera of the world, gradually forming a large and valuable collection which he left to the natural history section of the British Museum. His library was bequeathed to the Natural History Museum of Newcastle. He contributed many papers on entomology and ornithology to scientific journals, and published: *British Oölogy* (1833-42); *Colored Illustrations of the Eggs of British Birds* (1846); *The Genera of Diurnal Lepidoptera* (1846), with E. Doubleday; *Illustrations of Diurnal Lepidoptera* (1863-78); *Illustrations of New Species of Exotic Butterflies* (1851-76); *Descriptions of One Hundred New Species of Hesperidæ* (1867); *Descriptions of Some New Species of Lycænidæ* (1868); *Equatorial Lepidoptera* (1869-70); *Bolivian Butterflies* (1874).

HEWITT, hū'ĭt, Abram Stevens (1822-1903). An American manufacturer and public man, born at Haverstraw, N. Y., and educated at Columbia College, where he was acting professor of mathematics in 1843. He studied law and was admitted to the bar in 1844, but defective eyesight prevented him from practicing, and he engaged in the manufacture of iron with Edward Cooper, the son of Peter Cooper, and a college classmate, who later became his brother-in-law. In 1862 Mr. Hewitt learned in England the process for making gun-barrel iron, and upon his retirement in 1876 as president of the American Institute of Mining Engineers, he delivered a widely read address upon *A Century of Mining and Metallurgy in the United States*. He served in Congress in 1871-79 and 1881-86, was chairman of the National Democratic Committee which directed the Tilden campaign in 1876, and was a Democratic member of the House committee which, in 1877, conferred with a similar committee from the Senate in regard to the choice of an electoral commission to settle the disputed Presidential election. In 1886 he was elected Mayor of New York City, defeating Henry George and Theodore Roosevelt. He was an earnest worker for good government and labored with much success for municipal reform. After his administration of two years he remained closely identified with municipal movements, and for his services in furthering the rapid-transit plan in New York City he was awarded a gold medal by the New York Chamber of Commerce in 1901. As a public benefactor he gave great aid to numerous institutions, and the present educational prominence of Cooper Union, founded by his father-in-law in New York City, is due largely to his services as trustee and secretary. He was chosen chairman of the trustees of the Carnegie Institution at its organization in 1901.

HEWITT, John Napoleon Brinton (1859—). An American ethnologist and linguist. He was born on the Tuscarora reservation, near Niagara Falls, N. Y.; with some Tuscarora blood in his veins, he learned the language of that tribe while a child. He was educated in the public schools of Wilson and Lockport, and was successively farmer and journalist till 1879, where he was employed by the department of American ethnology in the Smithsonian Institution, where he devoted himself to Indian ethnology and the language of the Tuscaroras and Iroquois.

HEWLETT, Maurice Henry (1861—). An English novelist, born in London, and educated there. He was called to the bar in 1891, and in 1896 was made Keeper of the Land Revenue Records and Enrolments. Though he had written much previously, he gained his reputation in 1898 with a beautiful romance entitled *The Forest Lovers*. His other books include: *Earthwork Out of Tuscany* (1895); *The Masque of Dead Florentines* (1895); *Songs and Meditations* (1897); *Pan and the Young Shepherd* (1898); *Little Novels of Italy* (1899); *Richard Yea-and-Nay* (1900); and *New Canterbury Tales* (1901). In his first romance and in the short stories that followed, Mr. Hewlett has of all his contemporaries best interpreted the more elusive phases of mediæval thought and sentiment. He can write with great charm an historical romance having few or no historical characters, depending upon his truth to life upon his intimate acquaintance with the period he seeks to produce. Nothing of their kind can be better than the short stories called "Madonna of the Peach-Tree" and "The Duchess of Nona," in *Little Novels of Italy*. Some of the stories of the *New Canterbury Tales* are also exquisite in sentiment and execution.

HEXACHORD, hĕks'ă-kōrd (from Gk. ἕξ, *hex*, six + χορδή, *chordē*, chord). A name given by the ancient Greeks, in their music, to the great sixth. In modern music, hexachord denotes the six diatonic degrees of which Guido formed his scale, better known by the six syllables, ut, re, mi, fa, sol, la, to which the scale was sung. See Gamut.

HEX'ACORAL'LA (Neo-Lat., from Gk. ἕξ, *hex*, six + κοράλλιον, *korallion*, coral). A subclass of zoantharian corals so named by Haeckel because the radiating septal walls of the polyps are arranged in series of six or multiples of six. Recent researches have shown that the Hexacoralla constitute an artificial group. See Coral.

HEX'ACTINEL'LIDA (Neo-Lat. nom. pl., from Gk. ἕξ, *hex*, six + ἀκτίς, *aktis*, ray). One of the two orders of siliceous sponges (see Sponge), comprising those with six-rayed siliceous spicules; they live at considerable depths and include the glass sponge (Euplectella) and other hyaline forms. The other order is Desmospongiæ, including "Silicispongiæ devoid of six-rayed spicules." The group is an ancient one, present in geological formations from the Ordovician down to present times. Remains attributed to this group occur in Precambrian rocks at Saint John, N. B.

HEX'AGON (Lat. *hexagonum*, from Gk. ἑξάγωνον, from ἕξ, *hex*, six, + γωνία, *gōnia*, angle). A geometric figure of six sides. When the sides and angles are respectively equal, the hexagon is said to be regular. If a regular hexagon is inscribed in a circle, each side is equal to the radius of the circle, and by joining the angular points to the centre of the circle six equilateral triangles are formed. Hence the perimeter of the circle may be divided into six equal parts

by laying off in succession six chords, each equal to the radius. See POLYGON.

HEX'AGRAM (from Gk. ἑξαγράμματος, *hexagrammatos*, consisting of six letters, from ἕξ, *hex*, six + γράμμα, *gramma*, letter), MYSTIC. In 1639 Pascal, at the age of sixteen, published the proof of the proposition that the three pairs of opposite sides of a hexagon or *hexagramma mysticum*, as he termed it, inscribed in a conic, intersect in three collinear points. This is a fundamental proposition of modern geometry, and its reciprocal is Brianchon's theorem. See CONCURRENCE.

HEX'AHE'DRON (from Gk. ἕξ, *hex*, six + ἕδρα, *hedra*, base). A solid geometric figure of six faces. A regular hexahedron is called a cube. See CUBE; POLYHEDRON.

HEX'AM, LIZZIE. The heroine of the subplot in Dickens's *Our Mutual Friend*. She educates her ungrateful younger brother, frees her father's name from the stigma of murder, and is finally married to Eugene Wrayburn.

HEXAM'ETER (Lat., from Gk. ἕξ, *hex*, six + μέτρον, *metron*, measure). The name of a verse composed of six feet or measures. The name hexameter usually refers to the dactylic hexameter, the heroic or epic verse of the Greeks and Romans, the best examples of which are Homer's *Odyssey* and *Iliad* or Vergil's *Æneid*. The last part of every verse must be either a spondee (two long syllables, as in *anno*) or a trochee (a long and a short syllable, as in *qualis*), and the penultimate must be a dactyl (a long and two short syllables, as in *tĕgmĭnĕ*). The rest may be either dactyls or spondees. Thus constructed the verse is called dactylic. Homer offers a regular dactylic hexameter in the verse:

δευτὴ | δὲ κλαγ | γὴ γένετ' | ἀργυρε | οῖο βι | οῖο.

Vergil gives this example:

Tĭtyrĕ | tū pătŭ | lāĕ rĕcū | bāns sūb | tĕgmĭnĕ | fāgi.

The dactylic hexameter has often been employed in modern poetry, especially in English and in German. Thus, in Longfellow's *Evangeline*, we read these lines:

This is the | forest prim|eval. The | murmuring | pines and the | hemlocks
Bearded with | moss and with | garments green, indis|tinct in the | twilight,
Stand like | Druids of | old with | voices sad and pro|phetic,
Stand like | harpers | hoar with | beards that | rest on their | bosoms.

And Klopstock's *Messias* begins with the line:

Sing', un|sterbliche | Seele, der | sündigen | Menschheit Er | lösung.

The last line of the Spenserian stanza consists of an iambic hexameter. Thus:

And often knockt his brest, as one that did repent.

HEX'APLA (Gk. ἑξαπλᾶ, sixfold). The name given to the work compiled by Origen for the purpose of restoring the purity of the Septuagint text of the Bible and bringing it into closer agreement with the original Hebrew. (See BIBLE, heading *Versions*.) It consisted of a six-column text: (a) the Hebrew text; (b) the same text transliterated into Greek characters; and the Greek translations of (c) Aquila; (d) Symmachus; (e) the Septuagint; (f) Theodotion. In case of a number of books, Origen added comparisons with three other Greek translations. The omissions in the Septuagint were generally supplied from Theodotion and marked by an asterisk, while additions in the Septuagint, as compared with the Hebrew text, were indicated by an obelisk. In consequence, however, of the neglect of these distinguishing signs in manuscripts of the Hexapla, great confusion arose, so that it has been well nigh impossible to recover the original Septuagint text. The Hexapla, as a whole, has long been lost; several editions of those fragments which it has been possible to recover, have been printed; that by the Benedictine Montfaucon (2 vols., Paris, 1713), which retains, so far as it was retained in the manuscripts, the arrangement and even the asterisks and obelisks of Origen, long enjoyed high favor, but is now superseded by the admirable edition of Frederick Field (2 vols., Oxford, 1867-75), with additions and supplements by Pitra in *Analecta Sacra Spicilegio Solesmensi*, vol. iii. (Paris, 1883). See ORIGEN.

HEXAP'ODA (Neo-Lat. nom. pl., from Gk. ἑξάπους, having six feet, from ἕξ, *hex*, six + πούς, *pous*, foot). The name of a class of arthropods, the insects, equivalent to Insecta (q.v.).

HEXATEUCH (from Gk. ἕξ *hex*, six + τεῦχος, *teuchos*, implement, book). A term used to denote the first six books of the Bible, viz.: Genesis, Exodus, Leviticus, Numbers, Deuteronomy, and Joshua. While *Pentateuch* (q.v.) as a title of the five books ascribed to Moses, and *Octateuch* as a designation of these with Joshua, Judges, and Ruth, go back to antiquity, *Hexateuch* is a modern term that has come into vogue chiefly through Kuenen and Wellhausen. It represents a critical view, according to which the Book of Joshua was compiled from the same sources as the Pentateuch, and once formed with it a separate work. This opinion presupposes the conviction that the Pentateuch is not the work of Moses, but a later compilation from sources of different age, which sources also appear in the Book of Joshua. The existence of such sources is thought to be proved by duplicate accounts of the same events and marked differences of representation, which differences do not occur indiscriminately, but appear in well-defined sections and in combination, a given point of view and certain marked characteristics of language and style invariably being found together. The following sources are now generally recognized: (1) A prophetic narrative, itself a combination of two distinct sources, one using Jehovah (Yahweh) as the divine name and hence commonly called J, the other using Elohim as the name of God and hence called E, the combination being designated as JE. It presents a succession of more or less closely connected narratives, beginning with the creation and extending to the conquest of Canaan. (2) A priestly document (P), covering the same period, but distinguished by the combination of narrative with legal ordinances. It is often called the 'Priests' Code,' although the name strictly belongs only to the legislative portions (i.e. certain of the laws in Exodus and those of Leviticus and Numbers). (3) The code of laws known as the 'Book of the Covenant' (C; Ex. xxi-xxiii). (4) Another code, the 'Law of Holiness' (H; Lev. xvii.-xxvi.). (5) The Book of Deuteronomy (D; also containing certain codes). The work of combination is commonly referred to a 'redactor' designated by R. These sources are in turn generally considered as composite, or at

least to have undergone successive revisions before being combined into the Hexateuch as we have it. There is difference of opinion concerning the minutiæ of the analysis, the age of the documents, and their relation to each other, and the process or processes by which they have reached their final form. But scholars do not now question the existence of such sources; and they are in substantial accord as to what they are in the main, as indicated above. That the Pentateuch contains post-Mosaic material was seen by some writers as early as the second century, such as Ptolemy the Gnostic, and the author of the Clementine Recognitions. It was shrewdly intimated by Ibn Ezra (died 1167). Through Carlstadt (1520), Du Maes (1574), Pereira (1594), Bonfrère (1625), Hobbes (1651), Peyrère (1655), Spinoza (1670), Simon (1678), and Le Clerc (1685), the facts showing a later authorship of the Pentateuch were brought out. In 1753 Astruc published his epoch-making conjectures as to the documents possibly used by Moses in the compilation of Genesis. He had correctly observed that sections in which Elohim was used as the divine name differed in vocabulary, style, and thought from sections in which the name Yahweh was used, and concluded that they belonged to different documents, though some fragments could not be ascribed to either of these. Before the end of the century Eichhorn (1780) and Ilgen (1798) had further developed the documentary theory, the latter distinguishing between two sources using the name Elohim and leaving it an open question whether there was more than one writer using the name Yahweh, while Geddes (1792-1800) had framed a theory based on the existence of unrelated fragments recognized by Astruc. This theory was introduced in Germany by Vater (1802), and found an exponent in De Wette (1806), whose view that the divine names represented not so much different authors as different ages or schools of religious thought was destined to exercise a wider influence. He also suggested that an earlier epic was supplemented in later times. This led to the supplementary theory championed by Ewald and Tuch (1830). While De Wette himself and Gesenius (1815) still regarded the bulk of the legislation in Exodus and Leviticus as earlier than Deuteronomy, which they placed in the Exile, George (1835) and Vatke (1835) were led partly by a careful analysis of customs and ideas, partly by applying Hegelian principles of historic development, to the conviction that this priestly legislation was later than Deuteronomy, thus anticipating the position now generally held. The reaction led by Ewald against a too mechanical construction of history according to philosophical categories, and in the direction of a stronger emphasis upon personality, brought Hexateuchal criticism back to the documentary theory, while delaying for a time the recognition of Israel's historic development divined by the disciples of De Wette and by Reuss. This scholar in 1850 expressed his conviction that the priestly legislation was later than Deuteronomy, but without a definite conception of the Pentateuchal documents. Hupfeld in 1853 carefully defined the main sources of Genesis, making the necessary distinction between the two writers using the name Elohim. A correct characterization of Deuteronomy was given by Riehm (1854). A clear idea of the Priests' Code could only be obtained after the historical criticism of Reimarus (whose *Wolfenbüttel Fragments* were published by Lessing in 1777) had been resumed by Colenso (1860) and Nöldeke (1869). Before Nöldeke's work had appeared it was still possible for Graf (1866) to give to the legislative portions a post-exilic date, while leaving the closely allied matter in the pre-Deuteronomic period. This error was corrected by Kuenen (1866). The position reached by Reuss, Graf, and Kuenen was ably defended by Wellhausen (1876). His comparison between the regulations as to sanctuaries, festivals, priestly functions, and revenues in the different codes and between these and the historic and prophetic books was especially convincing. Budde (1883) observed that there was an earlier stratum within the Yahwistic documents which did not know of a deluge. The history of Israel was written from the new standpoint by Stade (1886). Dillmann embodied the results of documentary analysis in his learned commentaries on the books of the Hexateuch (1886-92), though he was unwilling to accept the priority of Deuteronomy except as regards some late additions to the Priests' Code. During the last decade most scholars have come to recognize the essentially post-exilic origin of the Priests' Code. The Book of the Covenant is considered the oldest of the codes and perhaps of the sources. It probably dates from early in the ninth century, B.C. It is generally held that the earlier Elohistic narratives originated in North Israel before the fall of Samaria in B.C. 722. The Yahwistic narratives show a marked preference for Judean heroes, sanctuaries, and traditions; hence many scholars assign them to the Kingdom of Judah before the reign of Josiah; others think they originated in the northern kingdom, but have been worked over in Judah. It is agreed that both the Elohistic and the Yahwistic documents received various additions from time to time. They were combined in the seventh century B.C. The difference of opinion as to their relative age has lost much of its positiveness and importance by the fact that, in case of duplicates, the originality is seen to be sometimes on one side and sometimes on the other, and by the shifting of interest from the writers, who, after all, were chiefly collectors of stories, to the narrators who gave them a form and told them at the sanctuaries. It is especially Gunkel (1902) who has called attention to these aspects of the question. While Steuernagel has not won general recognition for his analysis of the Deuteronomic Code, it is commonly maintained that our present book has gone through at least two redactions, and this scholar has made it probable that the work introduced by Josiah as the law of Israel (see JOSIAH) had itself been compiled from smaller codes embodying decisions by elders, priestly oracles, and acknowledged rules of conduct. The code of Holiness is thought to belong to the time of Ezekiel (c.560 B.C.), and the combination of Deuteronomy and JE probably took place at about the same time. Most uncertainty still prevails in regard to the Priests' Code. While some scholars consider this code as having been introduced by Ezra and afterwards united with Deuteronomy and the earlier code-books (c.400 B.C.), others look upon the Code of Ezra as a compilation containing both the priestly documents and the previously existing ones. The

general opinion is that the Priests' Code grew up in Babylon. Eduard Meyer regards Ezra as its author. But the unity of this book has long been questioned. Popper (1862) showed that Ex. xxxv.-xl. and Lev. viii.-x. are by a different hand from that which wrote Ex. xxv.-xxxi. Klostermann (1877) indicated a separate authorship for the Holiness Code (Lev. xvii.-xxvi.). Baentsch (1901) and Berthelot (1901) agree in regarding Lev. i.-vii. and Lev. xi.-xv. as independent minor codes. Graf (1871) and Maybaum (1880) suggested that the priestly writer was only a supplementer of the earlier text. Klostermann (1893) considered this writer as the editor of the Pentateuch. Schmidt (1902) also thinks that the so-called Priestly Document never existed as a separate code, but consists of a collection of laws, illustrative stories, annotations, and comments added to the already existing books by the priesthood in Jerusalem, chiefly during the Persian period. As the Book of Joshua has been subjected to a thorough priestly redaction, while the books of Judges, Samuel, and Kings have only been edited by men writing in the spirit of Deuteronomy, the question naturally arises why Joshua should have fared differently from the rest of the 'former prophets.' The answer generally given is that the Priestly Document ended with the conquest of Canaan, and that the Book of Joshua was cut off from the once existing Hexateuch. But Eduard Meyer is probably right in holding that there never was any Hexateuch, but that the Law, Joshua, Judges, Samuel, and Kings once formed one great historic work. This seems to have been essentially a Deuteronomistic work. The additions made in priestly circles affected some facts more than others. As the section dealing with events up to the death of Moses came to be regarded as 'the Law,' the rest formed a class by themselves. The division of the Law into five parts probably does not go back to the time when the Book of Joshua formed a part of the great work. The term Hexateuch is therefore likely to disappear, while the observations that led to its use are seen to be accurate, and the theory framed to account for them is recognized as essentially sound.

BIBLIOGRAPHY. Consult the later commentaries on the books of the Hexateuch; the introductions to the Old Testament of Bleek-Wellhausen, Cornill, Driver, König, and Wildeboer; the Hebrew histories of Kittel and Piepenbring, which include discussions of literary sources; the article "Hexateuch" by Cheyne in the *Encyclopædia Biblia;* id., by Wood, in the Hastings *Dictionary of the Bible;* Westphal, *Les sources du Pentateuch* (Paris, 1888-1892); Kuenen, *The Hexateuch* (Eng. trans., London, 1886); Wellhausen, *Die Composition des Hexateuch* (Berlin, 1889); Robertson Smith, *The Old Testament in the Jewish Church* (2d ed., Edinburgh, 1892); Addis, *Documents of the Hexateuch* (London, 1892-98); Holzinger, *Einleitung in den Hexateuch* (Freiburg, 1893); Klostermann, *Beiträge zur Entstehungs-geschichte des Pentateuchs* (Leipzig, 1894); Battersley-Carpenter, *The Hexateuch* (London, 1900); Kautzsch, *Die heilige Schrift des Alten Testaments* (Freiburg, 1896; Eng. trans., New York, 1899), a clear and concise survey of the sacred literature of the Hebrews. For arguments in support of the traditional view, consult Green, *Moses and the Prophets* (New York, 1883); id., *The Hebrew Feasts* (ib., 1886); and the series of articles by Harper and Green in *Hebraica*, vols. v.-viii. (1886-92). See the articles upon the books of the Hexateuch; also ELOHIST AND YAHWIST; EZRA; EZEKIEL; PENTATEUCH.

HEX'HAM. A market-town in Northumberland, England, on the Tyne, 20 miles west of Newcastle (Map: England, D 2). It has interesting remains of a splendid twelfth-century abbey church, erected on the site of a structure built by Saint Wilfrid about 675, the crypt of which was recently discovered. Hexham is the see of a Roman Catholic diocese. Coal and barytes are mined in the vicinity. The town was the scene of a Lancastrian defeat in 1464. Population, in 1891, 5900; in 1901, 7100. Consult: Raine, *The Priory of Hexham, Its Chroniclers, Endowments, and Annals*, Surtees Society (London, 1864-65); Hewitt, *Hexham and Its Antiquities* (Hexham, 1879).

HEY, hī, JULIUS (1832—). A German singing-teacher, important for his efforts to further Wagner's views on vocal training. He was born at Irmelshausen, and studied music under F. Schmitt and F. Lachner. He was introduced to Wagner by King Louis II., and, in connection with the Munich School of Music, attempted a revolution of the national system of singing. His attempts failed, and on Wagner's death, in 1883, he retired from public to complete his great work on singing, *Deutscher Gesangsunterricht* (1886). Although unsuccessful in his efforts to overturn the existing methods of voice culture, Hey exercised a powerful influence on the contemporary schools of singing.

HEY, WILHELM (1790-1854). A German fabulist. He was born at Leina, was educated at Jena, and successively became pastor at Töttelstädt (1818), Court preacher at Gotha, and superintendent at Ichtershausen. His more famous works, issued anonymously, *Fünfzig Fabeln für Kinder* (1833), and *Noch fünfzig Fabeln* (1837), were followed by poems called *Erzählungen aus dem Leben Jesu* (1848). Consult Hansen, *Wilhelm Hey* (Gotha, 1886).

HEYDEBRAND UND DER LASA, hī'dĕ-brănt ụnt dĕr lä'zȧ, TASSILO VON (1818-99). A German authority on chess, born at Potsdam. He was for a time German Ambassador to Copenhagen. The possessor of one of the largest libraries on chess in the world, he wrote the *Handbuch des Schachspieles*, which appeared under the name of Bilguer, and *Leitfaden für Schachspieler* (5th ed. 1880). With Frank he edited the old Portuguese work on the game by Damiano (1857).

HEYDEMANN, hī'dĕ-mȧn, HEINRICH (1842-89). A German archæologist. He was born at Greifswald, and studied at Tübingen, Bonn, Greifswald, and Berlin. His specialty, the study of vases, took him to Italy and Greece, and in 1869 he became instructor in archæology at the University of Berlin. Five years afterwards he went to Halle as professor of archæology. Most of his writing was for the journals, *Annali dell' Instituto, Archäologische Zeitung*, and *Zeitschrift für bildende Kunst*. Among his other works are: *Iliupersis* (1866); *Griechische Vasenbilder* (1870); *Die Vasensammlungen des Museo Nazionale zu Neapel* (1872); *Terrakotten*

aus dem Museo Nazionale zu Neapel (1882); *Dionysos' Geburt und Kindheit* (1885); *Pariser Antiken* (1887).

HEYDEN, hī'den, ADOLF (1838—). A German architect, born at Krefeld, pupil of Schlüter, in Berlin, where he worked at first independently, but after 1868 was associated with Walter Kyllmann in the erection of important structures there and in other cities of Germany. He also executed a great deal of decorative work, and strongly influenced the development of industrial art by his numerous designs in this branch.

HEYDEN, AUGUST VON (1827-97). A German historical painter, born at Breslau, the son of Friedrich von Heyden, the poet. He studied mining in Breslau and Berlin, and had already become director of the various mining interests of the Duke of Ujest before taking up painting in 1859 at the Berlin Academy under Eduard Holbein. He then entered the studio of Steffeck and finished his studies under Gleyre and Couture in Paris, where his "Saint Barbara, Patron Saint of Miners," was awarded the gold medal in the Salon of 1863. Of several historical and numerous ideal compositions, the more important are: "The Meeting of Luther and Georg von Frundsberg at the Diet of Worms, 1521" (1866, Germanic Museum, Nuremberg); "The French Ambassadors Suing for the Hand of Princess Clémence" (1869); "Morning Festival" (1870, National Gallery, Berlin); "Ride of the Valkyries" (1872, owned by the German Emperor); and "The Rescue of Wittich" (1880, Karlsruhe Gallery). Besides two large mural paintings for the Hall of Assizes at Posen, representing episodes from local history, he executed decorative work in the city hall, the National Gallery, and other public buildings in Berlin, where he was professor of the history of costume from 1882 to 1893. He published: *Blätter für Kostümkunde* (2d ed. 1876-90); *Die Tracht der europäischen Kulturvölker* (1889); the miners' fairy tales, *Aus der Taufe* (1878), and *Die Perlen* (1881), illustrated by himself; *Aus eigenem Rechte der Kunst* (1894); and *Jury und Kunstausstellungen* (1894).

HEYDEN, FRIEDRICH AUGUST VON (1789-1851). A German poet, born at Nerfken, near Heilsberg, in East Prussia, and educated at Königsberg, Berlin, and Göttingen. He wrote some dramas, which are now forgotten, but was successful as a writer of poetic tales, the best known of which are: *Die Gallione* (1825); *Reginald* (1831); *Das Wort der Frau* (1843, 23d ed. 1881); *Der Schuster von Ispahan* (1850); and *Die Königsbraut* (1851).

HEYDEN, JAN VAN DER (1637-1712). A Dutch landscape and architectural painter, born at Gorkum. His subjects are the exteriors of buildings, for which Adrian van der Velde, Eglon van der Neer, and Lingelbach supplied the figures. He was a thorough master of perspective and combined an extraordinary degree of finish with great breadth of general treatment and warm, harmonious color. Characteristic works by him are: three street scenes, in the Amsterdam Museum; another street scene in The Hague Gallery; three fine examples in the Louvre (one of them a view of the Amsterdam Town Hall); a street in Cologne, and a view of Cologne Cathedral in the National Gallery, London. His pictures are always of small dimensions.

HEYDEN, OTTO (1820-97). A German historical and portrait painter, born at Ducherow, Pomerania. He was a pupil of Wach and Kloeber at the Berlin Academy (from 1843), then of Cogniet in Paris (1847-48), and later continued his studies independently in Italy (1850-54). Although the bulk of his work is devoted to the delineation of national history, he also painted religious subjects, genre scenes, and landscapes, besides many portraits. From his sojourn in Italy dates "Job and His Friends" (Stettin Museum), followed after his return by "Foundation of Greifswald University, 1455" (1856, in the Aula of the University); "Duke Boguslav X. on His Pilgrimage to Jerusalem Attacked by Pirates, 1497" (Stettin Museum); "Field Marshal Schwerin in the Battle of Prague" (Royal Palace, Berlin). The Austro-Prussian War, in which he took part in the suite of Crown Prince Frederick William, brought "The Battlefield of Königgrätz" (1868, National Gallery, Berlin), and three episodes in the battle of Sadowa, all owned by the German Emperor, and several reminiscences of the Franco-German War of 1870-71, in which he also accompanied the army. "Emperor William I. Visiting the Wounded," in the National Gallery of Versailles, is especially noteworthy.. A visit to the East in 1869 resulted in several genre and landscape scenes from the Nile, and for the Dankeskirche in Berlin he executed the mural paintings of "The Last Supper," "The Adoration of the Magi," and "The Resurrection" (1883).

HEYDRICH, hī'drĭk, HEINRICH MORITZ (1825-85). A German poet, born at Dresden and educated at Leipzig and at Berlin. His principal works are: The tragedies, *Tiberius Gracchus*, and *Leonore von Portugal* (1861); the farce *Prinz Lieschen* (1861); and a collection of poems, *Sonnenschein auf dunklem Pfade* (1869).

HEYDT, hīt, AUGUST, Freiherr von der (1801-74). A Prussian administrator. He was born at Elberfield, where with his two brothers he carried on the banking business founded by his father. Elected a Deputy in 1847 and a member of the National Assembly in 1848, in the latter year he became Minister of Trade. Three years afterwards he was made director of the Prussian Bank. His Cabinet post he held through the period of reaction, as his politics were not extreme. In 1862 he became Minister of Finance in the Hohenlohe-Itzenplitz Cabinet, and attempted to please both sides in the growing conflict between Crown and Legislature. He retired on Bismarck's assumption of control later in the year, but was recalled in 1866 to face the question of raising funds for the war with Austria, clashed with the Diet, but held his place until 1869.

HEYDUK, hī'dụk, ADOLF (1835—). A Czech poet, born at Richenburg, and educated at Brünn and Prague. Since 1860 he has been professor in the Realschule at Pisek. He wrote a valuable sketch of Slavic and German mythology (1863), and the popular poems, mostly lyric, but many in the epic of idyllic manner: *Lesní kviti* (1875); *Dřevorubec* (1882); *Cymbal a husle* (1876), which deals with the Slovaks; *Písně* (1885);

Zavété listy (1886); *Na vlnach* (1890); and *Bahatýr* (1894).

HEYER, hī'ĕr, GUSTAV (1826-83). A distinguished German forester, son of Karl Justus Heyer (q.v.). He was born at Giessen, and studied at the University of Giessen, where at the age of twenty-seven he became professor of forestry. In 1868 he was appointed director of the Academy of Forestry at Münden, a post which he resigned in 1878, to accept a professor's chair in the University of Munich. From 1856 to 1878 he edited the *Allgemeine Forst und Jagdzeitung*. Among his many works on forestry may be mentioned: *Lehrbuch der forstlichen Bodenkunde und Klimatologie* (Erlangen, 1856); *Anleitung zur Waldwertrechnung* (Leipzig, 1895; 4th ed. 1892); *Handbuch der forstlichen Statik* (Leipzig, 1871).

HEYER, KARL JUSTUS (1797-1856). A noted German forester. He was born at Bessungen near Darmstadt, studied at Giessen and at Tharand, and at the age of twenty-one took active part in practical forestry, especially in the vicinity of Darmstadt, where he was then lecturing on forestry. In 1835 he was appointed instructor in the school of forestry at the University of Giessen, where, after having been also practical forester for Count Erbach-Fürstenau for four years, commencing in 1831, he became professor of forestry in 1835, a post he held until his death. During his incumbency he made many interesting contributions to the subject of forestry, in recognition of which a monument was erected in his honor at Giessen in 1892. Among his works may be mentioned: *Beiträge zur Forstwissenschaft* (Giessen, 1842 and 1847); *Anleitung zu forststatischen Untersuchungen* (Giessen, 1846); *Der Waldbau oder die Forstproduktenzucht* (Leipzig, 1854; 4th ed. by Richard Hess, 1891-93).

HEYLLI, ā'yē', EDMOND ANTOINE POINSOT, called GEORGES D' (1833—). A French bibliographer and editor. He was born at Nogent-sur-Seine, and in 1877 became chief of the Bureau of the Legion of Honor. He is best known as a collector of anecdotes about celebrities, Louis XV., Countess du Barry, Mme. Emile de Girardin, Marshal Ney, Madame Rachel, and others, and published a number of books, such as *Le scandale au théâtre* (1864); *Dictionnaire des pseudonymes* (1867), of which a third and enlarged edition came out twenty years later. He founded (1876) the *Gazette Anecdotique, Littéraire, Théâtrale*, brought out curious editions of *Manon Lescaut* and of *Paul et Virginie*, and collected a number of interesting documents relating to the War of 1870 and the Commune.

HEYLYN, hī'lĭn, PETER (1600-62). A Church of England divine. He was born at Burford, in Oxfordshire, November 29, 1600. He studied at Oxford, and through the interest of Laud, in whose theory of Church and King he devoutly believed, was appointed chaplain-in-ordinary to King Charles in 1630. Subsequently he held a variety of livings, but was deprived of them during the period of the Commonwealth. In 1651 he became blind. At the Restoration he was made subdean of Westminster as a reward for his literary services to the royal cause. He died in London, May 8, 1662. Heylyn was a very voluminous controversial writer, but his works are of no value now, except as illustrative of the age in which he lived and the ecclesiastical party to which he belonged. For his life, consult Robertson in his edition of Heylyn's *Ecclesia Restaurata* (London, 1849).

HEYNE, hī'ne, CHRISTIAN GOTTLOB (1729-1812). A German classical scholar, born at Chemnitz, in Upper Saxony, September 25, 1729. His father was a poor weaver. The pastor of Chemnitz, himself very poor, had Heyne educated at a school in the suburbs, and afterwards sent him to the University of Leipzig, where he suffered from extreme poverty. In 1753 he obtained a situation as copyist in the Brühl Library at Dresden. While in this office, he prepared his edition of *Tibullus*, which appeared in 1755, and roused the admiration of Ruhnken of Leyden. In 1756, unfortunately for Heyne, the Seven Years' War broke out. Frederick the Great marched against Dresden, and burned, among other things, the Brühl Library, but not before Heyne had edited, from a *codex* there, the *Enchiridion* of Epictetus. For some time he led a precarious life, being often without employment and without bread. In 1761 he married, and supported himself as best he could by writing for the booksellers; and in 1763 he was appointed professor of rhetoric at Göttingen on the recommendation of Ruhnken. This closed his period of misfortune. The rest of his long life was spent in comfort and professional activity. He died July 14, 1812. The principal works of Heyne, besides those mentioned, are his editions of Vergil (1767, 6th ed. 1803); Pindar (1774); Apollodorus (1787); Pliny (1790); Conon and Parthenius (1798); and Homer (8 vols., 1892; 2d ed. 1804). He published many translations, besides some ten or twelve volumes of minor works, of which six volumes were published separately under the title of *Opuscula Academica* (Göttingen, 1785-1812); and, finally, a great many reviews of books in the *Göttinger Gelehrte Anzeigen*, of which he was editor from 1770. In addition to this work, he had a seminar for the advanced study of philology and classical antiquity, from which he sent forth, in the course of his life, no fewer than 135 professors. Consult the life of Heyne by his son-in-law, Ludwig Heeren (Göttingen, 1813), and Carlyle's essay, *On the Life of Heyne*.

HEYNE, MORITZ (1837—). A Germanic philologist. He was born at Weissenfels, studied at Halle, and became docent there in 1864, and professor in 1869. In the following year he went to Basel as professor of German language and literature, and in 1883 was called to a similar chair at Göttingen. His most widely known work is that in the continuation of Grimm's *Deutsches Wörterbuch* (in which he edited the letter H, I, J, L, M, R, and part of S) and his own *Deutsche Wörterbuch* (1890-95). More important possibly is his work in phonetics and old Germanic literature: *Kurze Laut- und Flexionslehre der altgermanischen Dialekte* (3d ed. 1880); *Altsächsische und altniederfränkische Grammatik* (1873); editions of Beowulf (6th ed. 1898; also a metrical translation of Beowulf, 1898); of Heliand (3d ed. 1883); and *Altdeutsch-lateinische Spielmannsgedichte des zehnten Jahrhunderts* (1900); and in antiquities: *Kunst im Hause* (1881-83) and *Fünf Bücher deutscher Hausaltertümer* (1899-1901, the first two parts).

HEYNLIN, ā'lān', JOHANNES (c.1425-96). A prominent theologian and humanist of the fif-

teenth century, variously called *a Lapide* and *Lapidanus*. He studied at Leipzig, at Basel, and at Paris, where, in 1468, he was made rector of the university, and in the same year, and in 1470, prior of the Sorbonne. After teaching at Basel and the new University of Tübingen (1478), he was preacher in the cathedral of the former city (1484), but retired to a cloister three years afterwards. With Fichet he introduced the art of printing in Paris (1469). Consult Fischer, *Johannes Heynlin, genannt a Lapide* (Basel, 1851).

HEYNRICHS, hīn'rīks, J. N. The pseudonym of the German author and reformer Jenny Hirsch (q.v.).

HEYSE, hī'ze, JOHANN CHRISTIAN AUGUST (1764-1829). A German grammarian and lexicographer, born at Nordhausen, and educated at Göttingen. He taught at Oldenburg, in his native town, and in Magdeburg. His writings, practical rather than scholarly in nature, are: *Allgemeines Fremdwörterbuch* (17th ed. 1892); *Deutsche Schulgrammatik* (26th ed., by Lyon, 1900); and *Leitfaden zum Unterricht in der deutschen Sprache* (25th ed. 1885).

HEYSE, KARL WILHELM LUDWIG (1797-1855). A German philologist, son of Johann Christian August Heyse, born at Oldenburg. In 1816 he began his studies of philology and linguistics under Böckh and Bopp at Berlin, where he became professor in 1829. His work at first was mainly in Latin and Greek, but after his father's death he took up Germanics as well, and revised many of his father's works, especially the *Allgemeines Fremdwörterbuch*. His own works are: *Handwörterbuch der deutschen Sprache* (1833-49), which is both practical and scholarly; *Ausführliches Lehrbuch der deutschen Sprache* (1838-49), popularizing the results of historical and comparative linguistics; and *System der Sprachwissenschaft*, his most important work, edited by Steinthal (1856).

HEYSE, PAUL (1830—). A distinguished German author, the son of Karl Wilhelm Ludwig Heyse. He was born in Berlin, and educated there and at Bonn. A classical training was ripened by travel, during which he pursued in the libraries of Switzerland and Italy the philological researches, a taste for which was inherited. Even earlier, however, he had made his first dramatic essay on a subject which the romantic revival had made very popular, *Francesca da Rimini* (1850). A little later appeared his epics, *Die Brüder* (Berlin, 1852) and *Urica* (Berlin, 1851), which, when they were republished in 1854, made him so conspicuous that King Maximilian of Bavaria invited him to make Munich his home. Here he resided for many years with frequent visits to Italy, whose culture influenced all his writing deeply. In later life he spent most of his time in Italy on the banks of Lake Garda. The sum of Heyse's many and varied productions has made him a dominant figure among German men of letters. His prose fiction has been chiefly in the shape of short stories, for which he came to hold a high position in German letters. These tales are models of their kind, masterpieces in miniature, cameos in which every line leaves an impression. The best collection of them is *Das Buch der Freundschaft* (1883); the most famous single example is *L'Arrabbiata*. He also produced a few longer novels, tinged with radical thought on social and religious questions, especially: *Kinder der Welt* (1873); *Im Paradiese* (1875); and *Ueber allen Gipfeln* (1895), pessimistic in tendency, but fresh in style and gracefully light in movement. A large number of lyric and epic poems testify to a ripe culture, a warm imagination, and a suavity of expression which at times sacrifices strength to sweetness. The best-known of the longer poems is the epic *Thekla* (1858). In his dramas he maintained a high level, although he has not in any of them attained the highest dramatic rank. *Die Sabinerinnen* (1859), *Ludwig der Bayer* (1862), and *Hans Lange* (1866) are noteworthy among his earlier plays; and in the closing years of the century he produced some striking dramas, such as *Das verschleierte Bild von Sais*, *Der Heilige*, and *Maria von Magdala*, the last of which had a pronounced American success in 1902. At the same time he studied Italian literature and published a number of translations from the Italian. His *Complete Works* were first published in 1871, but large additions have since brought the number up to some forty volumes. His reminiscences, *Jugenderinnerungen und Bekenntnisse*, appeared in 1900. Consult: Brandes, *Moderne Geister* (Frankfort, 1887); Kraus, *Paul Heyses Novellen und Romane* (ib., 1888).

HEY'WARD, THOMAS, JR. (1746-1809). An American jurist, one of the signers of the Declaration of Independence. He was born on the estate of his father, a wealthy planter of Saint Luke's, South Carolina, and was educated in his native parish and in London, where he went to finish his law studies. His observations there and in other parts of Europe sent him home with strong republican ideas. From 1776 to 1798 he represented North Carolina in the Continental Congress, was a judge of the civil and criminal court in his native province from 1780 to 1798; was a captain of artillery in the war, and became a prisoner of the British at the surrender of Charleston. He was a member of the State convention for framing a constitution in 1790, and retired into private life the following year.

HEY'WOOD. A town in Lancashire, England, on the Roach, 9 miles north of Manchester (Map: England, D 3). It is an important centre of the cotton manufacture, has extensive coal-mines, iron and brass foundries, boiler-making, railway plant, and chemical works. It possesses handsome churches and other fine buildings. The municipality provides water, gas, markets, baths, fire brigade, technical school, free library, hospital, cemeteries, and owns a spacious park and recreation ground. Its incorporation dates from 1881. Population, in 1891, 23,300; in 1901, 25,460.

HEYWOOD, JOHN (c.1497-c.1577). An English author, sometimes called 'The Old Epigrammatist.' The place of his birth has not been definitely ascertained, but it was probably London or North Mimms, Hertfordshire. At an early age he came to Court, introduced, according to some traditions, by Sir Thomas More; and the "Book of Payments" of Henry VIII. shows him to have been in the royal service in 1515. He found great favor at the Courts of Edward VI. and Mary, where his quickness at repartee

and his witty imagination, besides the literary flavor of his writings, made him the superior intellectually of the usual Court jester. Shortly after the accession of Queen Elizabeth, he withdrew to Malines, Belgium. Of his literary remains the first chronologically were five *Interludes*, printed between 1533 and 1569. There are frequent plagiarisms from Chaucer, but they contain some original humor and vigorous satire; and the semi-dramatic form in which they are cast places them among the precursors of English comedy. A more ambitious but less successful production was *The Spider and the Fly*, which was printed in 1556. Written partly as a compliment to Queen Mary for her theological attitude, it represented Roman Catholics as the flies and Protestants as the spiders, with the Queen as the housemaid wielding her destroying broom. His best-known and most popular writings were the *Epigrammes*, the first extant edition of which bears the date 1562. The *Interludes* included: *A mery Play betweene the Pardoner and the Frere, the Curate and Neybour Pratte* (1533); *A mery Play betweene Johan the Husbande, Tyb the Wife, and Syr Han the Priest* (1533); *The Four P's* (1569); *The Play of the Wether* (1533); and *The Play of Love*. His other works besides those mentioned were *A Dialogue on Wit and Folly*, and several ballads. Consult: Halliwell, *Dictionary of Old English Plays* (London, 1860); Sharman's Introduction to an edition of the *Proverbs* (London, 1874); and Symond, *Shakspere's Predecessors in the English Drama* (London, 1884).

HEYWOOD, Thomas (c.1575-c.1650). A celebrated English dramatist and general writer, born in Lincolnshire. He seems to have studied at Cambridge. By 1596 he was apparently writing for the stage, and two years later he was engaged by Philip Henslowe as an actor. Heywood was a most prolific writer. In 1633 he claimed to have had "an entire hand, or at the least a main finger," in 220 plays. His career was not yet ended. Of these plays only twenty-four are extant. The best of them is a domestic drama entitled *A Woman Killed with Kindness*, performed in 1603. This play brings us close to the heart of English middle-class life. Somewhat similar to it is *The English Traveller* (1633). Representative of his work in low life is *The Wise Woman of Hogsdon* (1638). There are three admirable comedies of adventure: *The Captives*, *The Fair Maid of the West*, and *Fortune by Land and Sea*. Besides his 220 plays, Heywood wrote many pageants, triumphs, elegies, a long heroic poem entitled *Troia Britannica*, a universal chronicle history (1609); *An Apology for Actors* (1612; reprinted for the Shakespearean Society, 1841); *Nine Books of Various History Concerning Women* (1624); *The Hierarchy of the Blessed Angels* (1635); and much else. He also made translations from Sallust, Lucian, Erasmus, and others. He died about 1650. Consult: *Dramatic Works*, ed. by Pearson (6 vols., London, 1[illegible]); *Thomas Heywood*, a selection from his plays, ed. by J. A. Symonds and A. W. Verity, "Mermaid Series" (London, 1888); *Old English Plays*, ed. by Bullen, vol. iv. (London, 1885); and Ward, *History of English Dramatic Literature* (New York, 1899).

HEZE'KI'AH (Heb. *Khizkiyāh*, Yahweh is my strength). King of Judah, son of Ahaz. His reign may be approximately fixed as extending from B.C. 720 to 691. He ascended the throne at an early age—probably less than twenty—and appears to have been early influenced by the discourses of the prophet Isaiah, through whc he was induced to remove from the cult at Jerusalem certain practices, such as the worship of the brazen serpent (II. Kings xviii. 3, 4). We possess but little authentic information about Hezekiah's reign. The most important event was an invasion of Palestine by Sennacherib (q.v.), King of Assyria, c.701 B.C. With the help of the cuneiform annals of Sennacherib we can obtain a tolerably clear idea of this campaign, which was undertaken to offset the efforts of Babylonian and Chaldean chieftains like Merodach-Baladan (cf. II. Kings xx. 12-19) to make alliances with nations to the west whom Assyria claimed as vassals. Hezekiah and other rulers, such as the chiefs of the Philistines, of Edom and Moab, had actually promised Merodach-Baladan aid in making Babylon independent of Assyria. Sennacherib, after overthrowing Merodach-Baladan, proceeds to the west to wreak vengeance on Hezekiah and his allies. He succeeds in quelling the uprising, and removes those who had shown themselves faithless to him. Sennacherib advances within a few miles of Jerusalem, but after exacting a heavy tribute, withdraws without capturing the Judean capital (II. Kings xviii. 13; xix. 36). This deliverance is said to be due to the 'angel of the Lord,' who 'smites' the Assyrian camp (II. Kings xix. 35). The traditional interpretation of the passage makes it refer to a pestilence. The more probable reason for the withdrawal was the receipt of news from some troublesome Babylonian province which obliged Sennacherib to return to his land, content with having once more made his authority recognized in the west. It is hardly likely that after this Hezekiah ventured on any campaigns, so that the account (II. Kings xviii. 8) of a successful conflict with the Philistines is probably to be placed at the beginning of his reign. From certain notices (e.g. Proverbs xxv.) it would appear that in his days considerable literary activity prevailed, though it is highly improbable that the King himself wrote anything. The song in Isaiah xxxviii., ascribed to the King as having been composed by him after a severe illness, belongs to the post-exilic period, on the evidence of the language and contents, and the entire story of this illness is probably a bit of legendary lore that has found its way into an historical narrative because it served to illustrate the view taken by a later age of Hezekiah, who had become idealized like David and Solomon into the model of a God-fearing, pious Israelite after the pattern of the Yahweh purists.

H. H. The initials denoting the authorship of Helen Hunt (q.v.), *née* Fiske.

HIAWATHA, hī'ā-wä'thā. A city and the county-seat of Brown County, Kan., 40 miles northwest of Atchison; on the Missouri Pacific and the Saint Joseph and Grand Island railroads (Map: Kansas, G 2). It has Hiawatha Academy and the Morrill Public Library. The city is chiefly important as the commercial centre of a fertile agricultural country, and has lumber-yards, grain-elevators, a flour-mill, foundries, machine-shops, etc. There are municipal waterworks and two electric-light plants, one of which

is owned by the city. Population, in 1890, 2486; in 1900, 2829.

HIAWATHA, hī'â-wg'tà *or* -thà. A narrative poem by Henry Wadsworth Longfellow, founded on an Indian legend preserved in Schoolcraft's *Algic Researches,* and *History, Condition, and Prospects of the Indian Tribes of the United States.* However, the miraculously born hero is declared to be an Iroquois and not an Ojibway, according to other sources. Longfellow adopted the metre of the Finnish epic *Kalevala,* and was accused of taking the entire plan from that poem. But the incidents common to both show merely the recurrence of early myths.

HIB'BERT LECTURES, THE. A course of lectures given annually in London, discussing some unsettled problem in religion or theology. The lectures are supported from a fund left by Robert Hibbert, a Jamaica merchant, who died in 1849, leaving his property in trust for the promotion of scholarship, particularly among Unitarians. By a wise provision the trustees were empowered to revise the terms of administration from time to time, and in the exercise of this power they established the lectures in 1878. The first series was delivered in that year by F. Max Müller on "The Origin and Growth of Religion," and succeeding series have been given by Kuenen, Beard, Reville, Page Renouf, Renan, Rhys Davids, Pfleiderer, Rhys, Sayce, Hatch, and others.

HIBERNATION (Fr. *hibernation, hivernation,* from Lat. *hibernare,* to hibernate, from *hibernus,* winter, from *hiems,* winter, Gk. χιών, *chiōn,* Skt. *hima,* Av. *zima,* winter), AND ESTIVATION (Fr. *estivation,* from Lat. *æstivare,* to pass the summer, from *æstivus,* pertaining to the summer, from *æstas,* summer; connected with Lat. *æstus, heat,* Gk. αἴθειν, *aithein,* to burn, AS. *ād,* funeral pile, Skt. *idh,* to kindle). A physiological state of dormant vitality in which many animals in northern countries are able to pass the winter. It should not be confused with the torpor of freezing, which is a pathological and usually a fatal condition. The immediate cause of hibernation is not cold, for many animals go into their winter sleep some time before winter is on. Nor is it the lack of food, for the great bat begins sometimes to hibernate as early as the end of July, at a time when its insect food is still abundant. Moreover, the winter season is not the only one passed by animals in this kind of torpor. In dry countries, at the approach of the dry season, when moisture, herbage, and consequently animal food will be scarce, many kinds of animals are enabled to survive until the time of plenty again by going into a prolonged stupor, which seems not to be very different in kind or duration from the hibernation of northern forms. The Germans have for these two conditions the words 'Winterschlaf' (winter sleep) and 'Sommerschlaf' (summer sleep). The latter state is known in English as 'estivation.'

DORMANT VITALITY, or 'rigor,' is a term used for an apparent suspension of vital activity, distinguished from death by the possibility of resuscitation. Two general classes may be distinguished: (1) Dormant vitality induced by external conditions; and (2) dormant vitality determined by internal conditions. The first class is of three kinds: (*a*) *Desiccation rigor.* There are certain animals, notably rotifers, tardigrades, and nematodes, which can be dried in a vacuum until they become immobile, and can remain thus immobile for days or even months until, on the addition of water, they become active again. The organism has probably not lost all of its water, but has passed into an encysted condition; it is not dead, but its metabolism is greatly reduced. Even snails and other animals which can protect their internal tissues from complete loss of water may live for months without showing external activity. (*b*) *Dark rigor* is induced in green plants and even in certain fungi by their removal for several days from the light. The sensitive plant treated thus becomes immobile. Light is essential to movement. The reverse, or 'light rigor,' has been seen in bacteria. (*c*) *Heat rigor.*—The sensitive plant, muscle, and various other forms of protoplasm become quiescent at a temperature a few degrees below that at which they are killed by heat. The rigor seems to be due to the beginning of the death changes. Cold rigor occurs in simple protoplasm as it approaches the zero (centigrade) temperature. The chlorophyll granules of Vallisneria move only about one mm. per minute at 1° C., and not at all at 0°; the rotation of Nitella ceases at 0° C.; in Tradescantia hairs, movement is wholly arrested on freezing the cell-cap. Even in seeds and bacteria, which are not killed by the lowest temperatures, all vital activities have probably ceased at 0°, for De Candolle found that in only one species out of ten could he get a seed kept at 0° to germinate, and even then germination was so retarded that it took from 11 to 17 days as opposed to 4 days at 5.7°. Likewise, bacteria do not multiply below 5° to 10°. Among animals Kuhne found Amœba cooled to near 0° almost motionless. Purkinje and Valentin first noticed that the ciliated epithelium of the frog ceased its movements at 0°. Muscles of the frog were found by Kuhne to become at −3° to −7° a solid lump, which did not, however, wholly lack irritability. The evidence of all these cases shows that activity nearly ceases in protoplasm at or near 0° C.

Determined by internal conditions, seeds, resting spores, cysts, gemmules of sponges, and statoblasts of Bryozoa are all conditions of natural dormant vitality. The period of dormancy is not unlimited, however, the alleged germination of seeds many hundred years old not being confirmed. This indicates that even with a slow rate of living the food material eventually becomes exhausted.

Belief in human dormancy rests largely upon a certain collection of cases observed in India and published by James Braid.

PHENOMENA OF HIBERNATION AND ESTIVATION. The physiological facts mentioned above must be considered in studying the phenomena of habitual animal dormancy under conditions of winter, seasons of drought, and so on. The respiration in winter sleep is diminished much more than in ordinary sleep, and consequently the heart-beat is very slow. The digestive organs are practically inactive. Many animals void almost no fæces during this period, and the anal opening of those bears that hibernate is closed by a resinous plug known to hunters as the 'seal.' The temperature of the body is lowered to that or nearly that of the air. The voluntary control of the muscles is lost, but there is an increased muscular irritability, an unusual sensitiveness to external

stimuli. The slightest touch possible, even on the end of a quill of a hibernating porcupine, will result in deep breathing and perhaps muscular movements. There can be no sharp line drawn between normal sleep and the lethargy of hibernation, for there are all gradations in the depth and duration of this lethargy, beginning at the one end of the scale with what might, perhaps, be simply termed sleep, and ending with animals that do not once wake up from the hibernating stupor until the time for its final termination has come.

Nearly all of the burrowing rodents are hibernaters, especially, in the United States, the woodchuck. A number of animals indulge in alternate periods of waking and hibernation. The English squirrel, the hedgehog, and the mourning-cloak butterfly are frequently awake on warm days in winter. Grain-storing animals spend a great deal of their time in sleep, but when hungry they awake to partake of their food-supply, or go outside in search of fresh food if weather permits. In the case of the northern brown, black, and polar bears only the female hibernates in the strict sense of the word, probably because she must remain quiet until her young is born, often before the snow releases her. The males sleep a great deal, but they go out now and then in search of food. A number of animals of wide range of distribution hibernate in the northern but not in the southernmost parts of their range. Such is the case with the American prairie-dogs and the skunk. In the centre of their range they are awake and active during warm winters or warm days in winter. Thus there are all degrees of torpidity, and likewise gradations between ordinary periodical sleep and hibernating dormancy. Although we cannot understand why animals of one species should be active in winter while those of a nearly related species should hibernate, as is the case among mice, nevertheless, it is probably of advantage in the struggle for existence, since it enables animals to remain in certain geographical areas in which they could not possibly survive without long and perilous migrations twice each year. This is especially true of the small vegetable-eating animals of northern plains.

Mammals usually hibernate in hollow logs, in trees, in caverns, or even in burrows in the ground. Usually their winter homes are made additionally fitting by a bed or nest of dry grass and autumn leaves. Most of the hibernaters are entirely or in part vegetable feeders. All the grain-storing species are active all winter, or else are intermittent hibernaters.

Reptiles, amphibians, and some fishes hibernate. The land reptiles and amphibians bury themselves in the ground below frost-line and there remain until spring. Aquatic species, such as the water-turtles, burrow in the mud at the bottom of streams. A few fishes, such as carp, chub, minnows, and eels, likewise lie throughout the coldest part of the winter in the mud and débris at the bottom of the water. Various snakes crawl into crevices between rocks, or into hollows beneath stumps, or take possession of gopher-burrows and the like, or even burrow themselves into loose soil, and pass the winter often wrapped in a tangled mass composed of scores of individuals of the same species. The temperature of these sinks to that of the water or mud in which they lie; and those of a northern habitat can endure a stress of cold to which individuals of the same species living in a warmer region will succumb.

Among the invertebrates, land-snails hibernate within their closed shells. They also afford the most conspicuous American example of estivation. When the dry, hot weather of midsummer approaches many species secrete two or three diaphragms across the aperture of their shells, and behind these remain as torpid as in winter until tempted out by a prolonged shower, until the autumn coolness and dampness arrive. Slugs bury themselves in the ground, and the bivalve mollusks in the mud at the bottom of streams and ponds. A great many of the other land invertebrates survive as eggs or spores which remain inactive during the winter, and begin to develop on the return of spring. Spiders, more or less active, hide under fallen leaves or bark, and in other secluded places. Insects pass the winter in all stages of development. A number of beetles, flies, bugs, and a few butterflies winter as adults in northern climates. A large number of butterflies and moths pass the winter as pupæ, frequently protected by a silken cocoon. Several kinds of caterpillars are able to survive the winter either in spun nets or in sheltered hollows or chinks. A vast host of insects survive as eggs, whose development is delayed until spring.

Upon waking from their stupor the heat of the body of hibernating animals very quickly increases to the normal. Hunger is probably the chief agent that calls such animals to activity again. The most profound sleepers can scarcely be kept awake when brought into a warm room and stimulated. Partial hibernaters, after a hearty meal in winter, resume their torpor again. The air under a bell jar, in which a hibernating dormouse is put, remains unchanged. Hall kept a hibernating bat under water fifteen minutes without fatal effect, while a wakened bat will succumb after three minutes. Carbon dioxide, which is speedily fatal to active animals, has no effect on a torpid marmot. Hibernaters lose their weight in winter to the extent of 30 to 40 per cent. This loss of weight indicates that, notwithstanding their great diminution, the vital processes are going on in the hibernating animal all the time.

Consult: Hall, "Hibernation," in Todd, *Cyclopædia of Anatomy and Physiology*, vol. ii. (London, 1838); Browne, *Animal Torpidity and Hibernation* (Philadelphia, 1847); Semper, *Animal Life* (New York, 1881); Gadow, Beddard, Sharp, and other writers in the *Cambridge Natural History* (London, 1895-1903).

HIBER'NIA, IVERNA, JUVERNA, or **IERNE** (probably connected with Welsh *Ywerddon*, MBret. *Yuerdon*, Ir. *Erin*, *Herin*, Ireland, akin to Gk. Ἰωρία, *Pieria*, name of a district in Greece, Skt. *pîvan*, fat; cf. also MWelsh *Ewyrdonic*, Irish). Names by which Ireland is designated in the classical writers. Aristotle speaks of two islands situated in the ocean beyond the Pillars of Hercules, called British, Albion, and *Ierne*, beyond the Celtæ. Both Diodorus Siculus and Strabo report the natives to be addicted to cannibalism, but without proof. Pomponius Mela declares the herbage to be so luxuriant that the cattle who feed on it sometimes burst. Pliny repeats this statement, and adds that the Hibernian mother trains her child from the very

first to eat food from the point of a sword. The most important of all classical authorities on Hibernia is Ptolemy, who describes the country, and gives the names of the principal rivers, promontories, seaports, and inland towns. The island was never conquered by the Romans. See IRELAND.

HIBERNIANS, ANCIENT ORDER OF. A prominent Catholic Irish organization. The society was instituted originally for the protection of the Catholic priesthood and religion in Ireland, but it has now as its main object 'the advancement of the principles of Irish nationality.' According to some authorities the order was first instituted in 1642, following the great uprising in the north; according to others, in 1651, when Cromwell had proclaimed nearly the whole native population outlawed, and had put a price upon the head of every priest and made it death to attend a Catholic service. The founder was Rory Og O'Moo, and the society was at first known as The Defenders. On the establishment of Catholic emancipation, in 1829, the society was reorganized under its present name as a beneficial and nationalist organization. It was soon afterwards extended to England and Scotland and was introduced into the United States in 1836. Its membership is restricted to persons of Irish birth or descent and of Catholic faith. Military drill is a prominent feature in some of the branches. The order is an active supporter of the present Gaelic movement (see GAELIC LEAGUE), having endowed a Celtic chair at the Catholic University of America, and contributed generously toward the support of Gaelic organizers in Ireland. The latest report shows that, including the ladies' auxiliary, the American branch had a membership of 150,000, and disbursed annually nearly $1,000,000 in benefits. This branch is closely affiliated with the parent body in Ireland, as well as with those in England, Scotland, Australia, and other parts of the world.

HIBERNICISM. A term used to denote an Irish bull, i.e. a sentence expressing ideas that a moment's thought would show to be incompatible and absurd. A famous bull was made, it is said, by Sir Richard Steele when inviting a certain lord to visit him: "If, sir, you ever come within a mile of my house, I trust you will stop." Curran also used to relate a fine specimen: He started one day to attend a levee at the castle in Dublin. There was a long line of carriages, and he was suddenly startled by the pole of the carriage behind crashing into the back of his own carriage. He hastily called to his coachman to stop, saying, "The pole of the carriage in the rear is driven into ours." "And, sure, it's all right again, thin, your honor," cried Pat, "for I've just drove me pole into the carriage in front." Richard and Maria Edgeworth wrote a learned treatise entitled *An Essay on Irish Bulls* (1802); and Maria Edgeworth's *Castle Rackrent* (1800) is full of the most delightful blunders in speech.

HIBISCUS (Lat., from Gk. ἰβίσκος, *hibiskos*, mallow). A genus of plants of the natural order Malvaceæ, the numerous species of which are shrubs or trees, but mostly large herbaceous annuals and perennials, natives of warm climates. The flowers of many are very beautiful. *Hibiscus syriacus*, a native of Syria and Carniola, has long been in cultivation as an ornamental shrub and has proved hardy in Great Britain and parts of the United States. Some are favorite hothouse plants. The characteristic mucilaginous and fibrous properties of the Malvaceæ are very strongly developed in this genus. *Hibiscus abelmoschus* so abounds in mucilage that it is much used in the northwest of India for clarifying sugar. The unripe fruit of *Hibiscus esculentus*, an annual plant with a soft herbaceous stem three to five feet high, crenate leaves, axillary sulphur-colored flowers, and pyramidal, somewhat pod-like capsules, is in general use both in the East and West Indies for thickening soups, and otherwise as an article of food. It is called okra, gumbo, gombo, gobbo, and ochro in the West Indies and Southern United States; bandikai, ram-turai, and denroos in different parts of India; and bammia in the west of Africa. The bark of *Hibiscus tiliaceus*, a tree twenty feet high with a very thick bole, abounds

HIBISCUS SYRIACUS.

in mucilage and is chewed by the natives of South Sea Islands when food is scarce. This tree, the bola of Bengal, and the moho, majagua, or mohaunt of the West Indies is one of the most abundant trees of the South Sea Islands; and the wood, which is light, tough, and durable, is much used for many purposes. The very porous bark is made into cordage and matting in various tropical countries. Many other species yield fibres, some of them coarse, others fine and beautiful, which are used in different countries; but the most important in this respect is *Hibiscus cannabinus*, the Ambaree hemp, and Deccan hemp of Western India, called palungoo at Madras, and mesta pat in Bengal; a plant very generally cultivated in all parts of India, although nowhere to a great extent. It is an annual herb with a straight, unbranched stem, three to seven feet high. The fibre is not so strong as hemp, and is useful only for ropes and coarse fabrics. It has been suggested that many species of Hibiscus might be found valuable for the manufacture of paper. *Hibiscus sabdariffa*, Jamaica sorrel or roselle, is very generally cultivated in warm countries, on account of its calyx, which, as the fruit ripens, becomes fleshy, and acquires a very pleasant acidity. It is much used for making tarts and jelly, and a decoction of it, sweetened and fermented, affords a refreshing beverage. *Hibiscus abelmoschus*, sometimes called musk-mallow, another plant common in widely scattered tropical countries, is cultivated for its seeds, called ambrette, or *graines d'ambrette*,

which have a fragrance intermediate between musk and amber, and which are much used by perfumers. In Egypt and Arabia, these seeds are mixed with coffee, and stimulant and stomachic qualities are ascribed to them. The petals of *Hisbicus rosa-sinensis* are astringent, and are used by the Chinese to blacken their eyebrows and their shoes. A number of species of Hibiscus are cultivated as ornamental plants in the United States. There are also several indigenous species.

HICCOUGH, hĭk'kŭp, or **HICCUP.** Sudden short, convulsive inspirations, attended with a peculiar sound produced in the larynx by the inrush of air. The movements concerned in the production of hiccough are a spasmodic contraction of the diaphragm, and a certain degree of constriction in the glottis, which occasions the peculiar sound, and limits the amount of air inspired. These convulsive inspirations commonly succeed each other at intervals of a few seconds. The paroxysm may last only a few minutes; or may extend to hours or days, in which case it may be dangerous to life, from the exhaustion which it causes. Over-distention of the stomach, the ingestion of cold water, excessive acidity, etc., will provoke it. Certain diseases are frequently attended by hiccough. It occurs occasionally after severe hemorrhage, in debilitating diseases, pneumonia, peritonitis, appendicitis, etc., in which cases it is a grave symptom.

When the attack is slight it may often be stopped by making a very full inspiration, and then holding the breath as long as possible, the diaphragm being thus held in a state of voluntary contraction. A drink of water gives relief in ordinary cases. In more obstinate cases, aromatic spirit of ammonia, camphor, musk, etc., may be resorted to. When hiccough continues for an hour or more and the exhaustion is great, an anæsthetic may be necessary.

HICH'BORN, Philip (1839—). An American naval officer. He was born in Charlestown, Mass., studied in the Boston High School, was a shipwright apprentice in the Boston Navy-Yard, and, having gone to California in 1860, became master shipwright of the Mare Island Navy-Yard (1862). He entered the Navy in 1869, with rank of lieutenant, and served as assistant naval constructor until 1875, when he was commissioned full constructor. Four years afterwards Hichborn was sent to Europe to report on foreign dock-yards, and his book on this subject is a standard text-book. Having served on the Board of Inspection and Surgery, in 1881 he was appointed to the Naval Advisory Board. In that capacity and as chief constructor (appointed 1893 and 1897) he was prominently connected with the construction of the new navy. He was retired 1901, with the grade of rear-admiral.

HICH'ENS, Robert Smythe (1864—). An English novelist, born at Speldhurst, in Kent. He was educated at Clifton College, the Royal College of Music, and the London School of Journalism, and became a member of the staff of the London *World*. He began early to write musical lyrics and stories. His *Green Carnation* (1894), published anonymously and attributed to Oscar Wilde, created a sensation. It is a satire on the decadents. Among succeeding novels are: *An Imaginative Man* (1895); *Flames* (1897); *The Slave* (1899); *Tongues of Conscience*, short stories (1900); *The Prophet of Berkeley Square* (1901); and *Felix* (1902). He has also collaborated in successful plays, as *The Medicine Man* and *Becky Sharp*.

HICKES, George (1642-1715). An English non-juring clergyman, philologist, and author. He was born at Newsham, Yorkshire; studied at Northallerton Grammar School, then proceeded as sizar to Oxford, where he graduated B.A. In 1664 he received a fellowship of Lincoln College, and the following year received his M.A. degree. He took holy orders in 1666, was a tutor for several years, visited France in 1673, was appointed rector of Saint Elbe, Oxford, in 1675, and in 1676 became chaplain to the Duke of Lauderdale, whom he accompanied on his journey as High Commissioner to Scotland. Several rapid promotions culminated in a chaplaincy to James II. and the Deanship of Worcester (1683). At Worcester his study of the Germanic languages resulted in the publication of the *Anglo-Saxon and Mœso-Gothic Grammar* (1689). At the time of the Revolution he refused to take the oath of allegiance to William and Mary, and was deprived of his benefices. In 1693 he visited the exiled King at Saint Germains, with a mission from the non-juring clergy for coördinate action in regard to the continuance of their episcopal rights, and in 1694 he was consecrated by their leaders as Suffragan Bishop of Thetford. His subsequent publications in controversial and practical divinity were numerous. His greatest work is *Linguarum Veterum Septentrionalium Thesaurum Grammatico-Criticum et Archæologicum* (3 vols., 1703-05). Among his other writings are: *Controversial Letters* (1710); *Sermons* (1711); and a volume of *Posthumous Discourses*, published in 1726.

HICK'EY, Emily Henrietta (1845—). An English poet, born at Macmine Castle, Wexford, Ireland. With F. J. Furnivall she founded the Browning Society (1881), and she became known as a lecturer. In 1902 she edited *Havelok the Dane*, a Middle-English romance. Among her volumes of poems are: *A Sculptor and Other Poems* (1881); *Verse Tales* (1889); *Michael Villiers, Idealist, and Other Poems* (1891); *Poems* (1895); *Our Lady of May and Other Poems* (1902).

HICK'OK, Laurens Perseus (1798-1888). An American writer on philosophy. He was born in Bethel, Conn.; was pastor at Newtown, Kent, and Litchfield, Conn. (1822-36); professor of theology in Western Reserve College, Ohio (1836-44); professor in Auburn Theological Seminary (1844-52); professor of mental and moral science in Union College, and vice-president (1852-66) and president (1866-68). After his resignation of the last-named office, Dr. Hickok resided at Amherst, Mass. Among his published works are: *Moral Science* (1853); *Mental Science* (1854); *Rational Cosmology* (1858); *Rational Psychology* (1861); *Humanity Immortal* (1872); *Creator and Creation* (1872); *Logic of Reason* (1874). He died May 6, 1888.

HICK'ORY. A town in Catawba County, N. C., 50 miles northwest of Charlotte; on the Southern Railway (Map: North Carolina, A 2). It is the seat of Lenoir College (Lutheran), opened in 1891, and of the Claremont Female College, opened in 1880, and has Saint Paul's Lutheran Seminary and other educational insti-

tutions. There are manufactures of flour, lumber, foundry products, carriages and wagons, leather, etc. Population, in 1890, 2023; in 1900, 2535.

HICKORY (formerly *hiccory, pohickery*, from the North American Indian name), *Carya*, or *Hicoria*. A genus of trees formerly included among walnuts (Juglans). The hickories are exclusively North American. They are large and beautiful trees, with pinnate leaves, and attain a height of 70 or 80 feet. Their timber is very heavy, strong, elastic, and tenacious, but decays speedily when exposed to heat and moisture, and is peculiarly liable to injury from worms. Great quantities of hickory are used to make hoops for casks. It is much used for handspikes, axe-handles, baskets, agricultural implements, etc., the second growth being tougher, is preferred for these purposes. When used for baskets the logs are cut into sections of the required length, steamed in vats, and cut in a veneering machine, after which they are chopped into splints of the required width. Shafts of carriages, handles of whips, and golf-clubs, large screws, etc., are made of hickory. It

SHELLBARK HICKORY (*Carya ovata*).

is greatly esteemed for fuel. The fruit of the hickory is a smooth, hard-shelled nut covered by a four-parted husk, which in most species separates to the base upon maturity. The nuts of some of the species are of excellent flavor. The shell-bark and shag-bark hickory are so called from their shaggy outer bark, which peels off in long, narrow plates. The hickories are found from Maine to Florida and west to Minnesota, Kansas, and Texas, and extending into Mexico, several species occurring throughout the entire range. The trees are mostly slow growing. In forests they grow tall with few limbs, but in the open they branch widely and have many desirable qualities desired in park trees.

The principal species, according to different authorities, are:

	Gray		Britton and Brown	
Pecan	*Carya*	*olivæformis*	*Hicoria*	*pecan*
Shagbark hickory	"	*alba*	"	*ovata*
Shellbark hickory	"	*sulcata*	"	*lacin*
Mocker nut hickory	"	*tomentosa*	"	*alba*
Pig-nut hickory	"	*porcina*	"	*glabra*
Bitter-nut hickory	"	*amara*	"	*minima*
Water hickory	"	*aquatica*	"	*aquatica*
Nutmeg hickory	"	*myristicæformis*	"	*myristicæformis*
Mexican hickory	"	*Mexicana*	"	*Mexicana*
Small pig-nut hickory	"	*microcarpa*	"	*odorata*

HICKORY-POLE CANVASS. The name given to the canvass for Andrew Jackson in the Presidential election of 1828.

HICKORY SHAD. See MUD-SHAD.

HICKS, ELIAS (1748-1830). An American minister of the Society of Friends, born at Hempstead, Long Island. While still a young man of twenty he began to feel a deep interest in religion, and within a few years his upright life and his ability as a speaker gained for him universal recognition as a minister in the Society. During the next half-century he traveled widely through the Eastern States from Maine to Maryland, preaching and organizing new meetings. He was an earnest and influential advocate of abolition, not hesitating to speak against slavery even in such a slaveholding community as Maryland. To his efforts was due in large measure the passing of the act which emancipated all slaves in New York in 1827. He first became the leader of a faction in the Society in 1817. For a number of years before that there had been a determined effort made by some of the members to effect a closer union with the Friends of the English society, and as a step toward this was proposed the adoption of an orthodox creed, the main points of which were the deity of Christ and the vicarious atonement. The proposition met with considerable favor in Philadelphia, and a number of Friends from that city went down to the Baltimore yearly meeting in 1817 to advocate it there. Hicks, who was present, spoke eloquently against the measure, and secured its rejection. From that time may be dated the schism in the Society which became complete in 1828. Those who followed Hicks—called 'Hicksites' as a term of reproach—far outnumbered the orthodox, and for many years there was great bitterness of feeling between the two factions. Of late, however, this has largely disappeared. Hicks published: *Observations on Slavery* (1811); *Sermons* (1828); *Journal of the Life and Religious Labors of Elias Hicks* (1832); and *Letters* (1834).

HICKS, JOHN BRAXTON (1823—). An English gynecologist and anatomist, born at Rye, and educated at Guy's Hospital in London and at the University of London. In 1865 he became lecturer at Guy's Hospital, was later obstetrical examiner to the Royal College of Physicians, then (1892) consulting obstetric physician at Saint Mary's Hospital, president of the Obstetrical Society (1871-73), and Hunterian orator (1878). He wrote *The Honey Bee* (1860), with James Samuelson, besides many contributions to the *Guy's Hospital Reports*, to the *Transactions* of the Obstetrical Society, to the *Proceedings* of the Medical Society, and to the *Lancet*.

HICKS, THOMAS (1823-90). An American portrait painter. He was born in Newtown, Pa., October 18, 1823. He studied at the Philadelphia Academy, and afterwards at the National Academy, New York. Visiting Europe from 1845 to 1849, he studied with Couture in Paris. He was elected member of the National Academy in 1851, and established studios in New York, and Trenton, N. J. His color is good, his drawing is carefully executed, with elaborate accessories, and his composition is well balanced. He died in 1890. Some of his best-known portraits are: Edwin Booth as Iago, Henry Ward Beecher, Longfellow, Dr. Kane, William M. Evarts, Bayard Taylor, Hamilton Fish, Luther Bradish (1857); Henry Abbot (1863), in the Historical Society, New York; Parke Godwin (1879); Mrs.

1. BITTERNUT HICKORY (Carya amara).

2. SHAGBARK HICKORY (Carya alba).

S. F. Billings (1883); Dr. James R. Wood (1884), New York Academy of Medicine. Among his other subjects are: "Birches at Thornwood;" "Trenton Falls" (1879); "End of a Winter Day" (1885); "In Brittany" (1884).

HICKS, THOMAS HOLLIDAY (1798-1865). An American politician, born in Dorchester County, Md. He became sheriff in 1824, and a member of the State Legislature a few years later; was a member of the State Electoral College and was again elected to the Legislature in 1836; and in 1837 served on the Governor's Council. From 1858 to 1862 he was Governor of the State. He strongly sympathized with the South, and was indignant with the Northern people for their general attitude toward slavery, and in particular for their refusal to enforce the Fugitive Slave Law. When actual hostilities between the two sections began he seemed to think that the State could assume a neutral attitude, and largely by his refusal to call a special session of the Legislature managed to block radical measures. He saw that secession for Maryland meant devastation, and his policy gradually evolved itself until he found himself vigorously opposing secession and defying the Legislature. Rumors were current in the early part of 1861 of a plot, in which 3000 citizens of the State were organized to prevent Lincoln's inauguration and seize the city of Washington. He made preparations to thwart the attempt, caused State arms to be seized, suspended the writ of habeas corpus, planned the arrest of suspected persons, and indorsed the Administration in establishing a censorship of the press and in breaking up the Legislature. The proximity and alertness of the Federal headquarters was in reality all that prevented a serious secessionist movement, Hicks being the only prominent official of the State who stood by the Government. At the expiration of his term as Governor a new Legislature passed resolutions thanking him in its name and in the name of the people of Maryland for his attitude during the crisis, and declaring that it was he who had kept the State from joining the Confederacy. In 1862 Lincoln offered him the rank of brigadier-general, but ill health prevented his acceptance. In the same year he was appointed to the Senate to supply the vacancy occasioned by the death of Senator Pearce, and served in that body during the remainder of his life. Although he was at the same time denounced for selling the State to Lincoln, and praised for saving it by his remarkable ability, it is largely the uniqueness of the position in which he was placed which makes him especially memorable. Consult: Radcliffe, "Governor Hicks of Maryland and the Civil War," in the *Johns Hopkins University Studies in Historical and Political Science*, nineteenth series, Nos. xi., xii. (Baltimore, 1901).

HICKS, WILLIAM. See HICKS PASHA.

HICKS-BEACH, Sir MICHAEL EDWARD (1837—). An English Conservative politician, born in London. He was educated at Eton and Christ Church, Oxford; entered Parliament in 1864, and after 1885 represented West Bristol. He was Chief Secretary for Ireland from 1874 to 1878, and Secretary of State for the Colonies in 1878-80. In 1885 Lord Salisbury appointed him Chancellor of the Exchequer and leader of the House of Commons. In 1886 he again became Secretary for Ireland, but held the office less than a year. He was President of the Board of Trade from 1888 to 1892. In 1895, after the fall of the Gladstone Ministry, he became Chancellor of the Exchequer, from which post he resigned in 1902, immediately after the retirement of Salisbury. In the character of strict economist he greatly embarrassed the Balfour Government by an attack (October, 1902) on the finances of the War Office, in which he insisted that that department was not spending to best advantage the money assigned to it.

HICKSITES. See FRIENDS.

HICKS PASHA, pä-shä' (WILLIAM HICKS) (1831-83). An English soldier. He entered the British East Indian army as an ensign in 1849, and left the service in 1880 as an honorary colonel. Three years later he was appointed to the command of the Egyptian army in the Sudan, and with a force of from ten to twelve thousand native troops went against the Mahdi. He at first won what seemed a decisive victory near Khartum in April. In September, however, he went with a force of 10,000 to suppress a rebellion, and crossed the desert to El Obeid. Then Hicks Pasha found himself betrayed into an ambuscade, and after a battle of three days, ending with the massacre of nearly all his army, he fell in a last desperate charge of his mounted staff. Consult Colborne, *With Hicks Pasha in the Sudan* (London, 1884).

HIDAGE, hīd'āj (from *hide*, AS. *hīd*, *hīgid*, *hīged*, a certain portion of land, from ONorthumbrian *higan*, AS. *hīwan*, members of a family). An extraordinary tax paid to the kings of England on every 'hide' (q.v.) of land. It was abolished during the reign of Henry II.

HIDALGO, ē-päl'gō. A central State of Mexico, bounded by the State of San Luis Potosí on the north, Vera Cruz and Pueblo on the east, Tlaxcala and Mexico on the south, and Querétaro on the west (Map: Mexico, J 7). Area, 8917 square miles. The northern and northeastern portions are traversed by the eastern range of the Sierra Madre, and form a wild and rough mountain region, rising in its highest elevation to over 10,000 feet. The southern and western parts are mostly flat and traversed by fertile valleys. The climate is warm in the lower regions, and the agricultural products include cereals, sugar-cane, tobacco, coffee, and cotton. The State has extensive mineral wealth and mining is the chief industry. The chief mineral products are silver, quicksilver, copper, iron, lead, and zinc. Coal and marble are found. The southern part is traversed by several railway lines. Population, in 1900, 603,074. Capital, Pachuca (q.v.).

HIDALGO DEL PARRAL, dĕl pär-räl'. See PARRAL.

HIDALGO Y COSTILLA, ē-päl'gō ē kō-stē'lyä, DON MIGUEL (1753-1811). A Mexican priest and revolutionist. He was born at Corralegos, studied at Valladolid in Mexico, and was given charge of the parish of Dolores, in the State of Guanajuato. Dissatisfied with the Government, he conspired with the Indians to raise a general insurrection on November 1, 1810. Fear of discovery led him to hasten his plans, and the revolt began in September in the town of Dolores. His eloquence had a powerful effect on the people, and to heighten the enthusiasm he carried aloft the banner of Our Lady of Guadalupe, patron

saint of Mexico, and gave to his insurrection the character of a crusade. He took the towns of Guanajuato and Guadalajara, and with an army of 50,000 men marched on Mexico, defeating on the way a small force of soldiers sent to oppose him. But the decree of excommunication launched against him, and the discord prevailing among his lieutenants, caused his forces to melt away, and forced him to retreat. He succeeded, however, in reuniting his men to meet the army sent against him by the Government, but his disorderly mob of 100,000 men were pitilessly crushed by the onset of 6000 Spanish veterans, January 17, 1811. Hidalgo fled and set out for the United States to procure assistance, but was captured, degraded from his priestly office, and shot. Some years later he was extolled as a saint, and the new-born republic erected a magnificent statue to him.

HID'DENITE. A yellow-green to emerald-green variety of spodumene, discovered in 1879 by W. E. Hidden, in Alexander County, N. C. The transparent crystals, when cut and polished, resemble the emerald in lustre, although the color is not so intense as in the finer varieties of the latter gem. Hiddenite has a specific gravity of 3.19, and gems of 2½ carats in weight have been cut from it. When first introduced it aroused considerable interest on account of its novelty as an American gem. It is sometimes called the *lithia emerald.*

HIDE (AS. *hid, higed, higid,* from ONorthumbrian *higan,* AS. *hiwan,* members of a family). In Anglo-Saxon law, the family estate, corresponding to the *huba* of early Germanic law. It consisted apparently of a farm, or allotment, of definite extent, though its size varied greatly at different periods of German and English history. The normal hide at the time of the Conquest was 120 acres. But the term does not seem to have been employed to denote a unit of land measurement, but a definite parcel of land in the nature of a homestead, owned in severalty by the head of a family. As such, however, it was used by the Saxon kings as a unit of taxation, the amount assessed on each hide being known as *hide-gild.* After the Conquest the term gradually changes its meaning and comes to designate a measure of land, but its signification is not free from obscurity at any period of its history. See Pollock and Maitland, *History of English Law* (2d ed., Boston, 1899); Stubbs, *Constitutional History of England* (Oxford, 1880); Jenks, *Law and Politics in the Middle Ages* (New York, 1898); Seebohm, *English Village Community;* Maitland, *Domesday Book and Beyond.*

HIDEYOSHI, hē'dā-yō'shē, TOYOTOMI (1536-98). A Japanese warrior and statesman, the son of a peasant. He was born in the village of Nakamura, Aichi Ken, province of Owari, in 1536; became groom to Nobunaga (q.v.), who made him a soldier. He speedily distinguished himself by his military talents, and in 1575 was by Nobunaga created lord of Chikuzen, and was allowed to change his family name to Hashiba. On the death of Nobunaga in 1582 he took such vigorous action that he became in 1586 the practical ruler of the Empire under the title of Kuambaku, or regent, a high office that had been reserved exclusively for members of the Fujiwara (q.v.) family. In 1591 he nominally retired in favor of his son Hidetsugu, taking, as was customary in such circumstances, the title of Taikō, hence popularly known as Taikō-sama. In 1592 he dispatched a large army to Korea to conquer it as a preliminary step in the conquest of China, but the expedition met with disaster, the Emperor of China having sent a large army to the assistance of the Koreans, and after his death at Kioto in 1598 it was recalled. Displeased with the conduct and teachings of the Jesuits, he ordered their expulsion, but no steps were taken to carry out this edict until 1596, when several Franciscan priests, Jesuits, and native Christians were crucified at Nagasaki. A monument in his honor was erected at Kioto in 1896. He had many names; Toyotomi he received from the Emperor. His posthumous name is Toyokuni. Consult: Adams, *History of Japan* (London, 1874); Dening, *Life of Hideyoshi* (Tokio, 1889); Griffis, *The Mikado's Empire* (New York, 1900); and Brinkley, *Japan, Its History, Arts, and Literature* (8 vols., beautifully illustrated, Boston, 1901-02).

HIEL, hēl, EMANUEL (1834-99). A Flemish poet, born at Dendermonde. At first he was a bookseller; then he obtained a minor Government appointment and later the position of professor of oratory at the Brussels Conservatory, and librarian of the Industrial Museum in the same city. He is generally considered the chief Flemish lyrist of recent times. Among his longer poems are *Jacobæa van Beieren* (1867; new ed. 1880) and *Bloemardinne* (1877). In addition to these there are the collections *Nieuwe liedekens* (1861); *Gedichten* (1863); *Bloemeken een liederkrans* (1877); and some verses for children, *Liederen voor groote en kleine kinderen,* many of which were adapted to well-known melodies, and some of which were set to music by Van Gheluwe, *Liedersolfege* (1875). Hiel's greatest works are the poems *Lucifer* and *De Schelde,* for which Benoit composed oratorio settings; *Vrijheidshymnus* (music by Richard Hol); and *Prometheus* (1868). An edition of his poetry, *Volledige dichtwerken,* was published in 1885.

HIEN FŬNG, hyĕn fŭng, or **HSIEN FÊNG,** syĕn fēng. The name of the period during which I-chu, the seventh Emperor of the present Manchu dynasty of China, ruled; but the name is commonly transferred from the period to the Emperor himself. He was the fourth son of the Emperor Tao-Kwang, was born in 1831, and succeeded to the throne in 1850, but his reign, according to custom, dates only from the following year. He proved to be a weakling. At the beginning of his reign the Tai-ping Rebellion broke out in Canton Province; hordes of fanatics and lawless persons joined the standard of the 'Prince of Peace,' as the leader, Hung Hsŭ-Chüan, styled himself; half the country was devastated, and twenty millions are said to have been put to the sword. The rebellion would have taxed a stronger man, but able statesmen and generals arose, and in 1864 this greatest of all rebellions was crushed. Meanwhile a war with Great Britain had been precipitated in 1857 by an outrage on the British flag. Canton was for a second time taken by British troops, the Taku forts at the mouth of Peiho were captured, and a treaty was concluded in 1858 opening more new ports, throwing the country open to travelers, permitting the preaching and the practice of Christianity, and calling for more indemnity. In the following year, as the British envoy

was on his way to Peking to exchange ratification as previously arranged, he was fired upon, and his party driven back. This made another expedition necessary, and in 1860 another army (France joining) and fleet took the Taku forts a second time, captured Tientsin, and proceeded to Peking. Hien Fung fled to Jehol (q.v.), where he died in the following year, leaving his brother, Prince Kung, to negotiate a new treaty of peace, which in the circumstances was more rigorous than that of 1858. Additional ports were to be opened, and it was agreed that henceforth a British envoy or ambassador was to be allowed to reside at Peking, and in connection with this a Department of Foreign Affairs—the Tsung-li-Yamên—was established, Prince Kung becoming its first president.

HIERACITES, hī-ĕr'ā-sīts. See HIERAX.

HIERACIUM, hī'ē-rā'shī-ŭm. See HAWKWEED.

HIERAPOLIS, hī-ē-răp'ō-lĭs (Lat., from Gk. Ἱεράπολις, sacred city, from *ἱερος*, *hieros*, sacred + *πόλις*, *polis*, city). (1) A city in Southwest Phrygia, about six miles north of Laodicea. It was the religious centre of the native worship of the district, and was an important seat of the mysteries of the Phrygian nature-goddess, who was here called Leto, her daughter, Cora, a male deity, and a son. It possessed warm springs which had, and still have, a remarkable power of forming incrustations. Its religious fame was also increased by the Plutonium or Charonium, a narrow but deep chasm, from which issued a noxious vapor, supposed to be fatal to all except the eunuch priests of the goddess. This chasm had disappeared in the fourth century A.D. Consult: Ramsay, *Cities and Bishoprics of Phrygia*, vol. i. (Oxford, 1895); Hermann and others, *Alterthümer von Hierapolis* (Berlin, 1898).

(2) A city in the Glaucus Valley in Central Phrygia (now Kotch-Hissar), which seems to have been the old centre of a pentapolis, and is known in early Christian history from the life of Saint Abercius, or (better) Avircius, a leader in the second century A.D., who caused a remarkable protest against Montanism to be inscribed on his tomb. The original document has survived and is now in Rome. It is so drawn up that it bears a double meaning, and the esoteric Christian sense was clear only to 'him who comprehends.' It has also been interpreted as a heathen document. Consult: Ramsay, *Cities and Bishoprics*, vol. ii. (Oxford, 1897); and Dietrich, *Die Grabschrift des Aberkios* (Leipzig, 1896).

(3) A city of Syria Cyrrhestica, known also as Bambyce (Gk. *βαμβύκη*), situated about twenty-five miles south of the ancient Carchemish, on the hills southwest of the meeting of the Euphrates and Sajur rivers. It is now in ruins, but in the times of the Seleucids was a city of much commercial importance. In the reorganization of the Roman Empire under Diocletian it became the capital of the province of Euphratensis or Commagene. In the time of Justinian it had retrogressed, but the fortifications were restored by the Arabs, and it endured many vicissitudes during the Crusades.

HIERARCHY, hī'ĕr-ärk-I (from ML. *hierarchia*, Gk. *ἱεραρχία*, hierarchy, from *ἱεράρχης*, *hierarchēs*, hierarch, from *ἱερός*, *hieros*, sacred + *ἄρχειν*, *archos*, leader, from *ἄρχειν*, *archein*, to lead). The name used by theological writers to designate the whole governing and ministering body in the Church, distributed according to its several graduations. The word, in its strict acceptation is applicable only to the Roman Catholic Church, and to those Christian communities which retain the prelatical form of Church government, or at least the distinctions of ecclesiastical order and gradation. In considing the hierarchy it is necessary to bear in mind the well-known distinction of *order* and of *jurisdiction*. (I.) Considered under the head of *order*, the hierarchy embraces all the various orders or classes of ministers to whom has been assigned the duty of directing public worship, administering the sacraments, and discharging the various other offices connected with the preaching of the gospel; and these are of two kinds—the orders directly instituted by divine authority, and those established by ecclesiastical ordinance. Theologians commonly distinguish a *hierarchy of divine right*, and a *hierarchy of ecclesiastical right*. (1) The first includes the three ranks of bishops, priests, and deacons. The bishops are believed, as successors of the Apostles, to have inherited the integrity of the Christian priesthood. The order of episcopate, however, is not believed to be a distinct order from that of priesthood, but only a fuller and entirely unrestricted form of that order. In all that regards what Roman Catholics believe to be the Christian sacrifice of the eucharist, they hold that the priest possesses the same powers *of order* with the bishop; but he cannot confer the sacrament of orders, nor can he validly exercise the power of absolving in the sacrament of penance without the approbation of the bishop. (2) To the three ranks thus primitively instituted several others have been added by ecclesiastical ordinance. (See ORDERS, HOLY.) (II.) The *hierarchy of jurisdiction* directly regards the government of the Church, and comprises not only all the successive degrees of ecclesiastical authority derived from the greater or less local extension of the several spheres within which such governing authority is limited—beginning with the Pope as primate of the universal Church, and extending to the patriarchs as ruling their several patriarchates, the primates in the several kingdoms as national churches, the metropolitans or archbishops within their respective provinces, and the bishops in their dioceses.

In the Anglican Church, with the office of the episcopate, the theory of a hierarchical gradation of rank and of authority has been retained. The Anglican hierarchy comprises bishops, priests, and deacons. In the other reformed churches a hierarchical government is practically non-existent. Many theological writers, following Dionysius the Areopagite, regard the angels as organized in the same hierarchical manner according to their various orders.

HIERATIC WRITING. See HIEROGLYPHICS.

HI'ERAX, or **HIER'ACOS** (Lat., from Gk. Ἱέραξ). An Egyptian ascetic of the third century. He is said to have lived to the age of ninety, and devoted himself to scientific and literary pursuits. He was the author of biblical commentaries, both in Greek and Coptic, and is said to have composed many hymns. He became leader of the sect of the Hieracites, an ascetic society from which persons living in the married state were excluded. On other points Hierax fol-

lowed Origen in allegorizing Scripture. From this apparently Manichæan view of matrimony, taken with his denial of the resurrection and of a visible paradise, and his assertion that infants, as incapable of 'striving lawfully,' cannot inherit the kingdom of God, Hierax was regarded as a heretic.

HIERO (hī'ê-rō) **I.** (Lat., from Gk. *Ἱέρων*). A tyrant of Syracuse, who succeeded his brother Gelo in B.C. 478, having already, a short time before, distinguished himself in the battle of Himera. Being jealous of his brother Polyzelus, who had command of the army, he dispatched him on an expedition against the Crotonians, but Polyzelus fled to his brother-in-law, Theron of Agrigentum. Hiero undertook to make war on the two, but a reconciliation was effected, it is said, by the poet Simonides. Some time after this reconciliation Hiero assisted the people of Cumæ in driving off the Etruscan pirates, by whom they were harassed. He transferred the inhabitants of Naxos and Catana to Leontini, and repeopling Catana with citizens from Syracuse, Gela, and elsewhere, called the place Ætna. After the death of Theron, about B.C. 472, war broke out between Theron's son, Thrasydæus, and Hiero. The former was defeated and compelled to flee from Sicily. Hiero was now supreme in the island. He died, however, shortly after, having reigned ten years. As a ruler Hiero was jealous, cruel, and rapacious; fearing for his life, he surrounded himself with mercenaries and spies. He was, however, a patron of poets and philosophers, and he competed successfully at the Grecian games.

HIERO II. (c.308-216 B.C.). A king of Syracuse, son of a noble Syracusan named Hierocles. He first distinguished himself in the wars with Pyrrhus, and then, after Pyrrhus's departure from Sicily, B.C. 275, in the war with the Mamertines. In consequence of his military successes he was, in B.C. 270, chosen King of Syracuse. In B.C. 264 he assisted the Carthaginians in the siege of Messana, but was himself defeated by the Roman consul, Appius Claudius, and in B.C. 263 concluded a treaty with the Romans, to whom he thereafter remained faithful. In both Punic wars he assisted them with money and troops. During the interval of peace between the two wars he visited Rome and was received with great honors, while he himself on this occasion distributed a vast quantity of corn to the people. Hiero was a wise and merciful sovereign, simple in his ways and just in his rule. We are told that he was prevented from laying aside the kingly power only by the unanimous votes of his subjects. He bestowed great care upon the financial department of his government, and his agricultural laws (*leges Hieronicæ*) were in force in Cicero's time. He was also a patron of the arts, and beautified his city with many fine public buildings. His kinsman Archimedes he employed in the construction of a number of powerful engines of war.

HIEROCLES, hī-ĕr'ô-klēz (Lat., from Gk. *Ἱεροκλῆς, Hieroklēs*). (1) A Greek writer of the sixth century A.D., who composed, under the title *Traveling Companion* (*Συνέκδημος*), a work containing a description of the 64 provinces of the Byzantine Empire and of 912 cities in it. It is best edited by Burckhardt (Leipzig, 1893). (2) An Alexandrian Neo-Platonist of the fifth century A.D. He wrote a commentary on the Golden Verses of Pythagoras, and a treatise *On Providence and Fate*. Of the latter work only a few extracts have been preserved by Photius, and there is also an anonymous abridgment. The commentary is printed by Mullach, *Fragmenta Philosophorum Græcorum*, vol. i. (Paris, 1875). Under the name of Hierocles we also possess a very old collection of jokes and amusing stories (*Ἀστεῖα*), edited by Eberhard (Berlin, 1869).

HIEROCLES OF BITHYNIA. A Roman proconsul in the reign of Diocletian (A.D. 284-305), said to have been the instigator of the fierce persecution of the Christians under Galerius Cæsar in 303. He was a man of considerable intellectual culture, and wrote a work in two books, in which he endeavored to persuade Christians that their sacred books were full of contradictions, and that in moral influence and miraculous power Christ was inferior to Apollonius of Tyana. This treatise has not come down to our times, and is known to us through Lactantius, and still more through Eusebius, who is the author of a refutation.

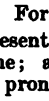
HIEROGLYPHICS, or **HIEROGLYPHS** (Lat. *hieroglyphicus*, from Gk. *ἱερογλυφικός, hieroglyphikos*, hieroglyphic, from *ἱερογλύφος, hieroglyphos*, carver of hieroglyphics, from *ἱερός, hieros*, sacred + *γλύφειν, glyphein*, to carve). The term applied to those systems of writing in which figures of objects take the place of purely conventional signs, and especially used to designate the writing of the Egyptians and Mexicans. The system of Babylonia (whence the cuneiform writing developed) and that of China were likewise originally picture-writings, but were very early simplified and conventionalized, and thus lost their hieroglyphic character. These two systems present so many striking analogies to the Egyptian that a connection is often assumed, but these analogies appear merely to afford an illustration of the tendency of the human mind to run, under certain conditions, in the same channel, and this view is strengthened by some analogies from American pictographs and hieroglyphics. Hieroglyphic systems are also represented by the monuments of the Hittites and the early Cretans, both as yet undeciphered; an Egyptian origin would, in these cases, be less improbable than in the cases of Babylonian and Chinese characters. The Phœnician alphabet cannot be proved to descend from a hieroglyphic system; the names of the letters (ox, house, etc.) seem to have been merely mnemotechnic helps for learners. The Egyptian system is the most remarkable of all, because it always retained the most primitive form, although developing to a high degree of philological perfection. It is impossible to trace this system back to its origin in descriptive pictures; such pictures, for example, as the North American Indians sometimes used for communications, though without developing a real writing. The very earliest monuments of Egypt, anterior to Menes, the first historical king, exhibit the system already perfected, differing in many details from the later orthography, but what were then the principles are the same as at all later periods. The invention must therefore belong to a very remote age.

The most primitive part is represented by the so-called ideographs or word-signs. Some of

these are shown in the accompanying illustrations. It is very easy to represent a man  (*romet*), a woman  (*himet*). Both taken together mean 'mankind'; one repeated three times, 'men' or 'women.' A soldier  is easily characterized by his arms and costume; a chief  by his staff; a king by the addition of the crown; a child  (*khrod*) by sucking its finger. Animals can be figured to a large extent, also some plants, the parts of the human body, etc. But wood (*khet*) can be represented only by a twig  ; grain (*yot*) by three grains  ; water (*mou*) by wavy lines  From indications of this nature there is but a step to symbolism. 'Hearing' (*sotem*) is expressed by the ear of an ox  , while the human ear  means only 'ear'; 'weeping' (*remy*) by a weeping eye  ; 'drinking' by a man drinking  (the arm and bowl alone suffice). 'Fighting battle' is symbolized by weapons  'going' by a pair of legs  ; 'returning' by an inversion  of this sign; 'bringing' (*eny*) by a vessel, in combination with the sign for 'going'  ; 'giving' (*day*) by an arm presenting a cake  . 'Rain' can, of course, be easily represented by a sky with water falling from it  ; but the ideas 'night,' 'darkness,' must be symbolized  by a star hanging from the sky; 'cool' (*gohh*) is indicated by a water-sprinkler  . A great many words and ideas, however, cannot be represented at all, and here the writer surmounts the difficulty by using the signs for homophonous words or for words of somewhat similar sound, exactly as such signs are employed in our modern rebus. For example *khun*, *khen*, 'inside, in,' and *kheny*, 'to approach,' have no etymological connection whatever with the pictorial sign for 'hide,' 'skin' (*khen*)  , but the same picture is used for all three words. Thus many signs pass from the ideographic into the phonetic class, that is, they merely represent sounds without regard to the meaning, and from word-signs they develop into syllabic signs of two consonants (for example, the figure of the hide becomes the syllabic sign *khn*, representing any syllable with the two consonants kh and n); a few signs finally obtain the value of single consonants and form the alphabet.

The rebus system, however, would have led to many obscurities. Some inscriptions, indeed, simply use the sign for *khn* for all three words, and leave it to the reader to decide from the context whether 'skin,' 'in,' or 'approach' is meant. The majority of scribes, however, use as helps the so-called determinatives. For example, they place after the sign *khn* the hieroglyph for 'house'  to indicate that it means 'within,' and distinguish the word 'approach' by the addition of a pair of legs, indicating a verb of motion. Again  (writing implements) means 'writing,' 'write,' 'scribe,' but by applying the proper determinatives, the writer can readily indicate which of these meanings he wishes to convey. By placing after this sign the figure of a man he makes it clear that 'scribe' is intended, while the addition of a roll of papyrus  indicates that 'writing,' 'book,' is meant.

These determinatives are not arbitrary, but are used in accordance with certain fixed principles. Thus all words for quadrupeds which cannot be easily represented are written phonetically, and determined by  a piece of skin; all names of persons are determined by the figure of a man or woman; all names of trees by a tree  ; small plants by  ; drugs, sand, etc., by round grains  ; actions of the mouth (eating, speaking, etc.); or thought by  ; violent actions by a man  or an arm in the act of striking  ; localities by a house, etc. To these determinatives belongs also the so-called cartouche (q.v.) or frame surrounding royal names. Perfectly analogous determinatives are found in Babylonian (where, however, they are rather sparingly employed), and in Chinese.

A great many of the ideographs are polyphonous, that is, they admit of more than one pronunciation; as, for example, the picture of a horse might be understood by an Englishman as standing for 'horse,' 'steed,' 'mare.' To prevent such ambiguity, many signs receive what is called the phonetic complement. For example, the sign  *mn* (originally representing a chess-board) is very rarely used alone; an *n* is generally placed after it to fix the pronunciation. Therefore, *men*, 'to remain,' is usually written  i.e. the syllabic sign *mn* + the phonetic complement *n* (not to be pronounced separately) + the determinative 'book,' indicating that the word belongs to the category of abstract ideas. In classical orthography, many signs are invariably followed by a phonetic complement. With some signs the phonetic complement precedes, while others have two or even three complements. For example, the word *seshem*, 'to lead,' is always written  *s* (phonetic complement); the word-sign *sshm* + *m* (second phonetic complement) + the determinative of a verb of motion. Thus arises a very complicated but quite regular orthography, which is of special service to the reader in that it enables him to

distinguish between the different values of the polyphonous hieroglyphs. The sign 'star,' for example, may be read *sb* or *dw*; if the latter reading be intended a *w* follows as phonetic complement, while for the former reading an *s* is prefixed. Word-signs having several synonymous values do not always have phonetic complements. The reader, for example, may be left to discover from the context whether the sign 'horse' is to be read *sesem*, 'horse,' *sesmet*, 'mare,' *nofer*, 'colt,' etc. The sign ⊙ (the sun) may be understood as 'day' (*hrow*), or as 'sun' (*rê*).

The alphabet developed from signs for very short words containing only one firm consonant. The opinion of the first decipherers, that the alphabet was acrophonic—that is, that the phonetic value of each letter was taken from the initial sound of the word represented by its sign—has not been confirmed. The alphabetic signs ought, of course, to be the latest element of the system, but we find them fully established on the earliest monuments, so that they certainly go back to the fifth millennium B.C. The Egyptian alphabet is as follows:*

(1)  The Semitic Aleph (ʾ), i.e. the general indication of a vowel beginning a syllable; later treated as a vowel.

(2)  (A reed leaf) *y*, as a consonant; at a very early period confounded with the preceding letter. and later distinguished from it by doubling. Thus in the later orthography a single reed-leaf stood for Aleph, a double reed-leaf for the consonant *y*.

(3)  (An arm, *ê*), the Semitic guttural Ain.

(4)  *w* or secondarily *u*; later variant  from about 1500 B.C.

(5)  *b*.

(6)  or more elaborately  *p* (representing a mat?).

(7) *f* (representing a viper or snail).

(8)  *m* (an owl); later variant 

(9) *n* (water); later variant .

(10)  *r* (*ro*, 'a mouth').

(11)  *h* (*hay*, 'a hall').

(12)  h; (a rough *h*; the lighter sound of Hebrew Kheth, Heth).

(13)  *kh*; (the Scotch and German gutteral *ch*).

(14)  *h* (similar in sound to the preceding, but somewhat softer). The sign originally stood for *hêt*, 'a belly,' and represented an animal cut open; the form here given is partially conventionalized.

(15)  *s* (originally different from the following, but soon after 3000 B.C. confounded with it). The sign represented a door-bolt.

(16)  *s* (sharp *s*; early confused with the preceding).

(17)  *sh*; a conventional representation of a lake (*Shei*).

(18) *q*. Hebrew Koph, Qoph, a guttural *k*. The sign represents a hill (*qay*).

(19)  *k*. It represents a working-basket (*kay*?).

(20)  *g*.

(21)  *t*. Perhaps another kind of basket, or a vase.

(22) *t*, a sibilant dental which is usually assumed to have been *th* or *z*, but seems to have been quite a peculiar sound. It was later commonly pronounced *t*.

(23) *d*.

(24) *z*, or more correctly the Hebrew emphatic *s* (Sade).

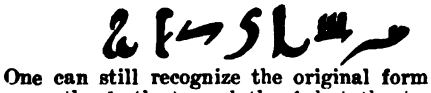
In later times the variants increased considerably, as the scribes were continually inventing new and playful forms of the letters; in Roman times hundreds of signs were in use for the alphabet, but several of the original sounds were lost or confused in later pronunciation. However, down to B.C. 1000 the variants enumerated above were the only ones, and all these sprang up after B.C. 1600. It will be observed that originally the letters expressed only the consonants, and the vowels were, with exception of a few vague indications, left for the reader to fill in, exactly as in unpointed Hebrew or Arabic. The group *hbs*, for example, may be read *hobs*, *hbos*, *hebos*, etc. Later orthography attempted to express the vowels in certain cases, especially in foreign names which demanded a more exact notation, but neither consistently nor successfully. All this adds greatly to the difficulties of the Egyptologists. They have not only to supply the vowels from Greek and other traditions, from the corresponding Coptic words, from variants, etc., but they must also reckon with the tendency of the Egyptian scribes to abbreviate and to omit consonants, where they were supposed to be readily supplied by the reader. For example, *henqet*, 'beer,' is always spelled *hqt*. See, however, below on the present degree of certainty of reading. Foreign names and words were, in the time of Dynasties 18-22, written in a strange orthography called the syllabic system. The vowels were copiously expressed by placing syllabic signs for every consonant, even where no vowel followed. For example, the Palestinian name of a city, *Shalem*, was spelled: *Sha-ra-ma*, the word *markabt*, 'chariot,' *ma-(i)ra-ka-bu-ti*, etc. This wild heaping of vowels is of little advantage to the reader, and has led to many errors.

The hieroglyphics were commonly written from the right to left; more rarely from left to right. On early monuments they are frequently written from above downward, like the earliest Babylonian and Chinese writing; the arrangement called *boustrophedon* by the Greeks is never met with. The number of signs is, in a certain sense, unlimited, as the artist could vary the de-

*The arrangement is, of course, modern; explanations are added only where they are quite certain.

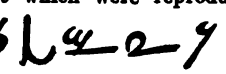
tails of each hieroglyphic according to his individual taste. But the sculptors did not greatly abuse this liberty, and usually kept within the bounds of intelligibility. As a matter of fact, the signs commonly used are only from five to six hundred in number. The artists found full play for their fancy in the minor details of execution; in the case of some magnificent buildings, they have actually designed and painted every feather of a bird, every finger of a human figure, etc., in inscriptions containing many thousand signs. The decorative effect of the brightly painted signs is exquisite. In other cases, however, when the sculpture had to be inexpensive, the signs were reduced to the simplest possible forms; in cheap funerary inscriptions they are often mere indications of figures, and their recognition calls for all the skill and ingenuity of the trained reader.

While in monumental use the pictorial character of the hieroglyphs always remained distinct, in the writing of books this was not the case. Here a simpler, more rapid method of writing was required, and even on the monuments of the First Dynasty we find the hieroglyphs simplified to a few strokes, where the pen is used instead of the chisel. On papyrus the writing soon assumed a cursive character, bearing no closer resemblance to the original pictorial hieroglyphs than our cursive script bears to our printed letters. The cursive style thus developed was called by the Greeks 'hieratic,' or the style for sacred writings, in contradistinction to the demotic character (see below), which was exclusively employed for profaner matters. This cursive style is found on the earliest books which have been preserved (dating from Dynasty 5). To give an idea of hieratic, we reproduce here the first seven letters of the alphabet (without variants) in the cursive style of about B.C. 1400.



One can still recognize the original form of the arm, the *b* (leg), and the *f*, but the two birds have become mere flourishes in which only the boldest fancy can detect a resemblance to the original pictures. Of course, this style of writing changed more than the monumental forms, and every century had its marked peculiarities. The Greek name must not be misunderstood; all literature, secular and religious, history, novels, love songs, business documents, letters, used the more convenient rapid style. Only funerary texts are frequently written in a simplified hieroglyphic character. It was only after the demotic had become prevalent that hieratic was reserved for books of a religious character (after B.C. 600). Hieratic runs from right to left like most Oriental writings; in the earliest times, however, it was sometimes written perpendicularly.

Demotic, or popular writing, is a later development of hieratic. The Egyptians themselves called it 'the documental or epistolary style,' as it seems to have been developed in the law courts and offices where the necessity of tachygraphy led to constant abbreviations, until finally a real stenography resulted. Its origin goes back to the seventh century B.C. In B.C. 400 it had assumed a convenient form, and came into general use, so that the Greeks found it employed for everything except religious literature (see above), and called it, therefore, the demotic (the common, popular) style or the enchorial (the writing of the country). In Roman times even religious texts were frequently written in demotic. As specimens we give here the same seven letters of the alphabet which were reproduced



above in hieratic. The second of these characters is more commonly represented by a single vertical stroke. It will be observed that two forms of the letter *p* are given, of which the first is more elaborately formed. The sign representing a crouching lion was reduced to a slanting stroke, etc. Whole groups of five or six hieratic signs were combined in a single flourish. Thus the writing became rapid enough to equal in speed our modern writing and the stenographic systems of the Romans; but its study was complicated and it became unintelligible where not written very distinctly. The number of demotic signs was smaller than that of hieratic (not over two hundred). Like hieratic, demotic was written from right to left. It is a common error to suppose that demotic means 'popular language'; the term properly designates a style of Egyptian writing, and a phase of the language, although documents written in the demotic script are usually composed in a later form of Egyptian. The Egyptian language, of course, underwent great modifications in course of time; the language of the earliest texts known to us—the religious texts in the pyramids—seems to have offered great difficulties to the Egyptian scholars of about B.C. 2500.

The use of the contemporary vernacular language was rarely allowed in literature, and in general the hierogrammates (sacred scribes) sought to write in as archaistic a style as possible. After B.C. 1600 they found it more and more difficult to write the old language correctly, and from about B.C. 1400 to 1100 the living vernacular language was used for letters, legal documents, and entertaining literature. The language of this period, the so-called Neo-Egyptian, has been treated by Erman, in his *Neuägyptische Grammatik* (Leipzig, 1880). After B.C. 1000 the scribes reverted to an exaggerated archaistic style, and the texts became more and more ungrammatical; the barbarous age began after B.C. 500, and in Roman times the monumental texts are so wild in grammar and orthography that their decipherment is especially difficult. In demotic literature a mixture of ancient and modern language prevailed. The vernacular language finally came into literary use in Roman times through the influence of Christianity. The heathen and their priests continued to write hieroglyphics on the monuments, hieratic and demotic on papyrus, almost to the end of heathenism. The last datable hieroglyphic inscription is found in the Temple of Esneh (q.v.), and contains the name of the Emperor Decius, A.D. 250. A demotic inscription at Philæ (where paganism lingered on after the edict of Theodosius, A.D. 379) is dated in the year A.D. 453. Even later, some sporadic knowledge of the old writing may have existed, but, stamped with the reproach of heathenism, it soon sank into oblivion.

Some attempts to write the living language in the Greek alphabet, supplemented by some demotic signs, had been made in pagan times, and we possess a papyrus, containing a horoscope,

which seems to have been written about A.D. 100. It was, however, the desire to make the sacred Christian writings accessible even to the unlearned that led to the origin of Coptic writing and literature. The date of the Coptic version of the Bible is disputed, but it does not seem to be older than the third century, perhaps later. Coptic was written with 24 Greek and 7 demotic letters. On its history and its extinction as a living language at the end of the Middle Ages, see COPTIC.

Interest in the lost knowledge of hieroglyphics was awakened in Europe in the sixteenth century. About 1650 the learned Jesuit Athanasius Kircher endeavored to interpret them by a fanciful method of his own, finding long theological and philosophic systems in groups which contained only the names of kings, etc. The few monuments with hieroglyphics which were then known were explained by means of Hebrew, Chaldee, Chinese, etc., rarely by means of Coptic, which was known only imperfectly in Europe before the eighteenth century. The Greek traditions on hieroglyphics in Horapollo, Tsetses, etc., were not incorrect, as has now been recognized, but insufficient. The basis for decipherment was furnished by the French expedition to Egypt under Napoleon. Through it a much larger number of the Egyptian monuments became known, above all the famous inscription of Rosetta, which proved the key to the decipherment. This stone, found by a French artillery officer in building a fort near Rosetta in 1799, and brought to London after the capitulation of the French army (see ROSETTA STONE), contains a decree of the Egyptian priests in honor of Ptolemy V., Epiphanes, written in Greek, and preceded by a translation into hieroglyphics and demotic. Unfortunately, the hieroglyphic text was much mutilated, and for some time defied the efforts of the decipherers. The demotic part was better preserved and De Sacy, Ackerbald (1802), especially Thomas Young (1815, etc.), correctly established the sense of many groups and sentences. Dr. Young came very near finding the correct value of some hieroglyphic letters (1819), but the merit of the decipherment belongs entirely to Champollion (q.v.), even if he did not work quite independently of Young, as he always claimed. He took as starting-point the two names Ptolemy and Cleopatra, furnished by the Rosetta Stone and an obelisk at Philæ. These two names yielded thirteen signs, the phonetic value of which Champollion determined correctly or approximately. He next identified the name Alexander, which furnished three more signs, and thus went on step by step, through the names of the Ptolemaic kings and Roman emperors found on the monuments, and if he had not died prematurely (1832) he would doubtless have succeeded in reading more than single sentences and in perfecting his system, which even in his posthumous works does not do full justice to his genius. His discoveries were continued by Rosellini, Salvolini, later by Birch, Lepsius, and De Rougé. For a long time the errors of Seyffarth and Uhlemann exercised a confusing and hindering influence. The French and Tuscan expeditions under Champollion and Rosellini, and especially the Prussian expedition under Lepsius (q.v.), furnished rich material from the monuments. Grammars of the language of the hieroglyphics were published by De Rougé (*Chrestomathie égyptienne*, Paris, 1867-75); Birch (in Bunsen, *Egypt's Place in the World's History*, trans. vol., London, 1887); Brugsch, *Hieroglyphische Grammatik* (Leipzig, 1872), also in French (1867). Later grammars by Lepage Renouf, *Elementary Grammar of the Egyptian Language* (London, 1875); Budge, *First Steps in Egyptian* (London, 1895); Loret, *Manuel de la langue égyptienne* (Paris, 1889). Erman's book, *Aegyptische Grammatik*, also in English (London, 1894), is very brief, but best represents the present knowledge. On his grammar of Neo-Egyptian, see above; his *Sprache des Papyrus Westcar* (Göttingen, 1889) treats of an early vernacular phase of the language. A copious dictionary is in preparation under the auspices of the Berlin Academy, as Brugsch's *Hieroglyphisch-demotisches Wörterbuch* (7 vols., Leipzig, 1867-80), although the best Egyptian dictionary at present in existence, is rapidly becoming antiquated. The dictionaries of Birch (in Bunsen V.), Pierret, *Vocabulaire hiéroglyphique* (Paris, 1875); Levi, *Vocabolerio geroglifico copto Ebraico* (Turin, 1887), are less reliable than that of Brugsch. Several journals are devoted to Egyptology, viz.: *Zeitschrift für aegyptische Sprache und Altertumskunde* (Berlin); *Recueil de travaux rélatifs à la philologie et à l'archéologie égyptiennes et assyriennes* (Paris); *Sphinx* (Upsala); and the literature of the subject is growing immensely. The success which attended the study of hieroglyphics attracted the attention of students to this branch of Egyptology, and demotic was for a long time neglected. In 1855 Brugsch published his *Grammaire démotique*, which, though now antiquated, formed the basis for all subsequent investigations. Again neglected for a considerable time, the study of demotic was revived by Revillout, who devoted special attention to the legal documents written in demotic script (*Chrestomathie démotique*, Paris, 1880), but his works are to be used with great caution. In more recent times, the most meritorious publications on the subject of demotic are those of F. Ll. Griffith and W. Spiegelberg. The hieratic documents were first made intelligible by the works of Chabas and Goodwin. The paleography of hieroglyphics has recently been treated by Griffith in several volumes of the Archæological Survey of Egypt. (See EGYPTOLOGY.) It may be remarked that the question as to whether the decipherment of Egyptologists rests on a better basis than the vagaries of Kircher was frequently asked as long as the fragmentary Rosetta Stone was the only bilingual (or rather trilingual) text. After the discovery of the larger and perfectly intact trilingual text, called the decree of Canopus, containing a decree of the priests in honor of Ptolemy III., Euergetes, in the year B.C. 238 (found by L. Reinisch, 1886, near Tanis; his companion Lepsius also claimed the discovery), such doubts became impossible. Since that time various bilinguals have been found, and other sources which control the decipherment are now available. The exact pronunciation of the vowels, which were never perfectly expressed in Egyptian writing, and changed frequently in course of time, is much disputed, and will possibly never be settled with absolute certainty in all points. The texts, however, are now, generally speaking, at least as well understood as any Phœnician inscription or as the Hebrew text of the Bible. The time when they will be understood as well as Greek or Latin

writers may not be far distant. That the Phœnician alphabet, the mother of our modern writing, was derived from the Egyptian hieratic signs was claimed by De Rougé (*Mémoire sur l'origine égyptienne de l'alphabet phénicien*, Paris, 1874), and this hypothesis has become very popular; it is, however, highly improbable and is losing ground among scholars.

Much less perfect was the hieroglyphic writing of the Aztecs or Mexicans, which was used also in Central America, especially by the Mayas. Unfortunately, the literature written in those hieroglyphs was destroyed so thoroughly by the Spanish priests that only a very few manuscripts (preserved in Rome, Dresden, etc.) have survived, besides a few inscriptions on stone. The Spanish writers of the sixteenth century have left the explanation of a few signs only, so that the Aztec writing is almost entirely unintelligible. However, what we understand of it seems to show that the Mexicans did not advance much beyond the pictographic stage, though the pictures they used were highly conventionalized. They could express the names of persons, places, months, etc., by painting the objects or beings after which they were called, and went so far as to use symbolical signs of plants and animals, to express grammatical forms so that their pictures were not read, but interpreted. Where, for example, they recorded historical events, they had to picture these, as the inscriptions alone would have been insufficient. The majority of their books seem to have been calendars, lists of omina, etc., for which their imperfect writing system sufficed. It is said that some Spanish monks made use of hieroglyphic signs for expressing Latin prayers. For example, they are said to have expressed the words *pater noster* by a flag (*pantli* = *pa*), a stone (*tetl* = *te*), a cactus-fruit (*nochtli* = *noch*), and a stone (= *te*, see above). Rude as this system seems, it marked, nevertheless, a step in advance, as the hieroglyphs from word-signs became phonetic signs. Such attempts, however, remained perfectly isolated; the Spanish missionaries usually showed the greatest hostility to anything recalling the former Aztec idolatry. The term hieroglyphic was used by the writers of emblemata or devices, symbolizing gnomic sentences taken from the Greek and Latin poets, and having no relation to Egyptian hieroglyphics. In recent times, also, the astrological almanacs have had their symbolical representations and supposed prognostics of future events, which they called hieroglyphs. Consult Brugsch, *Aegyptologie* (Leipzig, 1891); Berger, *Histoire de l'écriture dans l'antiquité* (Paris, 1891); Erman, *Life in Ancient Egypt* (London, 1894); Lepsius and Stern, *Liste der hieroglyphischen Typen aus der Schriftgiesserei des Herr F. Theinhardt* (Berlin, 1875); Von Lemm, *Aegyptische Lesestücke* (Leipzig, 1883); Erman, *Egyptian Grammar* (London, 1894); Levi, *Raccolta dei segni ieratici egizi* (Turin, 1880); Erman, *Die Märchen des papyrus Westcar* (part ii., Berlin, 1890); Brugsch, *Grammaire démotique* (Paris, 1855); Hess, *Der demotische Roman von Stne Ha-m-us* (Leipzig, 1888); Revillout, *Chrestomathie démotique* (Paris, 1880).

HIERON, hī'ĕr-ŏn. The name of two rulers of Syracuse. See HIERO I. and II.

HIERONYMITES, hī'ĕr-ŏn'ī-mīts. The common name of four associations of hermits in Spain and Italy, who all regarded Saint Jerome as their patron and example, and hence derived their name. (1) The Spanish congregation founded in the reign of Alfonso XI. of Castile (1312-50) by some disciples of Tommasuccio of Siena, a hermit who had considerable following in Northern Italy and observed the Franciscan rule. Their two earliest settlements were in the mountains near Toledo. Their numbers soon grew, and included many persons of rank and station, such as Ferdinand Pecha, principal chamberlain to Pedro IV., and his brother Alfonso, Bishop of Jaen. The former obtained confirmation for their association from Gregory XI. in 1373, under the rule of Saint Augustine, and is regarded as the real founder of the Order. By 1415 they had twenty-five cloisters, among them that of San Gerónimo de Yuste, in which the Emperor Charles V. passed his last years. That of Belem, near Lisbon, became the burial-place of the Portuguese royal family. A female branch of the Order was founded by Maria Garcias (died 1426). (2) The congregation of the Observance or of Lombardy, founded by the Spaniard, Lope de Olmedo (1370-1433), who became general of the foregoing Order in 1422. His purpose in establishing a separate congregation was the attainment of still greater strictness. The rule which he drew up was confirmed in 1429, but after his death was exchanged for that of Saint Augustine. The seven Spanish cloisters of the Order were in 1595 united by Philip II. with the foregoing, but the seventeen Italian retained their separate existence under a general residing at Hospitaletto, near Lodi. (3) The congregation of Peter of Pisa (Pietro Gambacorta, 1355-1435), who turned from a worldly to a hermit's life in 1377 and built a church and hermitage on Montebello, near Urbino. Several small communities of Franciscan tertiaries associated themselves with him; the principal settlements were at Vicenza and Mantua. Only simple vows were taken until 1569; but Pius V. imposed the solemn vows and the Augustinian rule. The Order had at one time over fifty houses, including one founded at Walchensee in Bavaria in 1688, and removed to Munich in 1725. (4) The congregation of Fiesole, founded by Carlo di Montegranelli and confirmed by Innocent VII. in 1406. It came to possess more than forty houses, including the Convent of Saints Vincent and Anastasius in Rome, but was suppressed as a separate organization by Pope Clement IX. in 1688.

HIEROPHANT, hī-ĕr'ō-fānt (Lat. *hierophanta*, *hierophantes*, from Gk. *ἱεροφάντης*, *hierophantēs*, hierophant, from *ἱερός*, *hieros*, sacred + *φαίνειν*, *phainein*, to show). The head of the secret worship of Demeter, at Eleusis, who at the celebration of the mysteries showed the sacred objects and explained the ceremonies. He was required to be one of the old priestly family of Eleusis, the Eumolpidæ, and probably was prohibited from holding any other office. With him was associated a hierophantes, or possibly two. The hierophant was required to be of mature age and clear voice; he seems to have held the office for life, but the statement that celibacy was required is of doubtful value. The hierophant laid aside his own name on assuming his office, and henceforth was known only as Hierophantes, though his father's name and his deme are ap-

pended as in the case of personal names. His costume was that usually worn by kings in tragedy. Consult Foucart, *Les grands mystères d'Eleusis* (Paris, 1900). See MYSTERIES.

HIEROSOLYMA, hī'ĕr-ō-sŏl'ĭ-mà. See JERUSALEM.

HIG'DEN, RANULF (?-1364). An English chronicler and monk of the Benedictine Order. A native of the west of England, he entered Saint Werburgh's monastery at Chester, in 1299, and is remembered chiefly for his *Polychronicon*, a synopsis of which was printed by Caxton in 1480, and in an English translation two years later. It is a universal history in seven books, extending down to Higden's own day and giving an excellent general idea of the learning of his time. The events after 1342 are recorded by other pens, and the whole has been edited and translated for the "Rolls Series" (9 vols., 1865-86).

HIG'GINS, ANTHONY (1840—). A United States Senator, born at Red Lion Hundred, Del. He graduated at Yale in 1861; studied at Harvard Law School, and in 1864 was admitted to the bar. From 1869 to 1876 he was United States Attorney-General for Delaware, and in 1881 received the Republican vote of the Delaware Legislature for United States Senator. In 1889 he was elected to the Senate, his term of office expiring in 1895.

HIGGINS, MATTHEW JAMES (1810-68). An English essayist and pamphleteer; often called by his pen-name Jacob Omnium. He was born at Benown Castle, and was educated at a school near Bath, at Eton, and at University College, Oxford, where, because of a preference for hunting, he never graduated. In 1847 he became an ardent Peelite, and wrote for the *Morning Chronicle*. In 1850 he married Mrs. Benett, née Tichborn, and moved to London, where he became a popular club man. He was most famed for his letters to the *Times*, over such signatures as 'Paterfamilias,' 'Mother of Six,' and 'A Thirsty Soul,' in which he exposed many abuses; for his dispute with the *Times* in connection with Major Crawley and his court-martial, and for his contributions to the *New Monthly Magazine*, where he first appeared as 'Jacob Omnium' in a satire on mercantile dishonesty; for his essays to the *Edinburgh Review*, the *Cornhill*, under the editorship of his friend Thackeray, and to the *Pall Mall Gazette*. Several of his essays were reprinted under the title, *Essays on Social Subjects* (1875), with a memoir by Sir William Stirling Maxwell.

HIG'GINSON, FRANCIS (1588-1630). An English Puritan clergyman, and one of the first ministers of Salem, Mass. He graduated M.A. at Cambridge University, England, in 1613; received his first charge in the Anglican Church in Claybrooke, Leicestershire, two years afterwards, and later was appointed preacher at Saint Nicholas, Leicester. He, however, became a Nonconformist, and was suspended about 1627; but continued working among his parishioners as a lecturer, and as a tutor to young men preparing for a university course, until, proceedings being instituted against him in the high commission court, he applied for a position as minister to one of the settlements of the Massachusetts Bay Company. He arrived at Salem in June, 1629, and was appointed assistant minister to Samuel Skelton, but died fourteen months later, August 6, 1630. He was author of "A True Relation of the Last Voyage to England, etc., written from New England, July 21, 1629," printed in ch. xi. of Young's *Chronicles of the First Planters*, etc. (1846); and of *New England's Plantation, or a Short and True Description of the Commodities and Discommodities of that Country* (3d ed. London, 1630). Consult: Felt, "Life of F. Higginson," in *Annals of Salem* (Boston, 1845); and Higginson, *Life of Francis Higginson* (New York, 1891).

HIGGINSON, THOMAS WENTWORTH (1823—). An American essayist, born in Cambridge, Mass., of a distinguished New England family. He graduated at Harvard in 1841, and after some teaching at the Divinity School there in 1847, he took pastoral charge of the Congregational Church in Newburyport; but he left this because of anti-slavery convictions in 1850, when he was an unsuccessful candidate for Congress. After a six years' pastorate in Worcester, Mass. (1852-58), he left the ministry, was active in the anti-slavery agitation, especially in Kansas, served with distinction in the Civil War as colonel of the first regiment of freed slaves, was wounded in 1863, and, after peace, devoted himself to literature, education, and the political rights of women. He resided till 1878 in Newport, but afterwards he made his permanent home at Cambridge. His works have lately been published in a uniform edition. Among the more noteworthy of many volumes are: *Outdoor Papers* (1863); *Malbone, an Oldport Romance* (1869); *Army Life in a Black Regiment* (1870); *Atlantic Essays* (1871); *Oldport Days* (1873); *Young Folks' History of the United States* (1875), translated (French, 1875; German, 1876); *Short Studies of American Authors* (1879); *Common Sense About Woman* (1881); *Life of Margaret Fuller Ossoli* (1884); *Larger History of the United States* (1885); *The Afternoon Landscape; Poems and Translations* (1889); *Concerning All of Us* (1892). His later volumes, beginning with *Cheerful Yesterdays* (1898), continued by *Old Cambridge* (1899) and *Contemporaries* (1899), have mainly dealt with the interesting generation of which he is almost the sole survivor. His latest volume (1902) is a memoir of Longfellow. As an essayist he is noted for his consistent defense of things American, and for his epigrammatic power of expressing thoughts that are often as subtle as they are convincing. Higginson's collected works were published in 7 vols. in 1900. Consult Bentzon, "Un Américain représentatif—Thomas Wentworth Higginson," in *Revue des Deux Mondes* (Paris, 1901), and translated in book form, 1903.

HIG'GINSVILLE. A city in Lafayette County, Mo., 55 miles east of Kansas City; on the Missouri Pacific and the Chicago and Alton railroads (Map: Missouri, C 2). A State Confederate Home is situated here. The city is of importance as a grain, poultry, and coal market, several coal-mines being operated in the vicinity, and has flour-mills, machine-shops, brick-works, a large beehive-factory, etc. The water-works and electric-light plant are owned by the municipality. Population, in 1890, 2342; in 1900, 2791.

HIGHBINDERS (probably *high*, in slang sense + *binder*, variant of *bender*, spree). A name used in California to designate the disorderly and dangerous Chinamen domiciled there. They are not connected with the Six Companies

(q.v.), nor are they regularly organized, but act in an irresponsible, lawless way for and among themselves. They are men without definite occupation, living as best they can upon the Chinese communities, as keepers of evil resorts, gamblers, parasites upon prostitutes, thieves, and criminals generally. The name was originally applied to any rough, and was in use in New York and Baltimore as early as 1849, but has gradually become restricted to its present application.

HIGH COMMISSION, The Court of. An extraordinary tribunal, famous in English history, originating under the Act of Supremacy during the first year of Elizabeth's reign, which authorized the Queen to appoint an ecclesiastical commission to reform or correct all "heresies, errors, schisms, abuses, contempts, and enormities whatsoever." In July, 1559, Elizabeth granted a commission to "Matthew Parker, nominate Bishop of Canterbury, and Edmund Grindall, nominate Bishop of London," with seventeen laymen, constituting them a court for the whole realm. The court might proceed by witness, with or without a jury, or in any way it should deem proper. It might compel attendance on mere suspicion, examine either the witnesses or the accused "upon their corporal oath," and commit them to 'ward' for disobeying its summons or any of its decrees.

The tribunal was created primarily to administer the Acts of Supremacy and Uniformity. As already seen, this first commission authorizes the use of the oath *ex officio*, through which the accused might be forced to convict himself. "This procedure, which was wholly founded on the canon law, consisted in a series of interrogations so comprehensive as to embrace the whole scope of clerical uniformity, yet so precise and minute as to leave no room for evasion, to which the suspected party was bound to answer" upon his 'corporal' oath. According to Strype, the oath *ex officio* was the ground of much of the popular hatred of the High Commission. That tribunal was regarded as a kind of ecclesiastical star chamber; and, in fact, the relations of the two bodies were very close. The real activity of the High Commission began in 1583 on the succession of Whitgift to the office of Archbishop of Canterbury. It was maintained with increased powers during the reigns of James I. and Charles I.; but, hated by the people and opposed by the law courts, with the Star Chamber it was abolished by the Long Parliament in 1641. It was restored in a modified form by James II. in 1686, but was definitively abolished in 1688. The commission issued by Elizabeth authorized the commissioners to act throughout the whole kingdom; but in practice their jurisdiction was restricted to the Province of Canterbury or Southern England. "There is evidence to show that during, at all events, the greater part of the period 1559-1640, a northern commission was sitting at York, Durham, Ripon, or elsewhere, and discharged functions analogous to those discharged by the southern commission at Lambeth, Fulham, Croydon, or Canterbury" (Prothero, *Select Statutes*, xlv.). There was also a commission for Ireland, and until 1606 commissions were sometimes issued for particular dioceses. The text of the principal commissions and other documents may be found in Prothero's *Select Statutes* (Oxford, 1894). Consult also: Hallam, *Constitutional History* (new ed., London, 1876); Strype, *Annals* (4 vols., new ed., Oxford, 1824), vol. iii.; Burn, *The Star Chamber: Notices of the Court and Its Proceedings, with Notes on the High Commission;* Gardiner, *Report of Cases in the Court of Star Chamber and High Commission, 1631-32*, in Camden Society, new series, vol. xxxix. (Westminster, 1886); and the histories of Green, Ranke, and Gardiner.

HIGH COURT OF JUSTICE. The division of the English Supreme Court that has general original jurisdiction. It was created by the Judicature Acts (q.v.).

HIGHER CRITICISM. See Biblical Criticism.

HIGHER LIFE, The. A name given to an advanced state of grace which many persons claim may be reached in this life. It is also called entire holiness, full salvation, and Christian perfection. The doctrine has various forms. (1) Complete sinlessness may be reached by a single act of complete consecration to God, continuing according to some during life, according to others for indefinite periods. The objection to this claim is twofold. Complete sinlessness does not seem to be established as a fact. Nor is any previous state, founded on a consecration of self to God which is less than complete, truly a Christian state at all. (2) The state is one of perfection of Christian love, by grace made supreme in the soul. Most sin would necessarily be excluded by such a love, and errors that were objectively wrong would not be subjectively sins, because not intended as such. The question as to this form of the doctrine is one of fact. Is there reason to believe that given individuals are thus under the domination of uninterrupted, perfect love? (3) The state is attained by conformity to the actual demands of God, which are lowered from the strict standard of ideal perfection to meet the capacity of our feeble natures. This theory confounds the standard of conscience and the demands of God with what may be effected as a rational probability that men shall attain. Consult Johnson, *The Highest Life* (New York, 1901).

HIGH'GATE. A northern, hilly section of metropolitan London, in Middlesex, 5 miles north-northwest of Saint Paul's (Map: London, C 7). It commands a fine view of the city, comprises many elegant villas and historical residences, and is the seat of important benevolent institutions. The Highgate or North London Cemetery contains the graves of numerous celebrities, including Lord Lyndhurst, George Eliot, Coleridge, and Faraday.

HIGH-HEELS AND LOW-HEELS. The two political parties of Lilliput, in Swift's *Gulliver's Travels*. They are so called from the distinguishing mark adopted by themselves. They are designed to represent respectively the Tories and the Whigs.

HIGHHOLE (variant of *highhoe, heighaw, haihow*, possibly onomatopoetic in origin; connected by popular etymology with *high* + *hole*). A local name in the United States for the flicker (q.v.), heard in many forms, and having many relatives in the provincial speech of both Great Britain and America. Consult *Bulletin Nuttall Ornithological Club* (Cambridge, 1881).

HIGHLAND, or KYLOE CATTLE. A race of small hardy cattle, of the western 'Highlands'

of Scotland, descended from ancient stock, and noted for their shaggy, usually reddish coats and hardy constitutions. They are comparatively short-horned, and feed in a semi-wild condition upon the hilly moors. See Plate of WILD CATTLE, under CATTLE.

HIGHLANDERS. Scottish regiments of the British Army, the oldest of which is the Black Watch (q.v.), founded in 1668. The Scottish social structure and conditions generally offered peculiar facilities for good recruiting — which fact, together with their proved military qualifications, encouraged the British Government in the organization of the following regiments:

ORIGINAL TITLE	Regimental number	Date of formation	Present territorial title	Number and headquarters depot of territorial district		Battalion numbers	
						1st	2d
Black Watch, The	42	1704	Royal Highlanders, The	42	Perth, N. B.	42	73
71st Highlanders	71	1777	Highland Light Infantry	71	Hamilton, N. B.	71	74
Ross-shire Buffs	72	1777	Seaforth Highlanders	72	Fort George	72	78
74th Highlanders	74	1787	2d Battalion Highland L. I.	71	Hamilton, N. B.	71	74
Duke of Albany's Own	78	1793	2d Battalion Seaforth Highl'ders.	72	Fort George	72	78
Cameron Highlanders	79	1805	The Queen's Own, Cameron H'ders	79	Inverness	79	79
Gordon Highlanders	92	1796	2d Battalion Gordon Highlanders	75	Aberdeen	75	92
Sutherland Highl'ders	93	1800	2d Bat. Argyle and Sutherland H.	91	Stirling	91	93
Other Scottish regiments (not Highlanders) are:							
Cameronians	26	1688	Scottish Rifles	26	Hamilton, N. B.	26	90
The Douglas Reg't	1st	1660	Royal Scots, Lothian Regt	1	Glencorse, N. B.	1	1
Scots Fusilier Guards	21	1660	Scots Fusiliers	21	Ayr, N. B.	21	21

The personnel of the Highland regiments is no longer confined to Scottish officers and men; the changed industrial conditions and widely diffused educational facilities having reduced recruiting in Scotland to a very low ebb, despite the efforts of the British Government. See *British Empire* under ARMIES.

HIGHLAND FLING. One of the distinctive national dances of Scotland. It is ordinarily danced by three or four persons to the music of the strathspey (q.v.). The time is $\frac{4}{4}$, and most of the music is distinguished by an extended use of syncopation. Its name is derived from the peculiar, flinging action of the steps as the performer dances alternately on each leg, throwing the other out in front and behind. Like all Scotch dances, the Highland fling is animated, sharp, and vigorous.

HIGHLAND MARY. A poem by Robert Burns (1792), celebrating his affection for Mary Campbell, a nursemaid in the family of Gavin Hamilton and daughter of a sailor settled near Dunoon. She died shortly after their betrothal.

HIGHLAND PARK. A city in Lake County, Ill., 22 miles north of Chicago; on Lake Michigan and on the Chicago and Northwestern Railroad (Map: Illinois, E 1). Picturesquely situated on wooded bluffs one hundred feet above the lake, it is a popular residential suburb of Chicago, and has the Northwestern Military Academy and other educational institutions. Fort Sheridan (q.v.) adjoins the city on the north. Population, in 1890, 2163; in 1900, 2806.

HIGHLANDS. A name applied to the mountainous region north of and including the Grampian Mountains in Scotland. This district has no political or civil boundary, and is separated by only a vague line of demarkation from the division called the Lowlands. It may be briefly described as that portion of the north and northwest of Scotland in which the Celtic language and manners have lingered until modern times. See GREAT BRITAIN; also Browne, *History of the Highlands and the Highland Clans* (4 vols., 1838).

HIGHLANDS OF THE HUDSON. A group of mountains extending in a southwest-northeast direction through Rockland, Orange, Putnam, and Dutchess counties, N. Y., and forming a northerly continuation of the Blue Ridge of Pennsylvania and New Jersey. The Hudson River crosses the mountains through a winding gorge whose sides rise abruptly in places to peaks about 1500 feet above the water. The region abounds in beautiful scenery, and has great historic interest. Stony Point and West Point, two promontories on the west side of the river, were the scenes of stirring struggles during the Revolution. See HUDSON RIVER; NEW YORK.

HIGH LIFE BELOW STAIRS. An amusing farce by James Townley (1759). The authorship was concealed for some time, and the comedy has been attributed to Garrick. It has been translated into French and German, and frequently produced. See LADY BAB.

HIGHNESS. See TITLES OF HONOR.

HIGH PLACE (Heb. *bamah*). A term never used in its literal sense 'heights' except in poetry, but always in prose as a designation of a sanctuary. All worship in ancient Israel was conducted at high places, and there was, therefore, a very large number of such shrines. Generally they were located on the top of a hill or a mountain, which accounts for the name; but sometimes a *bamah* was within a city, at the gate, or in a valley, not necessarily even on an artificial mound, as has been supposed. At such a high place there would be an altar, a sacred stone of phallic shape, a wooden post, a sacred tree, or often a sacred fountain. While some may have been only small shrines, others had large halls where the worshipers took part in the sacrificial meal, as well as an *adytum* for the image of the deity. There probably was an idol in every such temple. At Bethel and Dan there were bull images of Yahweh, at Jerusalem a brazen serpent as well as bulls. The worship at these sanctuaries was, in earlier times, characterized by joy, by eating, drinking, dancing, and sexual indulgences. This rejoicing was hallowed by offerings of sacrifices, libations, and intercourse with the hierodules. As most of these

high places were taken over from the Canaanites and the denunciations of the prophets show the continuance in Israel, even at a late date, of the worship of the Baals, it is probable that with Yahweh other deities also, especially the *Baalim* or *Elim*, 'lords' or 'gods,' to whom the sanctuaries had once belonged, were recognized by sacrifices in these temples. That these high places were once regarded as altogether legitimate is evident from the fact that Samuel conducted worship at a number of them, David, Solomon, and all his successors down to Josiah sacrificed in them, and at these sanctuaries the stories of the patriarchs were told. Many of the stories of Genesis cluster about the high places of Shechem and Bethel, Mizpah and Mahanaim, Hebron and Beersheba, and Beer-la-hai-roi. But the prophets of the eighth century, men like Amos and Hosea, Isaiah and Micah, denounced these temples of the nation and the sacrificial cult there carried on. They maintained that Yahweh had not commanded that sacrifices be brought to Him, that Israel was happiest and most pleasing to Yahweh when no sacrifices could be offered, viz. in the wilderness; and they attacked the drunkenness and religious prostitution that flourished at these temples. While the earliest law of Israel, the Covenant Code (Ex. xxi.-xxiii.), regards worship at those sanctuaries where Yahweh had revealed Himself as perfectly legitimate, the Deuteronomic law introduced by King Josiah about 620 declares that sacrifices shall be offered in only one place. This centralization of the cult in Jerusalem may have been an ideal of the local priesthood as early as the days of Hezekiah, and some Judean temples may have been closed and destroyed as is stated in II. Kings xviii. 4, 22; xxi. 3, though it is probable that the author of these verses has wrongly given Hezekiah credit for the same reformatory work as Josiah. That Josiah attempted to carry out the change proposed in Deuteronomy, and did so with a high hand, there can be no doubt (II. Kings, xxiii.). But it is equally certain that the affection of the people could not by his violent measures be diverted from their ancient temples. The destruction of the temple in Jerusalem by Nebuchadnezzar naturally enhanced the importance of the smaller shrines and caused a reaction against the Yahweh cult in favor of the worship of other gods. The reluctance to rebuild the temple in Jerusalem complained of by Haggai was no doubt in part caused by this reaction. There is evidence in parts of the Book of Isaiah written during the Persian and Greek periods of the survival of licentious and idolatrous rites that can scarcely be connected with the temple in Jerusalem. A positive proof of the existence of other temples besides that in the capital at a very late time is found in the letter of Onias to Ptolemy and Cleopatra, quoted by Josephus (*Ant.* xiii. 3, 1), in which he states that the Jews of Egypt, Cœle-Syria, and Phœnicia have many temples of different patterns, and therefore wishes to have permission to build his temple in Leontopolis (see ONIAS'S TEMPLE), on the model of that in Jerusalem. From this it must be concluded that the idea of the illegitimacy of all worship except at Jerusalem cannot have been universally cherished among the Jews, and that the hill temples are likely to have attracted worshipers as late as in the second century B.C. If Onias's letter should prove to be a forgery, its testimony would not be of less value, as it would then show a still longer survival of this attitude. Consult Von Gall, *Altisraelitische Kultstätten* (Giessen, 1898), and Moore, in *Encyclopædia Biblica*.

HIGH PRIEST (Heb. *hakkohen haggadol*). The chief of the Jewish priesthood. There is no evidence that in the pre-exilic period there was any distinctive office of high priest. In early days among the Hebrews, the rulers united in their persons priestly and civil functions, and to a certain extent the Kings of Israel and Judah continued to perform offices of a priestly character. By the side of the king-priest there were guardians of the sanctuaries scattered throughout the country, and as some of those (e.g. at Shiloh, Bethel, Samaria, and Jerusalem) grew in importance an ecclesiastical government gradually developed, and naturally in such significant centres as Samaria and Jerusalem there was always one priest who was regarded as supreme over the others. In the Deuteronomic code there is no reference as yet to the high priest as such; nor does Ezekiel make mention of such an office in his sketch of the future theocracy. Deuteronomy makes no distinction between priests and Levites; in Ezekiel the priests are members of the Zadokite family, to whom is assured control of the temple at Jerusalem, while the Levites are the body-servants of the priests and represent those attached to the old sanctuaries of the country, which were set aside with the establishment of the principle of central authority for the temple of Jerusalem. (See DEUTERONOMY.) In the post-exilic priestly code (see EZRA; LEVITICUS), however, the prerogatives of the Zadokites are thrown aside, and in accord with the general theory underlying this code, which traces everything back to the days of Moses, the priesthood is fixed by Moses himself in the family of his brother Aaron. The latter is accorded the dignity of high priest and the office is handed down to Aaron's eldest son, Eleazer, and by the latter to his son, Phinehas, and so in regular succession. The regulations for the office are set forth in great detail in the Priestly Code (cf. Lev. viii., x., xxi., etc.), but it must be borne in mind that these regulations remained to a certain extent in the domain of theory. Many more restrictions were attached to the office than belonged to the ordinary office of a priest. The high priest was allowed to marry none but a virgin, and one of his own tribe; every impure contact, even of the dead bodies of his own parents, he was strictly forbidden, besides many other things that might cause defilement. His functions consisted principally in the general administration of the sanctuary and all that belonged to the sacred service. He alone was allowed to enter the Holy of Holies on the Day of Atonement, and to consult the urim and thummim (q.v.). His costume was of surpassing costliness and splendor, comprising numerous vestments in addition to those of the ordinary priests. This costume was laid aside by the high priest when, on the Day of Atonement, he went to perform the service in the Holy of Holies; a simple garb of white linen—the funeral dress of the Jews in later times—was all he wore on that occasion. The revenues of the high priest were in the main the same as those of the other priests; but, according to the Talmud, he was to be richer than these, and if his own means were insufficient, he was to be

provided with means by his brethren, in virtue of his position; the other priests never addressed the high priest but by *ishi kohen gadol*, 'my lord high priest.' Before the law, however, the high priest was equal to any other Israelite. See PRIEST; LEVITE; AARON; LEVITICUS.

HIGH SCHOOLS. A term that has been variously employed in different countries at different times to indicate a type of schools. In Germany in official language it is customary to refer to the universities as high schools (*Hochschulen*). In the middle of the sixteenth century in Edinburgh the designation was applied to a famous educational institution of a liberal character, but in grade below the university. In the United States it is very generally used to indicate an important and definite type of schools which forms a component part of the public-school system. This term came into use between 1820 and 1850, when, in place of or by the side of schools called 'academies,' which were maintained by endowment or at private expense, schools of a corresponding grade were established at public expense. Such institutions were variously designated at first. In Philadelphia the Central High School yet retains its original name; in New York the corresponding institution was known first as the Free Academy, and later as the College of the City of New York. This institution has since expanded in scope until it offers approximately the ordinary college course. In Baltimore the corresponding institution is known as the City College, while similar institutions for girls bear the name of high schools. The Boston Latin School, founded in early colonial times, is a free public high school, fitting boys for college.

The term high school came into use in Boston when in 1821 the English High School was established as complementary to the Latin school. A few years later the girls' high school was founded. During the period of Horace Mann's secretaryship of the Massachusetts Board of Education (1837-48) a system of high schools was instituted. This example of Horace Mann was followed by other educational leaders, notably by Henry Barnard in Connecticut. From the middle of the nineteenth century the movement in the establishment of high schools became very general. In many of the Western States high schools have from the first formed a part of the public-school system, and in some instances their maintenance is recognized by the Constitution of the State. During the year 1899-1900 there were reported to the United States Commissioner of Education 6005 public high schools, having an attendance of 519,251 pupils. This was an increase in the year of more than 137 per cent. in the number of schools, and of more than 155 per cent. in the number of students attending. The courses of study, the terms of admission, and the length of time required for completing the instruction differ widely, but in general the term high school in this country means a school supported from the public treasury, where tuition is usually (but not necessarily) free, and where pupils of both sexes are carried forward from the grammar schools to the study of 'higher' branches, and thus fitted for active life or for admission to universities, colleges, and technical schools. In its origin the high school, as also the academy, arose in answer to the demands for schools of a lower grade than colleges, appealing to a wider constituency and satisfying more needs. For the most part the high school yet retains these characteristics. In the central and western Commonwealths of the Union it fits directly for colleges, and especially for the State university; but this is due to the fact that there is a very great freedom of choice in regard to the subjects essential for entrance to college and university courses. The adjustment has been made by the college rather than by the high school. By far the larger part of high-school graduates do not enter college. However, high schools seek to meet various needs either by offering a variety of courses or in large cities through distinct schools. Thus, there are the classical courses or schools, which are distinctively college-preparatory in their nature; the scientific or English courses or schools, which furnish preparation for professional schools or simply equipment in general; there are also of recent years manual training (q.v.) high schools or courses, giving a technical or industrial preparation, and commercial high schools, with a corresponding purpose in view. No part of the educational system of the United States is so responsive to local demands and to public opinion. Hence arises the greatest variety of local conditions in these schools in city and country. For the most part they are wholly under local control, and are subject to general State supervision of only a nominal character. In some States, such as New York, this supervision is more intimate; in others, such as California or Michigan, it is exercised chiefly through the State universities. This amenability to local influences constitutes the greatest element of their strength, while at the same time the absence of general standards constitutes a most serious element of weakness. That the public high school is the representative secondary school of the United States is indicated by the fact that during 1899-1900 private secondary schools numbered only 1632, with an attendance of 110,797 pupils, while the increase for the previous decade had been only 21 per cent. and 16 per cent. respectively.

Consult: Butler, *Education in the United States* (Albany, 1900); Brown, *History of Secondary Education in the United States* (New York, 1902); *Reports of the United States Commissioner of Education* (Washington). See ELECTIVE COURSES AND STUDIES; GRAMMAR SCHOOL; NATIONAL EDUCATION, SYSTEMS OF; SECONDARY SCHOOLS.

HIGH SEAS. As a term of admiralty law in England, the open, uninclosed waters of the ocean; that "part of the sea which lies not within the body of a county." It is used in contradistinction to bays, harbors, and arms of the sea inclosed within the *fauces terræ*, or narrow headlands or promontories. The high seas, or 'the main sea,' to use Sir Matthew Hale's synonym, are deemed within the exclusive jurisdiction of the Admiralty, up to high-water mark when the tide is full.

The term has been much considered by the judicial tribunals of the United States, and the Federal Supreme Court has held it applicable to the open, uninclosed waters of the Great Lakes. This conclusion, however, was not unanimous. According to the majority view, the Great Lakes possess every characteristic of seas. They are of large extent, wholly navigable by the largest vessels; they separate States in many instances, and in some instances constitute the boundary

between independent nations; and their waters, after passing long distances, debouch into the ocean. We may as approximately designate the open, uninclosed waters of the lakes as the high seas of the lakes, as to designate similar waters of the ocean as the high seas of the ocean, or similar waters of the Mediterranean as the high seas of the Mediterranean. A minority of the court vigorously dissented, insisting that legal usage had limited the term to the ocean, the common highway of all nations.

While the high seas are, as a rule, the common highway of all nations and not the subject of ownership or monopoly by any one, a State is entitled to a large measure of jurisdiction over that part of them lying within a marine league of its coast. This control is accorded by international law, in order that a State may protect itself by proper fiscal and defensive regulations. Accordingly, within this three-mile limit, the vessel of a friendly power may be boarded and searched, on suspicion of being engaged in unlawful commerce, or of violating the revenue laws. It may even be chased beyond these territorial waters and arrested and searched outside their limits. See BERING SEA CONTROVERSY; FISHERIES; and MARE CLAUSUM. Consult the authorities cited under the above titles and under ADMIRALTY LAW; also *United States vs. Rodgers*, 150 United States Reports, 249 (1893).

HIGH STEWARD. See STEWARD.

HIGH TREASON. See TREASON.

HIGHWAY. A place over which the public generally has a right to pass. In Lord Holt's language, "it is the *genus* of all public ways." As a term of the common law, it includes roads, streets, foot-paths, bridle-paths (or ways along which the public is entitled to ride or lead a horse), driftways (or places along which the public may drive cattle), public canals, ferries, bridges with their approaches, public squares, and navigable streams. In statutes, however, it is sometimes used in a narrower sense, being limited to country roads.

Ordinarily, the right of the public in a highway is that of user, not of land-ownership. To this extent it partakes of the nature of an easement (q.v.), but it is not a true easement, because there is no dominant estate. The public enjoys a right of way, but not as the owner of an estate in land to which such a right is appurtenant. A private way, on the other hand, is an easement, for its user belongs to particular persons, by reason of their ownership of certain lands. Whether a place of passage is a highway or a private way does not depend upon its being a thoroughfare, that is open at both ends, or leading to a public place. It is now well settled that a *cul-de-sac* may be a highway. If the public is entitled to pass and repass, the place is a highway, although its terminus is at the gate of a private house.

Highways are created either by act of the Government, or by dedication of the landowner and acceptance by the public. Dedication may be either express or implied. It is of the first kind where a landowner formally lays out a public road or street and gives notice that the public may use it. The dedication is implied where the public makes use of a way without objection of the landowner, and under circumstances indicating his assent to the public use. One may irrevocably convert a portion of his land into a highway, by selling lots bounded along a specified road or street, without securing an acceptance of the highway by the proper authorities. In such a case, he is bound to keep the road or street open for the benefit of those who have been induced by his representations to become purchasers of abutting property, but the public is not bound to keep the way in repair. In order that this burden be cast upon the public, there must be an acceptance by the proper authorities. At common law, a formal act of acceptance is not required. Any assumption of control, which is properly exercisable by the proper authorities in the case of highways, such as letting a contract for the improvement of the road or street in question, will establish an implied acceptance. In the United States country highways are created more frequently by the act of Government than by private dedication. At times they are established by special legislation, but as a rule under general statutes. These differ in the various States, although their principal provisions are much alike. They ordinarily require a formal application for the highway, proper notice to the various persons whose property will be directly affected, a proper hearing before certain officers or tribunals, a proper assessment of damages or of benefits, and a proper record of the proceedings. After a highway has been established, it can be lawfully altered or vacated only by act of Government. This may be accomplished by special legislation. As a rule, however, the State delegates its authority over this subject to county, town, or city officials. In this country, even the State cannot change or vacate a highway without making compensation to landowners, whose property rights are taken away thereby. This is because of constitutional prohibitions against the taking of private property for public use without just compensation. In England, Parliament is not thus hampered by constitutional limitations.

The ordinary rule, both in England and in this country, is that the public has only a user of the surface of the highway; the fee of the land remains in the adjoining owner. Under the first branch of the rule, the public is entitled to use every part of the highway, and is not limited to the traveled or beaten part only. Accordingly, if any portion of a highway is unlawfully occupied by a fence, gate, wall, or building, such obstruction is a nuisance, and may be abated either by the public authorities, or by any traveler whose right to use the road is interfered with. This is one of the few cases where a person is allowed to take the law into his own hands. It is his duty, in such cases, to proceed in a peaceable manner, and to do no more injury than necessary to the property which constitutes the nuisance. The person who is responsible for the nuisance is liable in damages to any one injured thereby. In some circumstances a traveler has a right to deviate from the highway and go upon adjoining lands. This is based upon the ground of public convenience and necessity. Highways being established for the use and benefit of the whole community, a due regard for the welfare of all requires that when temporarily obstructed by storm or flood, travel should not be interrupted. A person traveling on a highway is in the exercise of a public right, and if he is compelled by impassable obstructions to leave the

thoroughfare and go upon private lands, he is still in the exercise of the same right. But this right of deviation rests upon necessity, not upon the personal convenience of the traveler. It is properly exercisable, therefore, only when the obstructions are due to sudden or recent causes, or when the traveler cannot make his journey by other ways.

Under the second branch of the rule, stated above, if the land on both sides of a highway belongs to the same owner, then the right to the ground beneath the road belongs to him also; and if the land on one side belongs to a different owner from the land on the other side, then each is presumed to have the right to the ground under the highway up to the middle line. This rule is more than a mere theory, for though neither of the adjoining owners can ever interfere with the passage of the public, who have an absolute right forever to use it for every lawful purpose of transit, yet the adjoining owner has all the rights incidental to the property which do not interfere with this public right of passage. Thus, if a mine were discovered under the road, the adjoining owner would have the sole right to dig it and keep the contents; all that he would require to attend to would be to leave sufficient support for the surface of the road. So, in like manner, where there are strips of land at the side of the road on which trees grow or grass, these belong solely to the adjoining owner, and the public have no right to them. Another consequence follows, that if, for example, a gas company or a water company without due permission were to presume to take up the highway in order to lay pipes under the surface, this would be not only an indictable nuisance as regards the public, inasmuch as it obstructs the use of the road for the time being, but would subject the company to an action of trespass at the suit of the adjacent owner, whose property consists of all that lies under the surface of the highway. Still another consequence of the same rule is, that if a person is loitering on a highway, not with the intention of using it as a traveler, but for some unlawful purpose, such as creating a disturbance and abusing an adjoining property-owner, he may be dealt with as a trespasser.

The English common law imposed the duty of maintaining and repairing all highways upon the parish. If the duty was neglected the parish was indictable, and was liable for damages sustained by travelers through its negligence. Public bridges, although included in the term highways, as we have seen, were an exception to the rule just stated. The duty of constructing and maintaining them rested upon the county as a part of the *trinoda necessitas*, or threefold service, to which all grants of absolute ownership of land were formerly subject. At present, the maintenance and general control of highways and bridges in England and Wales are committed chiefly to district and county councils, in accordance with the Local Government Act, 1894 (56 and 57 Vict., c. 73).

In this country, while every highway is subject to the control of the State or Federal Government, comparatively few roads are constructed and maintained directly either by a State or the nation. The power to establish them and the duty of keeping them in repair are generally delegated to some subdivision of the State, such as the township, the county, or the city. The liability of these political subdivisions for their negligent performance of this duty varies in the different States. As a rule, however, they must respond in damages for injuries caused to travelers by defects in highways of which the proper authorities had notice, and which it was their duty to remedy. In some States, a township is divided into road districts, and all ordinary repairs are made by the inhabitants of these several divisions, while extraordinary repairs, as well as the maintenance of bridges, belong to the township at large. In other States, the unit of highway administration is the county or city.

The Legislature has power to commit the work of improving and repairing highways to private corporations. Accordingly, turnpike and similar companies receive from the State authority to construct roads and keep them in good repair, and to reimburse themselves by tolls levied upon the members of the public using the roads. By this system, the cost of maintaining proper roads is shifted from the property-owners of a particular territory to the traveling public; but the cost is still borne as a tax, which the State has a right to impose. It is also established that the Legislature of a State may lawfully authorize temporary obstructions in highways, and may delegate the exercise of this power to municipal corporations. Hence come city ordinances providing for permits to deposit building materials in city streets, to erect stands, to use apparatus for hoisting goods, and the like. Gas and water companies receive authority to excavate highways and lay pipes; telegraph and telephone companies are permitted to erect poles and string wires along public thoroughfares, and even railroad companies are allowed to lay tracks and run cars over their surface. If the use which such companies are authorized to make of the street subjects adjoining property to injuries not contemplated or provided for when the street was laid out, it may give the property-owners the right to compensation for these injuries from the users. The use of city and village streets for gas and water mains is generally deemed to be within the scope of the original dedication, but not so in the case of country highways. Railroads, on the other hand, are usually regarded as an encroachment on the rights of the owner of the fee of a road, whether urban or rural, though the contrary has usually been held in the case of street railways.

In England, teams meeting upon a highway turn to the left. In this country, they turn to the right. This usage of the road has received legislative sanction in some of our States, and penalties are imposed upon its violators. Consult: Woolrych, *The Law of Ways* (2d ed., London, 1847); Elliott, *The Law of Roads and Streets* (Indianapolis, 1900); Birdseye, *General Statutes of New York—Highway Law* (New York, 1901).

HIKONE, hē'kō-nā. A town in the Japanese Prefecture of Shigo, situated in the central part of Nippon, on the eastern shore of Lake Biwa (Map: Japan, D 6). Its chief attraction is the remains of a fine feudal castle, the former seat of a famous Daimio. Population, about 19,000.

HILALI, hē-lä'lē, Badr ud-Din. A Persian Sufi poet of the first third of the sixteenth century, born in Astrabad and educated at Herat. In 1531 he was imprisoned and killed by Obeid

Khan, as a Shiite heretic, although it seems certain that he had long before forsaken the national heresy and become an orthodox Sunnite. His poems include the epics, *Sifat Alasyikin* ("On the Ways of Lovers"), and, most famous of all, *Shâh u Gada* ("King and Dervish"), translated by Ethé in *Morgenländische Studien* (1870), and the lyric *Divan*, published at Cawnpore in 1864.

HILA'RIA (Lat. nom. pl. of *hilaris*, Gk. Ἱλαρός, *hilaros*, gay). A Roman festival, celebrated in honor of Cybele at the vernal equinox. It began on March 22d and closed on the 25th. The last day of the feast was the most important, and on it the inhabitants of the city abandoned themselves to the most extravagant merry-making. The only religious ceremony in connection with it was the solemn procession of the priests who bore round the streets the statue of the mother of the gods. The festival celebrated the departure of winter, and hailed the approach of spring.

HILA'RION, SAINT (c.288-371). The reputed founder of monachism in Palestine. According to the legendary and untrustworthy account of his life, he was born at Tabatha, near Gaza, in 288, was converted at Alexandria, and, attracted by the fame of Saint Anthony, went to visit the latter in his hermitage and became his disciple. Returning to Palestine with some companions, while still only a lad of fifteen, he gave away all the property which he had inherited by the recent death of his parents, and withdrew into the desert between the sea and the marshes on the Egyptian border. He observed the most rigid asceticism, and after twenty years of this life was rewarded with rapidly growing fame, miraculous gifts being attributed to him; disciples and imitators multiplied to the number of two or three thousand, all under the spiritual control of Hilarion. When sixty-three years old, the death of Saint Anthony being revealed to him, he went to Egypt and visited the scene of that saint's labors; afterwards he proceeded with a favorite disciple, Hesychius, to Sicily, where his popularity rendered the quiet and retirement which were congenial to him impossible. A further migration to Epidaurus thus became necessary, and ultimately he found a resting-place in Cyprus, the diocese of his friend Epiphanius, where in a lonely cell among some almost inaccessible rocks he died in 371. He is commemorated by the Roman Church on October 21st. Consult Israel, "Die Vita Hilarionis des Hieronymus," in *Zeitschrift für wissenschaftliche Theologie* (Jena, 1880).

HIL'ARY (Lat. *Hilarius*). Pope, A.D. 461-68. He was an earnest promoter of the faith, and severe in discipline. During his pontificate canons were adopted forbidding the ordination of men who had married a second time, or those who had married widows, and also forbidding bishops to nominate their successors. He is a saint in the Roman calendar, and his day is September 10th.

HILARY, SAINT, Bishop of Arles (401-49). A churchman whose name occupies a conspicuous place in the history of the fifth century. He was born at Arles, and was made bishop there in 426. As metropolitan bishop he became involved in a serious controversy with the Pope, Leo the Great. The cases of two deposed bishops having been carried to Rome on appeal, the condemnation was reversed; but Hilary refused to submit to the decision, maintaining that the authority was uncanonically exercised. In the end, however, he sought a reconciliation with the Pope, and the dispute was amicably terminated. Hilary died at Arles in 449. His works are in Migne, *Patrol. Lat.*, i. His day is May 5th.

HILARY, SAINT, Bishop of Poitiers (c.320-66). One of the Latin Church fathers. He was born of pagan parents at Poitiers about 320. His conversion to Christianity was mainly the result of his own study. About the year 353 he was elected bishop of his native city, and immediately rose to the first place in the Arian controversy. Having provoked the displeasure of the Court party, he was imprisoned and sent into exile in Phrygia (356); but appears in the Council of Seleucia in 359, and was permitted to resume possession of his see, where he died in 366. The Church holds his day on January 13th. Hilary's theological writings are especially valuable for the history of the Arian party, and particularly for the doctrinal variations of that sect, and the successive phases through which it passed between the Council of Nicæa and the first Council of Constantinople. The best edition is that of the Benedictine Dom. Constant (Paris, 1693), or the reprint of it with additional matter by Maffei (Verona, 1730; in Migne, *Patrol. Lat.*, ix. and x.). His selected works, with biographical and critical introductions, have been translated in the *Nicene and Post-Nicene Fathers*, 2d series, vol. ix. (New York, 1890). His determined opposition to Arianism won him the epithet 'Athanasius of the West.' For his life, consult Cazenove (London, 1883) and Largent (Paris, 1902).

HILARY TERM. In English law, one of the four terms held for the administration of justice by the courts of common law, and named from the saints' days nearest to the date of beginning the terms. Hilary term was formerly appointed to commence on January 11th and to end on January 31st. It is now, by statute, a movable term, ending on the Wednesday before Easter. See TERM (OF COURT).

HIL'DA. A New England girl who goes to Rome to pursue the profession of painting, in Hawthorne's *Marble Faun*. A watch-tower which contains an image of the Virgin, and in which the original of this character is supposed to have kept a light continuously burning, is still pointed out, in Rome, as Hilda's Tower.

HILDA, or **HILD,** SAINT (614-80). Abbess of Streanshalch or Whitby. She was a member of the royal family of Northumbria, and was baptized by Paulinus (q.v.), with her kinsman, King Edwin, April 11, 627. During the pagan reaction which followed Edwin's defeat and death Hilda was tempted to settle with her widowed sister Hereswid at the Monastery of Chelles, 10 miles from Paris; but she was recalled to England by Bishop Aidan (q.v.), and in 649, two years after her consecration as a nun, she was appointed to succeed Heiu, the abbess of Heortea, or Hartlepool. When, in fulfillment of the vow which he had made before the decisive battle with Penda (November 15, 655), Oswy dedicated his infant daughter to God, it was to the care of Hilda that he intrusted her. In 657 the abbess founded the famous monastery on the cliffs of Streanshalch or Whitby, and for the next twenty-

two years she ruled over her double community of monks and nuns, among whom were Saint John of Beverly and the poet Cædmon. Hilda died November 17, 680. Her day in the Roman calendar is November 17th.

HILDEBERT OF TOURS, tōōr (c.1055-c.1133). A French prelate and author, born at Lavardin, near Vendôme. Tradition says he was the pupil of Berengarius of Tours, but this is not established. In 1092 he was made archdeacon, and in 1097 Bishop of Le Mans. After some difficulties with the Count of Le Mans, the Bishop found a new enemy in William Rufus, who took the city about 1099. He had constant quarrels with the neighboring prelates, and finally was in almost open rebellion against the King, Louis the Fat. In 1125, somewhat against his will, he was elected Bishop of Tours. Two years afterwards he presided at the Synod of Nantes. Toward the end of his life he was on more amiable terms with the King. The works of Hildebert were edited by Antoine Beaugendre (1708), but far from perfectly, and in part by Baluze and Muratori. They consist of sermons, letters, theological writings, and poems. A collection of the latter was published under the title *Mélanges poétiques d'Hilibert de Lavardin* (1882). The treatise *Tractatus Theologicus*, formerly attributed to Hildebert, is by Hugues of Saint Victor.

HILDEBRAND. See GREGORY VII.

HILDEBRAND, hĭl'de-brănt. The pseudonym of the Dutch poet Nickolaas Beets (q.v.).

HILDEBRAND. An aged warrior and sage in German legend, the tutor of Dietrich von Bern. He appears in the *Hildebrandslied*, and plays a leading part in the *Nibelungenlied* and other legends.

HILDEBRAND, BRUNO (1812-78). A German economist and statistician, born at Naumburg-an-der-Saale, and educated at Leipzig and at Breslau, where in 1839 he became professor. In 1841 he was appointed to a professorship at Marburg, from which he was suspended in 1846, because of the tone of a contribution to a London paper. He was elected to the National Assembly at Frankfort from Marburg in 1849, after having been reinstated in his academic position. He went to Zurich as professor in 1851, and five years later to Bern as the head of the new Swiss Bureau of Statistics. But, as a result of differences with his superiors, he was dismissed, and in 1861 became professor in the University of Jena and director of the Bureau of Statistics. His works comprise: *Nationalökonomie der Gegenwart und Zukunft* (1848); *Die Kurhessische Finanzverwaltung* (1850); *Statistische Mitteilungen über die volkwirtschaftlichen Zustände Kurhessens* (1853); and *Beiträge zur Statistik des Kantons Bern* (1860). He edited *Jahrbücher für Nationalökonomie und Statistik* (1863 et seq.).

HILDEBRAND, HANS OLOF (1842—). A Swedish historian and antiquarian; son of the archæologist and numismatist Bror Emil Hildebrand (1806-84). He was born at Stockholm; studied at Upsala; in 1865 was made amanuensis of the archæological museum; and in 1879 succeeded to his father's position of State antiquarian. His special study was Norse archæology and the related subjects, and his works are: *Svenska folket under hednatiden* (last edition, 1872); *De förhistoriska folken i Europa* (1873-80); *Fynder i Troas og Homers Troja* (1878); *Lifvet på Island under sagotiden* (last edition, 1883); *Sveriges medeltid* (1879-97), a history of civilization; the second volume of *Sveriges Historia*, dealing with the mediæval period; *Från äldre tider* (1882); *The Industrial Art of Scandinavia in the Pagan Time* (1882); *Zur Geschichte des Dreiperiodensystems* (1886); *Wisby och dess minnesmärker* (1892-93); *The Industrial Art of Scandinavia in the Middle Age* (1893); and *Sveriges mynt under medeltiden* (1895). In 1872 he founded the *Kongl. Vitterhets Historie och Antiquitets-akademiens månadsblad*, and in 1880 became editor of *Antiqvarisk Tidskrift för Sverige*.

HILDEBRAND, RUDOLF (1824-94). A Germanic philologist. He was born in Leipzig, and studied there. From 1848 to 1868 he taught in the Thomasschule. In 1864 he began to act as one of the editors of Grimm's *Deutsches Wörterbuch*, and five years later became professor of modern German literature and language in the University of Leipzig. His most important works are: *Vom deutschen Sprachenunterricht in der Schule und von deutscher Erziehung und Bildung überhaupt* (7th ed. 1901); and *Gesammelte Aufsätze und Vorträge zur deutschen Philologie und zum deutschen Unterricht* (1890). Consult Burdach, *Zum Gedächtnis Rudolf Hildebrands* (Hamburg, 1896).

HILDEBRANDSLIED, hĭl'de-brănts-lēt. A fragmentary Old High German poem, the oldest preserved specimen of German heroic poetry. It is written in alliterative verse, and dates from the eighth century. It is known only through a manuscript preserved in the museum at Kassel, and written by two monks of Fulda at the beginning of the ninth century on two blank pages of a religious work. It narrates the combat of Hildebrand and his son, Hadubrand, who after many years of separation meet, and unknown to each other engage in a duel. The account breaks off without completing the story of the combat. The facsimiles of the manuscript have been published by W. Grimm (1830) and E. Sievers (1872), and a number of annotated editions of the text have appeared.

HILDEBRANDT, hĭl'de-brănt, EDUARD (1818-68). A German landscape and marine painter. He was born at Danzig, September 9, 1818, the son of a house-painter. He traveled extensively, and was celebrated for his paintings of striking points of view, such as would interest the traveling public. As a lad he wished to be a sailor, but his father apprenticed him to the painter Meyerheim. He studied under Krause in Berlin, and under Isabey in Paris, in 1841. In 1843 he gained a gold medal in that city, and was invited by Humboldt to visit Brazil. The water-colors and oil paintings he made while there are now in the possession of the German Emperor. Hildebrandt visited the Canary Islands, Spain, and Portugal, and brought from those places two hundred water-colors of various subjects, also in the Emperor's possession. In 1851, by order of the King of Prussia, he went to Italy, Malta, Egypt, Palestine, Turkey, and Greece, and later traveled through Switzerland. In 1855 he was made professor and member of the Berlin Academy, and in 1856 he joined an Arctic expedition, as the result of which, at

Brussels in 1858, he obtained the gold medal for his "North Cape," painted while on that expedition. At Amsterdam he was given another gold medal for his "Sea of Marmora." Between 1862 and 1864 he traveled around the world, and brought home four hundred water-colors, which were exhibited in London in 1866. Among his works are: "Brazilian Primeval Forest," "Cave at Staffa" (1865), "Castle Kronborg" (1857), in the National Gallery, Berlin; "Moonrise in Madeira," Corcoran Gallery, Washington; "The Bay of Naples," Metropolitan Museum, New York; "By the Dead Sea," "Benares at Early Dawn," "Evening in Siam," and many others. His last work, "Under the Equator," a study of the ocean, popularly called "Das Blaue Wunder" (the blue wonder), was the occasion of much argument and imitation. His paintings are not without technical merit, especially in color, but the painter of 'striking views' is never the great artist. His aquarelles excel his oil paintings. He died in Berlin, October 25, 1868. Consult: his *Reise um die Erde* (Voyage Around the World), edited by Ernst Kossak (Berlin, 1857); Arndt, *Ernst Hildebrandt, der Maler des Kosmos* (ib., 1869); Bruno Meyer, *Studien und Kritiken* (Stuttgart, 1877).

HILDEBRANDT, THEODOR (1804-74). A German painter, born at Stettin. He studied at the Berlin Academy, and afterwards became a pupil of Schadow. With this master he went to the Netherlands and traveled in Italy. Ultimately he was made professor at the Düsseldorf Academy (1836). His works are largely historical; many of them illustrate scenes from Shakespeare or Goethe; and he is also a portrait painter. His masterpiece is the "Murder of the Children of Edward IV." (1836), which is in the Spiegel Gallery at Halberstadt.

HILDEBURN, CHARLES SWIFT RICHÉ (1855—). An American bibliographer and librarian. He received his education in the private schools of his native city, Philadelphia, and in 1876 became librarian at its Athenæum. His literary work includes the compilation, *A Century of Printing: The Issues of the Press in Pennsylvania, 1685-1784* (2 vols., 1885-86), and the editorship of the *Statutes at Large* of Pennsylvania.

HILDEGARD, SAINT (c.1098-1179). A German nun, a friend of Bernard of Clairvaux, born at Böckelheim. She founded an abbey near Bingen; boldly attacked ecclesiastical abuses; and composed many mystical works, of which the best known is the *Scivias* (edited in Migne, *Patrologia Latina*, vol. cxcvii.). Consult the biography by Schneegans (Barmen, 1891); and Roth, *Die Lieder und die unbekannte Sprache der heiligen Hildegard* (Wiesbaden, 1880).

HILDEN. A town of the Prussian Rhine Province, situated nine miles east-southeast of Düsseldorf (Map: Prussia, B 3). It is a growing place, with manufactures of silk goods, carpets, machinery, etc. Population, in 1890, 8600; in 1900, 11,296.

HILDESHEIM, hĭl'dĕs-hīm. The former capital of the Bishopric of Hildesheim, in the Prussian Province of Hanover, situated on the Innerste, 21 miles south-southeast of Hanover (Map: Prussia, C 2). It has narrow streets, old monuments, some quaint, mediæval, highly ornamented façades, is partly surrounded by lofty walls, and contains many excellent examples of architecture owing to its having been a German home of the Romanesque and Renaissance art, including particularly the timber framework features. The Catholic cathedral, erected in the eleventh century and greatly modified, is built partly in the Romanesque and partly in the late Gothic. Its ancient cloisters are exceptionally curious and interesting. Its treasury is rich in objects associated with the lives of Charlemagne, Bishop Bernwald, and others. The brass doors and bronze Easter column are richly ornamented with reliefs; there are also a number of gilded sarcophagi, including that of Bishop Godehard. Against the wall of the cathedral stands a rose-bush which is 25 feet high and reputed to be a thousand years old. Two of the best examples of Romanesque architecture in Germany are the Catholic Church of Saint Godehard, erected in the twelfth century and recently restored—a basilica-shaped edifice surmounted by three towers—and the large Protestant Church of Saint Michael, founded by Bishop Bernwald at the beginning of the eleventh century, and containing his tomb. Saint Michael has an interesting interior, with good mediæval ceiling paintings.

Hildesheim contains also a number of interesting secular buildings, notably the fifteenth-century late-Gothic Rathaus, adorned with rare frescoes by Prell, and possessing valuable archives; and the former butchers' guild-house, regarded as perhaps the finest wooden building in Germany. There is an interesting mediæval public square—Altstädter Markt. The environs are pleasant, and not without interest. In recent times Hildesheim has been brought into special prominence by the collection of elaborate Roman silver plate (known as the Hildesheimer Silberschatz) discovered near the town in 1868. The collection consists of a complete service for three persons (69 pieces), and is believed to belong to the Augustan age. It is in the Berlin Museum. The educational institutions of Hildesheim include a Catholic Gymnasium, originally founded as a cathedral school in the ninth century, a Protestant Gymnasium, dating from the Middle Ages, a seminary for teachers, a theological seminary, an agricultural school, etc. There are also two museums of art and antiquities, including the valuable Römer Museum, and a municipal library of about 30,000 volumes. Hildesheim manufactures iron products, tobacco, sugar, cotton and woolen goods, machinery, church bells, carpets, preserves, wagons, glass, stoves, etc. The chief articles of commerce are grain, wool, leather, and building materials. Population, in 1890, 33,481; in 1900, 42,973, including 14,300 Catholics.

The town existed before the ninth century. It came into great prominence after it was made in 818 the seat of the Bishopric of Hildesheim. Under Bishop Bernwald (993-1022) Hildesheim became famous for its fine ecclesiastical buildings and religious art productions executed under the supervision of the Bishop. In the thirteenth century the town joined the Hanseatic League and acquired considerable privileges. After continuous struggles with its bishops Hildesheim came, upon the secularization of the bishopric, into the hands of Prussia in 1803, was annexed to Westphalia in 1807, and to Hanover in 1813, and with Hanover passed to Prussia in 1866. Consult: Wachs-

muth, *Geschichte von Hochstift und Stadt Hildesheim* (Hildesheim, 1863); Bauer, *Geschichte von Hildesheim* (ib., 1891); Holzer, *Der Hildesheimer antike Silberfund* (ib., 1870); Lachner, *Die Holzarchitecktur Hildesheims* (ib., 1882).

HILDRETH, Richard (1807-65). An American historian, born at Deerfield, Mass. He graduated at Harvard College in 1826, studied law, and began to practice in Boston in 1830. In 1832, however, he abandoned his profession to become editor of the Boston *Atlas*. In the autumn of 1834, being out of health, he went to the South, where he resided nearly two years on a slave plantation in Florida, and used his opportunity to study the workings of slavery. The result was a powerful anti-slavery novel, published in 1837 under the title of *The Slave, or a Memoir of Archy Moore*. It was reprinted in England, and in 1852 was republished in America under the title of *The White Slave*. When the annexation of Texas began to attract attention, he published in the Boston *Atlas* a series of articles which did much to intensify the hostility of the Northern people to that scheme. After publishing a *History of Banks* (1837) he passed the winter of 1837-38 in Washington as correspondent of the *Atlas*, and, upon his return to his editorial chair, entered warmly into the campaign for the election to the Presidency of General Harrison, a life of whom he published in 1839. A year later (1840) he translated Dumont's version of Bentham's *Theory of Legislation*. The same year appeared his *Despotism in America*, a work on the political, economical, and social aspects of slavery. A second edition with an added chapter was issued in 1854. From 1840 to 1843 he resided in Demerara, British Guiana, busying himself in editing two free-labor newspapers. After his return he published a *Theory of Morals* (1844) and a *Theory of Politics* (1853). The work, however, for which he is most remembered is his *History of the United States*, in six volumes (1849-56), in which he attempts to present the founders of the Republic in their true character, without trying to heighten their virtues or disguise their mistakes and faults. The first three volumes treat the period from 1492 to 1789; the second three from 1789 to the close of Monroe's first term (1821). The bias is Federalist, the treatment accurate and vigorous; but the graces of style are lacking, and the work is more consulted than read. In 1855 Hildreth published *Japan as It Was and Is*, and in 1856 *Atrocious Judges*, based on Campbell's *Lives*. For several years, ending with the inauguration of Lincoln as President, he was engaged on the staff of the New York *Tribune*. He went abroad in the summer of 1861 as United States consul at Triest, and died in Florence.

HILES, Henry (1826—). An English musician, born at Shrewsbury. He studied music with his brother John, a well-known organist, and, after holding various positions as organist, became in 1876 lecturer on harmony and counterpoint at Owens College, Manchester, and three years later at Victoria University. In 1867 he had received the degree of Doctor of Music. He was co-founder of the National Society of Professional Musicians (1882); for a time professor of harmony and counterpoint at the Royal Manchester College of Music; and in 1885 became editor of the *Quarterly Musical Review*. His compositions, which are popular in England, include the oratorios *David* (1860), *The Patriarchs* (1872), cantatas, anthems, psalms, songs, odes, and music for the organ and piano. His best-known treatises are: *Harmony of Sounds* (3 editions, 1871, 1872, 1878); *Part Writing, or Modern Counterpoint* (1884); and *Harmony versus Counterpoint* (1894).

HILFERDING, hĭl'fĕr-dĭng, Alexander Fedorovitch (1831-72). A Russian author, born at Moscow, of German stock. He studied in the city of his birth, and after travels abroad devoted himself to historical and ethnographic studies. An ardent Panslavist, he wrote: *On the Servians and Bulgarians* (translated into German by Schmaler, 1856-67); a history of the Baltic Slavs (1855); a history of their struggle with Germany in the Middle Ages (1861); and the very unscientific discussions of the relation of the Slavic languages to Sanskrit (1853), and to the allied languages (1853). His greatest work is the collection of popular songs, in the search for which he lost his life. The collection was edited by Hiltebrant (Saint Petersburg, 1873). Hilferding's complete works were published 1868-74.

HILGARD, Eugene Woldemar (1833—). A German-American agricultural chemist and geologist, born at Zweibrücken, Rhenish Bavaria. He studied at Zurich and elsewhere, came to America in 1835, but subsequently returned to complete his studies, receiving the degree of Ph.D. at Heidelberg, in 1853. In 1858 he was appointed State Geologist of Mississippi, and at the close of the Civil War resigned to become professor of chemistry at the University of Mississippi. From 1868 to 1875 he was professor of geology and natural history in the University of Michigan, and in 1875 was made professor of agricultural chemistry and director of the agricultural experiment station at the University of California. In 1894 he received the Liebig medal for distinguished services to agriculture, from the Munich Academy of Sciences. As a member of the Northern Transcontinental Survey, he devoted three years (1880-83) to a study of the agricultural capabilities of Oregon, Washington, and Montana. His investigations on the chemistry and physics of soil, and the reclamation of alkali lands, resulted in important contributions to agricultural science. Much of his work may be found recorded in the publications of the California Agricultural Experiment Station.

HILGARD, Julius Erasmus (1825-91). A German-American engineer. He was born in Zweibrücken, Rhenish Bavaria, went to Illinois in 1835; studied engineering, and was employed in the coast survey service. In 1862 he had chief charge of the office, and supervision under the Treasury Department of weights and measures. He was one of the members of the Metric Commission at Paris in 1872, and was made a member of the permanent committee. In 1847 he was president of the American Association for the Advancement of Science, and from 1881 to 1885 superintendent of the United States Coast Survey.

HILGARD, Theodore Charles (1828-75). An American physician and scientist, born in Zweibrücken, Germany. He came to America in 1835, and began his professional work in Saint Louis.

He gave especial attention to microscopic studies of lower organic life until his health failed, when he came to New York and engaged in the study of terrestrial physics with his brother Julius. His published works, besides papers appearing in the annals of various scientific societies, include: *Experimental Observations on Taste and Smell* (1854); *Exposition of Natural Series in the Vegetable Kingdom* (1858); *Phyllotaxis: Its Numeric and Divergential Law* (1859).

HILGENFELD, hĭl'gen-fĕlt, ADOLF (1823—). An eminent German Protestant theologian, of the Tübingen school, born at Stappenbeck, and educated at Berlin and Halle. In 1847 he became privat-docent, and three years later professor, at Jena. Editor of the *Zeitschrift für wissenschaftliche Theologie* (1858 sqq.), he wrote: *Die Clementinischen Rekognitionen und Homilien* (1848); *Das Evangelium und die Briefe Johannis nach ihren Lehrbegriff* (1849); *Ueber die Evangelien Justins*, etc. (1850); *Das Markusevangelium* (1850); *Der Galaterbrief* (1852); *Das Urchristentum* (1855); *Die jüdische Apokalyptik* (1857); *Der Kanon und die Kritik des Neuen Testaments* (1863); *Novum Testamentum extra Canonem Receptum* (2d ed. 1876-84); *Historisch-Kritische Einleitung in das Neue Testament* (1875); *Ketzergeschichte des Urchristentums* (1884); *Judentum und Judenchristentum* (1886); an edition of Hermas's *Pastor* (1887); and *Acta Apostolorum Græce et Latine Secundum Antiquissimos Testes* (1899).

HILIGUAYNA, ĥ-lē-gwī'nâ, HILIGUEYNA, or HILIGVOYNA. A Visayan dialect in Panay Island, Philippine Islands (q.v.).

HILL, AARON (1685-c.1750). An eccentric English author, born in London. He treated in his verse many themes, from the creation of the world to doomsday. *Elfrid* (1710) is the earliest of eight dramatic pieces, either original or adapted. In conjunction with William Bond he edited an imitation of the *Spectator*, called the *Plain Dealer* (1724). His poems and letters were collected in 1753, and his plays in 1760.

HILL, ABIGAIL. Favorite of Queen Anne of England. See MASHAM, MRS.

HILL, AMBROSE POWELL (1825-65). An American soldier, prominent on the Confederate side in the Civil War. He was born in Culpeper County, Va.; graduated at West Point in 1847, and served in the United States artillery in the Mexican War; in Florida, against the Seminoles; and on the Coast Survey, but resigned in March, 1861, to accept a commission as colonel in the Confederate service. At the battle of Beaver Dam Creek, June, 1862, his troops took part in the attack on the Federal position, and on the retreat of the latter to Gaines's Mill and New Cold Harbor pursued and again attacked them, only to be again repulsed. At Antietam, September 17, 1862, he arrived just in time to stay the Federals, who were sweeping all before them, and so afforded Lee an opportunity to draw off his exhausted army. He commanded a division under Jackson at Fredericksburg, December 13, 1862. At Chancellorsville, May 2-4, 1863, he commanded the reserve; and it was his troops who, on being moved to the front to take the place of the decimated regiments that had borne the brunt of the first day's fighting, mistook Jackson's escort for Federals, and fired the fatal volley which caused Jackson's death. On May 10, 1863, General Lee reorganized his army, making three corps instead of two, and gave one corps to Hill, who at the same time was made a lieutenant-general. This corps he led in the battle of Gettysburg, and from the Wilderness until he met his death while reconnoitring at Petersburg, April 2, 1865.

HILL, BENJAMIN HARVEY (1823-82). An American legislator. He was born in Georgia; graduated at the State University in 1844, and within a year began the practice of law. In 1851 he was elected to the State Legislature as a Whig. He was a Unionist member of the State Secession Congress in 1861, but after striving vainly to prevent his State from seceding supported the movement. He was a member of the Provisional Confederate Congress the same year, and was soon afterwards chosen to the Confederate Senate. In 1865 he was for a short time a prisoner of war in New York. After the war he was an earnest Democrat, and denounced the reconstruction acts of Congress, his *Notes on the Situation* (1867-68) attracting wide attention. He supported Horace Greeley for the Presidency in 1872, and was defeated for the United States Senate in the following year. He became a member of the House of Representatives in 1875, and in 1876 was elected to the United States Senate, in which body he served until his death. A statue of him was erected in Atlanta in 1886. Consult Benjamin H. Hill, Jr. (editor), *The Life, Speeches, and Writings of Benjamin Harvey Hill* (Atlanta, 1891).

HILL, DANIEL HARVEY (1821-89). An American soldier in the Confederate service, and an educator, born in South Carolina. He graduated at West Point in 1842, and served in the Mexican War, for his gallantry in which he was brevetted major. He resigned in 1849, and became a professor in Washington College, Lexington, Va., and later filled a similar position in Davidson College, North Carolina. In 1859 he became superintendent of the North Carolina Military Institute, at Charlotte, but resigned in 1861 to enter the Confederate service. He commanded at the battle of Big Bethel, June 10, 1861, and was soon afterwards promoted to be a brigadier-general. He fought against McClellan in the Peninsular campaign, and was especially conspicuous at the battle of Seven Pines and Fair Oaks, May 31 and June 1, 1862. He was with A. P. Hill at the battle of Beaver Dam Creek, and participated in that of Gaines's Mill. At South Mountain, September 14, 1862, with only 9000 men, he managed to hold the whole Federal army in check until Lee was able to get his trains and artillery out of danger, and then joined the main army in time to take part in the battle of Antietam on the 17th. He was appointed a lieutenant-general by President Davis in July, 1863, and was placed in command of a corps in General Bragg's army, with which he fought at the battle of Chickamauga, September 19-20, 1863. In the last year of the war he fought under Joseph E. Johnston at the battle of Bentonville, N. C., and laid down his arms at Durham Station, on April 26, 1865. After the war he was for a number of years editor of a monthly magazine entitled *The Land We Love*, and later edited the *Southern Home*. From 1877 until 1884 he was president of the Arkansas Industrial University,

and from 1885 until the year of his death of the Middle Georgia Military and Agricultural College. His publications include: *Elements of Algebra* (1858); a number of religious tracts; and several articles in *Battles and Leaders of the Civil War* (Johnson and Buel, editors, New York, 1887).

HILL, DAVID BENNETT (1843—). An American politician. He was born at Havana, N. Y.; was admitted to the bar in 1864, and practiced law at Elmira, N. Y. He was a Democratic member of the New York Assembly from 1869 to 1871, and was elected Mayor of Elmira in 1882. He early became prominent in State and National politics, and was chairman of the Democratic State Convention in 1877, and again in 1881, and in the following year was elected Lieutenant-Governor on the ticket with Grover Cleveland, upon whose resignation in 1885, preparatory to assuming the duties of the Presidency, he became Governor. He continued to hold this position until 1891, when he succeeded William M. Evarts as a member of the United States Senate, where he took a prominent part in the debates, especially in those concerning the Wilson Tariff Bill in 1894. During his Senatorial term he opposed various measures approved by President Cleveland, and was instrumental in preventing the confirmation by the Senate of the nominations of William B. Hornblower and Wheeler H. Peckham as justices of the United States Supreme Court. He was a prominent candidate for the Presidential nomination before the Democratic National Convention of 1892, and was defeated for Governor of New York in 1894 by Levi P. Morton. After the expiration of his term in the Senate (1897), Mr. Hill practiced law in Albany, though he continued to take an active part in politics.

HILL, DAVID JAYNE (1850—). An American author and educator, especially well known for his writings on rhetoric. He was born at Plainfield, N. J.; was educated at Bucknell University (then Lewisburg), where he was professor of rhetoric (1877-79), and then president. In 1888 he was made president of Rochester University. After resigning his office he spent three years in the study of public law and diplomacy in Europe, and was subsequently called to the office of Assistant Secretary of State in Washington. In 1903 he was appointed United States Minister to Switzerland. During his residence in Washington he held the professorship of European diplomacy in the School of Comparative Jurisprudence. His works include: *The Science of Rhetoric* (1877); *The Elements of Rhetoric and Composition* (1879); *Life of Washington Irving* (1879); *Life of William Cullen Bryant* (1880); *Principles and Fallacies of Socialism* (1885); *The Elements of Psychology* (1887); *The Social Influence of Christianity* (1887); *Genetic Philosophy* (1893); and an edition of Jevons's *Logic* (1884).

HILL, GEORGE BIRKBECK (1835-1903). An English author, born at Tottenham, Middlesex, and educated at Pembroke College, Oxford. From 1859 to 1876 he was head master of the Bruce Castle School; in the latter year he resigned to devote himself to literature. He is best known as a Johnsonian scholar and editor. His numerous published works include: *Dr. Johnson: His Friends and His Critics* (1878); *Life of Sir Rowland Hill* (1880); *Colonel Gordon in Central Africa* (1881); *Wit and Wisdom of Dr. Johnson* (1888); *Footsteps of Dr. Johnson in Scotland* (1890); *Writers and Readers* (1892); *Harvard College, by an Oxonian* (1894); *Talks About Autographs* (1896); *Johnsonian Miscellanies* (1897); *Life of Edward Gibbon* (1900). He edited: *Boswell's Correspondence* (1879); *Boswell's Life of Johnson* (1886); *Rasselas* (1888); *Select Essays of Dr. Johnson* (1889); *Letters of Johnson* (1892); *Letters of Dante Gabriel Rossetti* (1897); *Unpublished Letters of Dean Swift* (1899).

HILL, GEORGE WILLIAM (1838—). An American astronomer, born in New York, and educated at Rutgers College. He became an assistant on the staff of the *American Ephemeris* and of the *Nautical Almanac* in 1861, was elected to the National Academy of Sciences in 1874, and was awarded a gold medal by the London Royal Astronomical Society in 1887, for his work on the lunar theory. He wrote largely on celestial mechanics and mathematics, and contributed to the governmental *Astronomical Papers* (especially 1882, 1890, 1891, 1895), to the *Year Book* of the Agricultural Department (1898), and to the publications of the Washington Bureau of Navigation. His most valuable work is *A New Theory of Jupiter and Saturn* (1890).

HILL, HENRY BARKER (1849—). An American chemist, son of Thomas Hill, president of Harvard (1862-68), and born at Waltham, Mass. He was educated at Harvard and the University of Berlin. He was assistant in the chemical laboratory at Harvard (1870), assistant professor (1874), full professor (1884), and director of the chemical laboratory (1894), and was elected to the National Academy of Sciences in 1883. He contributed to its *Proceedings* (1881 sqq.), to the *American Journal of Chemistry*, to Silliman's *American Journal*, and to the *Berichte der deutschen chemischen Gesellschaft* (vols. ixxxxiii.), and wrote *Notes on Qualitative Analysis* (1874).

HILL, JAMES J. (1838—). An American railway promoter, born near Guelph, Ont. He was of Scotch-Irish descent, and left his father's farm for a business career in Minnesota. In 1870 he formed the Red River Transportation Company, which was the first to open communication between Saint Paul and Winnipeg. Eight years afterwards he helped to form the syndicate which, under another name, ultimately built the Canadian Pacific Railway. From 1883 to 1893 he interested himself in the building of the Great Northern Railway, extending from Lake Superior to Puget Sound, with northern and southern branches and a direct steamship connection with China and Japan. Mr. Hill gave $500,000 toward the establishment of a Roman Catholic theological seminary in Saint Paul, Minn.

HILL, JOHN HENRY (1791-1882). An American educator, chiefly identified with teaching and missionary work in Greece. He was born in New York City, graduated at Columbia College, and was ordained a deacon in the Protestant Episcopal Church in 1830. In the same year he went as a missionary to Greece, and at Athens he and his wife established a girls' school, afterwards a school for boys, and also a high school for the training of teachers. His work at first received little encouragement, but prospered after

pupils from prominent and wealthy Greek families began to attend the school. Dr. Hill was chaplain of the British Legation in Greece from 1845 to 1875, and continued his teaching during that time. On his death, at Athens, the Greek Government, in recognition of his educational work among the women of Athens, buried him with the honors of a taxiarch, and the Athenian municipality erected a monument to his memory. Honorary degrees were conferred on him by Harvard and Columbia.

HILL, Octavia (c.1836—). An English social reformer, born in London. At an early age she began her efforts to improve the homes of the London poor. She first began this work under Frederick D. Maurice, and later, in 1864, was associated with John Ruskin. The latter advanced the money for undertaking the scheme of owning the houses and improving them or erecting new ones. She taught multitudes to help themselves, impressing upon them ideas of cleanliness, order, and self-respect. Her publications include: *Homes of the London Poor* (1875), and *Our Common Land* (1878).

HILL, Robert Thomas (1858—). An American geologist, who became connected with the United States Geological Survey in 1886. He was born at Nashville, Tenn., and in 1886 graduated at Cornell University. During his explorations on the southern borders of the United States and Mexico, and in Central America and the West Indies, he demonstrated the existence of the Lower Cretaceous formations in the United States, and proved that artesian wells might be procured over a vast area of Texas. In addition to his chief work, *Cuba and Puerto Rico, with Other Islands of the West Indies* (1898), his publications include many papers on the original relations of the Antilles, contributed to the *Proceedings* of scientific societies of which he became a member. For two years he was professor of geology at the University of Texas.

HILL, Rowland (1744-1833). An English preacher of great popularity. His father was a baronet, and he was born at Hawkstone Park, Shropshire, on the border of Wales, August 23, 1744. He graduated B.A. at Cambridge in 1769, and while there made the acquaintance of Whitefield, preached in the surrounding villages before taking orders, and conducted religious services in the houses of the sick and poor. He was appointed in 1773 to the parish of Kingston, Somersetshire, where he preached in the open air and attracted great crowds to the services which he held nearly every day of the week. Having, on the death of his father in 1780, inherited considerable property, he built for his own use Surrey Chapel, on the Blackfriars Road, London. The chapel was opened June 8, 1783. Although he now occupied a position as a dissenting minister, Hill conducted his services in accordance with the forms of the Church of England, in whose communion he always remained. His chapel soon became filled with a larger congregation than any other in London. In the summer months he made what he called 'gospel tours' into all parts of the country, sometimes extending them to Scotland and Ireland, attracting, wherever he went, crowded and interested audiences. After these tours he used to return to his duties at the Surrey Chapel, where he continued to officiate to the end of his life. He published accounts of two journeys through England and Scotland (1799 and 1800); a very popular hymn-book (1783); numerous sermons, but especially *Village Dialogues* (1801, 34th ed. 1839). He was among the founders of the Religious Tract Society and the British and Foreign Bible Society, an early and courageous defender of vaccination, and himself vaccinated thousands of persons. He wrote in favor of the practice, *Cowpock Inoculation Vindicated and Recommended from Matters of Fact* (London, 1806). He died in London, April 11, 1833. His life has been written several times: by Sidney (4th ed. London, 1844); Sherman (London, 1857); Charlesworth (London, 1879).

HILL, Rowland, Viscount (1772-1842). An English soldier, nephew of the preacher of the same name, born at Prees Hill, Shropshire. He entered the army when he was fifteen, and studied a year at Strassburg. He served under Abercrombie in Egypt (1801), and accompanied Wellesley to Portugal in 1808. Throughout the Peninsular War he showed ability second only to his chief's. In 1811 he utterly defeated the French army at Cáceres, and in 1812 he took the fortress of Almarez, thus separating the two French armies. At Vitoria, in 1813, his forces made the initial attack, and in the same year, on the Nive, he again defeated the French. He had been promoted to lieutenant-general in 1812; two years later he was created Baron Hill of Almarez and Hawkstone, and received an annual grant from Parliament of £2000. During the Hundred Days he was no less active and prominent. After a diplomatic errand to the Prince of Orange, he commanded a division in the allied army. His horse was shot under him at Waterloo, and he was so stunned that, in the thick of the fight, he was for some time lost and supposed to have been killed. Hill remained with the army of occupation in France as second in command. He was promoted general in 1825, and three years later succeeded Wellington as commander-in-chief; but in 1842 he resigned, because of failing health, and turned over the command to Wellington. He became viscount in the same year, a few months before his death.

HILL, Sir Rowland (1795-1879). The reformer of the English postal system. At twelve he became a teacher in his father's school at Birmingham, and before he reached his majority he had organized a remarkable system of discipline which came to be known as the Hazelwood method (from the name of the school). This system was described by his elder brother, Matthew Davenport Hill, in a pamphlet entitled *Public Education: Plans for the Government and Liberal Instruction of Boys in Large Numbers* (1822). The school became widely popular, and was carried on with success by the family. Rowland finally withdrew, however, partly because he recognized the defects of his scholarship, and partly because he was oppressed by the religious observances required. He thought of joining Robert Owen in his communistic schemes, but in 1833 became secretary of the commission for colonizing South Australia. From childhood he had a strong bent toward invention. About this time he devised a successful rotary printing-press; but it was not then adopted, because the Treasury demanded that each single sheet for a newspaper should be previously stamped, and

forbade the attaching of the stamps by machinery. But his great work was that of securing the adoption of penny postage. The franking privilege was widely used by members of Parliament and high officials for themselves and their friends. The great body of the people, however, sent few letters, and postage on them had to support the whole service. Rates depended upon distance, and as they were rarely prepaid, to receive a letter was often a hardship. Under this system, rates of postage were advancing and postal revenues diminishing. After making a careful study of the statistics, in 1837 Hill published a pamphlet, *Post-Office Reform*, in which he recommended a penny rate for half-ounce letters, regardless of distance, inside the United Kingdom, and the use of adhesive stamps. His plan was adopted, and in 1840 he was given an appointment in the Treasury, where, against great opposition, he was working out the system when he was dismissed by a change of Ministry. In 1846 a fund of £13,000 was raised by public subscription for him. The same year the Whigs again came into office, and he was made secretary to the Postmaster-General, and in 1854 chief secretary. In 1864 he retired on full salary, and received a Parliamentary grant of £20,000. He wrote a *History of Penny Postage*. This was published in 1880, with an introductory memoir by his nephew, Dr. G. Birkbeck Hill.

HILL, Thomas (1818-91). An American educator and Unitarian clergyman, born in New Brunswick, N. J., of English parentage. He was left an orphan when about ten years old, and in 1830 was apprenticed to a printer for a term of three years. He spent the year 1834-35 at the Lower Dublin Academy, near Philadelphia, where his eldest brother was principal, and then apprenticed himself to an apothecary in New Brunswick. In 1839 he decided to go to college, and entered Harvard the following year, in the class of 1843. His preëminence in mathematics won him an offer of a high position at the National Observatory in Washington; but he intended to go into the ministry, and, contrary to the advice of his professors, entered the divinity school, from which he graduated in 1845. For the next fourteen years he was pastor of the Unitarian Church in Waltham, Mass. In 1859 he succeeded Horace Mann as president of Antioch College. Although the college was in such financial straits that he was obliged to supplement his salary by preaching in Cincinnati, 70 miles distant, he continued his services until elected president of Harvard in 1862. The elective system and the academic council were instituted during his administration, and the lectures of the university were at this time first opened to the public. Failing health compelled him to resign in 1868. In 1871 he was elected to the Legislature. In the same year he went to South America with Louis Agassiz. On his return he accepted a call to the First Parish Church in Portland, Maine. He was a man of unusual versatility, and gained distinction in many of the pursuits in which he interested himself. He was one of the foremost natural scientists of the time, and an accomplished classical scholar, as well as a mathematician. He invented several mathematical machines, among which his occultator is of the most importance, and made valuable contributions to the knowledge of curves in simplifying their expression and in discovering new forms. Besides publishing essays, text-books, and volumes of sermons, he edited Eberty's *Stars and the Earth* (1849), and wrote *Christmas and Poems on Slavery* (1843); *Geometry and Faith* (1849); *Curvature* (1850); *Jesus the Interpreter of Nature, and Other Sermons* (1870); *Statement of the Natural Sources of Theology, with Discussion of Their Validity, and of Modern Skeptical Objections* (1877); *In the Woods and Elsewhere*, verse (1888).

HILL, Thomas (1829—). An American painter, born in Birmingham, England. He came to America in 1841. He studied in Paris under Paul Meyerheim for several months, but beyond this instruction was self-taught. His first important work was the "Yosemite Valley," which was published in chromo by Prang. His other pictures include: "White Mountain Notch;" "The Home of the Eagle;" "Donner Lake;" and the "Grand Cañon of the Sierras."

HIL'LAH, or **HEL'LA**. The capital of a sanjak in the Vilayet of Bagdad, Asiatic Turkey, situated on the Euphrates, not far from the ruins of Babylon, from which most of its building material has been taken (Map: Turkey in Asia, L 6). It is rather poorly built, but has a large number of mosques, and is a stopping-place for pilgrim caravans on the way to the holy cities of Meshhed-Ali and Meshhed-Hussein. It has some manufactures of cotton goods and woolen mantles. The population is estimated at about 10,000, largely Arabs.

HIL'LARD, George Stillman (1808-79). An American lawyer and author. He was born in Machias, Maine; graduated at Harvard in 1828; studied law and acquired an extensive legal practice in Boston. He also served in the State Legislature, and from 1866 to 1870 was United States District Attorney for Massachusetts. At earlier periods he collaborated with George Ripley in editing the *Christian Register*, a Unitarian paper, and with Charles Sumner in publishing the *Jurist*. In 1856 he bought an interest in the Boston *Courier*, and was for some time associated in its editorial management. Among his numerous works are: *Six Months in Italy* (1853); *Life and Campaigns of George B. McClellan* (1864); and, with Mrs. Ticknor, a *Life of George Ticknor* (1873). He also edited *The Poetical Works of Edmund Spenser* (5 vols., 1839).

HILLEBRAND, hĭl'le-brănt, Joseph (1788-1871). A German philosopher and historian of literature, born at Grossdüngen, near Hildesheim. He was originally a Catholic, studied at Hildesheim and at Göttingen, and in 1815 entered the priesthood and taught at Hildesheim, but resigned his position on accepting Protestant views. Upon Hegel's departure from Heidelberg in 1818, he was appointed professor of philosophy there, and in 1822 took a like position at Giessen. He was President of the Lower House of the Hessian Chamber in 1848. His most important work in the field of literary history was *Die deutsche Nationallitteratur seit dem Anfang des 18 Jahrhunderts* (3d ed. 1875). Of less importance are his philosophical works, which show tendencies toward the views of Jacobi: *Die Anthropologie als Wissenschaft* (1822-23); *Lehrbuch der theoretischen Philosophie und philosophischen Propädeutik* (1826); *Litterarästhetik* (1826); *Uni-*

versalphilosophische Prolegomena (1830); *Der Organismus der philosophischen Idee* (1842); and *Philosophie des Geistes* (1835).

HILLEBRAND, KARL (1829-84). A German historian and publicist. He was born in Giessen, and studied law there and at Heidelberg. He was imprisoned for participation in the insurrection at Baden in 1849, but escaped to France and completed his studies at the University of France and the Sorbonne. He next taught German at the Military Academy at Saint Cyr, and in 1863 was appointed professor of foreign literature at Douai. At the outbreak of the Franco-German War he went to Italy as correspondent of the London *Times* and settled at Florence. He contributed numerous articles to French, English, Italian, and German periodicals, and published many separate works, including the prize essay *Des conditions de la bonne comédie* (1863); *La Prusse contemporaine et ses institutions* (1867); *Zeiten, Völker und Menschen Gesammelte Aufsätze* (1874-85); *Geschichte Frankreichs von der Thronbesteigung Ludwig Philips bis zum Fall Napoleons III.* (1877-79); and *Lectures on German Thought During the Last Two Hundred Years* (1880). Consult Homberger, *Karl Hillebrand* (Berlin, 1884).

HILLEBRANDT, ALFRED (1853—). A German Sanskrit scholar, born at Grossnädlitz. He studied at Breslau and Munich, and became professor in the former university. His especial branch of study is Vedic mythology. *Varuna und Mitra* (1877) was a prologue to his great work *Vedische Mythologie* (1891-1902). Hillebrandt also wrote: *Das altindische Neu- und Vollmondsopfer* (1880); *Vedachrestomathie* (1885), a section on religious antiquities in Buhler's *Grundriss der indo-arischen Philologie und Altertumskunde* (1897); and *Alt-Indien, Kulturgeschichtliche, Skizzen* (1899).

HIL'LEL, HILLEL HABABLI ('the Babylonian'), or HAZZAKEN ('the elder'). A Jewish rabbi who died a few years after the beginning of the Christian Era. By birth a Babylonian, he left his home and came to Jerusalem to study the law. By doing manual labor he was enabled to support himself while attending the lectures of Shemayah and Abtalion, the president and vice-president respectively of the Sanhedrin. His progress was rapid. His solution of a difficulty which arose concerning the lawfulness of slaughtering the Paschal Lamb on the Sabbath led to his being appointed president of the Sanhedrin (B.C. 30), and he held this position till about A.D. 10. Hillel's character was gentle, patient, and peace-loving. It is Hillel to whom is ascribed the maxim, "What is hateful unto thee do not unto others." He plays an important part in the history of Jewish legal science. He introduced a set of seven rules, by which the Scriptures are to be interpreted and laws derived from them. Entirely the opposite of Hillel in character was Shammai (q.v.), the vice-president of the Sanhedrin. His teaching was marked by a strict adherence to the letter and great vigor. The difference between the leaders was continued by their followers, so that, years afterwards, we still encounter the school of Hillel and the school of Shammai. The honor and respect won by Hillel was so great that his position of president of the Sanhedrin remained in his family. (See TALMUD.)—HILLEL HANNASI ('the prince'). A descendant of the preceding, who lived about A.D. 350. He was also president of the Sanhedrin and had charge of the school at Tiberias. His great work was the arranging of the Hebrew calendar. In this he followed the system of Meton.

HIL'LER, FERDINAND (1811-85). An eminent German pianist, conductor, and composer, born at Frankfort. From early boyhood he was a student of music, his concert début taking place at ten years of age, followed two years later by the production of his first composition. His first teachers were Hofmann for the violin, Aloys Schmitt for the pianoforte, and Vollweiler for harmony and counterpoint. Later (1825) he became a pupil of Hummel at Weimar. For seven years (1828-35) he was engaged as teacher of composition at Choron's School of Music, Paris, but eventually gave up his position so that he might better equip himself as a pianist and composer. He returned to Frankfort the following year (1836), and devoted himself to composition. His abilities were recognized, and although but twenty-five, he was asked to act as conductor of the Cäcilienverein during the illness of Schelble. He had by this time attracted the notice of Rossini and Mendelssohn, the former assisting him to launch his first opera, *Romilda* (which was a failure), at Milan, and the latter obtaining for him the entrée to the Gewandhaus, and affording an opportunity for the public presentation of his oratorio *Die Zerstörung Jerusalems* (1840). After a year of study in Church music at Rome, he returned to Leipzig, and during the season of 1843-44 conducted the Gewandhaus concerts. By this time his position in the musical world was established, and honors and appointments were showered upon him. He became municipal kapellmeister of Düsseldorf in 1847, and in 1850 received a similar appointment at Cologne, in which latter city he founded the well-known Cologne Conservatory. He was conductor at the Italian Opera in Paris during the season of 1852-53. Meanwhile he had increased his reputation and prestige by his conductorship of the Gürzenich concerts and the Lower Rhine music festivals. He was elected a member of the Royal Academy of Fine Arts, Berlin, in 1849, and in 1868 received the title of doctor from the University of Bonn. As a composer Hiller ranks high, not for the magnitude and depth of his work, but for its poetry, elegance, and rhythmic melody. His compositions include operas (six), none of them of more than local significance; six cantatas, one or two of which have been popular in England, and one (*The Lorelei*) occasionally heard in America. Other works comprise pieces in every form and variety of composition. He was also a very successful lecturer and a forceful writer, his contributions to reviews and newspapers having been since collected in book form. He also published among others: *Musikalisches und Persönlisches* (1876); *Wie hören wir Musik* (1880); *Goethe's musikalisches Leben* (1880); and *Erinnerungsblätter* (1884). He died at Cologne.

HILLER, JOHANN ADAM (1728-1804). An important German dramatic composer, born at Wendisch-Ossig, near Görlitz. He was of musical parentage, and was endowed with a fine soprano voice, which obtained for him a course

of free instruction at the Görlitz Gymnasium, from which he went to the Kreuzschule at Dresden, where he became a pupil of Homilius for pianoforte and thorough-bass. Later he went to Leipzig for study at the university, and while there earned a bare existence as flutist and singer in local concerts and by private teaching. His first good fortune came with his appointment as tutor to the son of Count Brühl at Dresden, with whom he went in 1758 to Leipzig. It was during his stay here at this time that he conceived the idea of reviving the old subscription concerts, an attempt which ultimately led to the founding of the famous Gewandhaus concerts, of which he was the first conductor. From 1789 to 1801 he was music director of the Thomasschule. He also founded a singing school in 1771. To him has been given the credit of being the originator of the *Singspiel*, the beginnings of German comedy opera as distinct from the French and Italian developments. The most important of these were: *Lottchen am Hofe* (1760); *Der Teufel ist los* (1768); *Pattis, oder Das gerettete Troja* (1782). The lyrics of all his *Singspiele* were of considerable musical value, and have been long popular. Among his sacred compositions are: *A Passion Cantata; Funeral Music in Honor of Hasse;* the one hundredth Psalm; and a few symphonies. He also edited many important collections of music, and wrote considerably concerning musical topics. He was one of the most important German musical scholars and writers of the eighteenth century. He died at Leipzig.

HILLERN, Wilhelmine von (1836—). A German novelist, born at Munich, daughter of the popular dramatist Charlotte Birch-Pfeiffer. She is best remembered for her satire of blue-stockings in *Der Arzt der Seele* (1869), and for a charming tale of Freiburg-im-Breisgau in Reformation days, *Höher als die Kirche* (1876). Worthy of mention also are *Die Geier-Wally* (1873), cleverly dramatized by her in 1881, and the Black Forest sketches *Ein Blickins Weite* (1897).

HILL FORTS. Defensive positions on hills. The customs of early groups of people as to defensive locations for residence on elevations have determined the foundation of many of the most famous cities. Hill forts of various periods from the most ancient are common throughout the world, and refer to the monuments and settlements of small groups of men, both securing them from attack and forming a base for industrial occupations and forays. Rome, Athens, and Jerusalem were such hill forts. Settlements on plains or shores represent either times or localities of greater security or the weight of large bodies of men discounting attack, and they supply the means of building great artificial fortifications. The history of nearly every nation gives evidence of this period, and these forts are still found among the more primitive tribes, especially in India.

HILLHOUSE, James (1754-1832). An American legislator, born at Montville, Conn. He graduated at Yale in 1773 and practiced law. He took an active part in the war of the Revolution, and when New Haven was attacked by the English under Tryon in 1779, was captain of the Governor's Guards. He became a Federalist member of Congress in 1791, and from 1795 to 1810 was a member of the United States Senate. In 1815 he was a member of the Hartford Convention. That New Haven is known as the 'Elm City' is largely due to Senator Hillhouse, who set out with his own hands many of these trees.

HILLHOUSE, James Abraham (1789-1841). An American poet. He was born in New Haven, Conn., the son of Senator James Hillhouse, graduated at Yale in 1808, and for some time was engaged in business in New York City. After 1822 he devoted himself almost wholly to literature. His chief works are: *The Judgment: A Vision* (1812), and the dramas *Percy's Masque* (1820) and *Hadad* (1825). An edition of his works was published in two volumes in 1839. His heavy, ambitious dramas were once highly praised.

HILLIARD, hĭl'yĕrd, Francis (1806-78). An American jurist, born in Cambridge, Mass. He graduated at the Harvard Law School in 1823, and served for a time as judge, but is known principally as a writer of legal text-books. His best-known works are: *American Law of Real Property* (2d ed. 1846); *American Jurisprudence* (2d ed. 1848); *Law of Mortgages of Real and Personal Property* (1853); *Treatise on Torts* (1859); and *The Law of Injunctions* (1864).

HILLIARD, Henry Washington (1808-92). An American lawyer, born in Fayetteville, N. C. He graduated in 1826 at South Carolina College, and was admitted to the bar in 1829. From 1831 to 1834 he was a professor in the Alabama University, Tuscaloosa, and in 1838 was elected to the State Legislature. In 1842-44 he was chargé d'affaires in Belgium, and from 1845 to 1851 was a member of Congress from Alabama. He opposed the secession of the South, but subsequently accepted the posts of commissioner to Tennessee and brigadier-general in the provisional Confederate Army. From 1877 to 1881 he was United States Minister to Brazil. He published: *Roman Nights*, from the Italian (1848); *Speeches and Addresses* (1855); and *De Vane* (1865).

HILL MUSTARD. See Bunias.

HILL-MYNA (*hill* + *myna*, from Hindi *mainā*, starling). The common name, in India, of the 'grakles' of the family Eulabetidæ. These starling-like birds belong to the group called 'glossy starlings,' and especially to the genus Eulabetes. They are birds of moderate size and glossy black plumage, marked by fleshy yellow or orange wattles on the head. The shortness and squareness of the tail are noticeable. The best-known species is that of Southern India and Ceylon (*Eulabetes religiosa*), which is distinguished from the others by two long patches of bare skin on the neck; also by a white spot at the base of the wing-quills. They live in the forest and feed on small fruits. They are excellent mimics, learn easily to whistle and talk, and are not only highly prized as cage-birds in India, but are exported in large numbers. Other species are known in Northern India and eastward. See Myna.

HILL-PARTRIDGE, or **Tree-Partridge.** One of a numerous group of partridges (genus Arboriphila) which frequent elevated forested regions from the Himalayas eastward to Formosa. They are mostly of very dark colors. The plumage is alike in both sexes, and the eggs are pure white. They frequently alight on trees when flushed by dogs, but live upon the ground like

other partridges. They are favorite game birds in Northern India.

HILLSBORO, hĭlz'bŭr-ō. A city and the county-seat of Montgomery County, Ill., 61 miles northeast of Saint Louis, Mo.; on the Cleveland, Cincinnati, Chicago and Saint Louis Railroad (Map: Illinois, C 4). Among its industrial establishments are a coal-mine, flour and woolen mills, furniture and carriage factories, etc. Population, in 1900, 1937.

HILLSBORO. A village and the county-seat of Highland County, Ohio, 60 miles east of Cincinnati; the terminus of branches of the Baltimore and Ohio Southwestern and the Norfolk and Western railroads (Map: Ohio, C 7). It has a public library of 7500 volumes, and a handsome soldiers' monument of granite. The manufactures include lumber, furniture, flour, foundry products, etc. The water-works are owned by the municipality. Population, in 1890, 3620; in 1900, 4535.

HILLSBORO. A city and the county-seat of Hill County, Tex., 34 miles north of Waco; on the Saint Louis Southwestern and the Missouri, Kansas and Texas railroads (Map: Texas, F 3). It is the centre of a fertile agricultural district, with an important trade in cotton, grain, live stock, and hides, and has cotton gins and compresses, a cotton-mill, a cottonseed-oil mill, flour and planing mills, and manufactures of hosiery, garments, novelties, candy, hay-presses, etc. The water-works are owned by the municipality. Population in 1890, 2541; in 1900, 5346.

HILLSBOROUGH, hĭlz'bŭr-ō. A seaport town of Albert County, New Brunswick, Can.; on the right bank of the Petitcodiac estuary, just above its outlet into Shepody Bay, 24 miles by rail from Salisbury (Map: New Brunswick, E 4). It has manufactures of plaster, which, with mineral oil from the depleted 'Albertite' coal-mines in the neighborhood, it exports in considerable quantities to the United States. The town was founded in 1763 by a member of the Steeves family, of whom there are now 700 representatives in a population of 3000.

HILLSBOROUGH, WILLS HILL, Earl of (1718-93). A British statesman, first Marquis of Downshire, a native of Fairford, Gloucestershire. He was elected to Parliament for Warwick in 1741, and the following year succeeded his father as Lord Lieutenant of Downshire. He became a peer of Ireland in 1751, but went from the Irish to the English Privy Council (1754), George II. having made him comptroller of his household. After entering the English House of Lords (1756), he held various political appointments. While Secretary of State for the Colonies (1768), his stubbornness and bad judgment made much mischief between them and the mother country, and he showed but little more tact in advocating the union of England and Ireland. He was said to have been a model Irish landlord. At the conclusion of his first letter, Junius mentions Lord Hillsborough as one of the ministers responsible for the American crisis.

HILLSDALE. A city and the county-seat of Hillsdale County, Mich., 90 miles southwest of Detroit, on the Lake Shore and Michigan Southern Railroad (Map: Michigan, J 7). It is the centre of a fertile agricultural and stock-raising region, and manufactures fur and fur-lined overcoats, flour, window-screens and screen doors, furnaces, wooden novelties, tables, wagon-wheels, etc. The city has a beautiful private park, and south of the city limits is Baw Beese Park, a popular summer resort. Hillsdale College (Free Baptist) was established here in 1855. Hillsdale, settled about 1840, is governed under a charter of 1896, by a mayor elected annually and a unicameral council, of which the executive is a member. The city owns and operates its water-works and electric-light plant. Population, in 1890, 3915; in 1900, 4151.

HILLSTAR. Any humming-bird of the genera Diplogena and Oreotrochilus. These are among the largest of the tribe, very gay in color, and inhabit the Andes from Ecuador to Bolivia. Those of the former genus are remarkable for their brilliant crown spots. In the latter genus are many species, each of which is limited in its range to a single mountain, or very limited area of high elevation. See HUMMING-BIRD.

HILL-TIT. One of a numerous family (Leiotrichidæ) of small insect and berry eating birds, often brightly colored, which inhabit the Himalayan region and eastward. Among them is the red-billed hill-tit (*Leiothrix lutea*), which is widely dealt in as a cage-bird under the name 'Japanese robin,' though it is unknown in Japan. It has brilliant colors, a sweet song, and gentle manners.

HILMEND, hĭl'mend. See HELMUND.

HILO, hē'lō. The second town in size and the best seaport of the Hawaiian group, situated on Hilo Bay, on the eastern coast of the island of Hawaii (Map: Hawaii, F 4). It has a protected harbor with a lighthouse, and contains a court-house, a custom-house, and a library. The town is surrounded by luxuriant tropical forests, with extensive lava-fields in the vicinity. There are delightful drives, and an excellent carriage-road winds from the town up toward the crater of Kilauea. The population (district, 19,785 in 1900) is extremely heterogeneous, and the American element is prominent.

HILONGOS, or **ILONGOS,** ē-lōng'ōs. A town on the island of Leyte, Philippines, situated on the southwestern shore, 96 miles from Tacloban (Map: Philippine Islands, J 9). Population, 13,800.

HILPRECHT, hĭl'prĕkt, HERMANN VOLLRAT (1859—). An Assyriologist, born at Hohenerxleben, Germany, and educated at Bernburg and Leipzig. In 1885 he was repetent in Old Testament theology at Erlangen, and in the following year came to Philadelphia to become editor of the Oriental department of the *Sunday-School Times*. Afterwards he was appointed professor of Assyrian in the University of Pennsylvania. He studied the Assyrian inscriptions (1882) in the British Museum, traveled in Syria, Babylonia, and Asia Minor, and became an authority on cuneiform paleography, so that the Turkish Government made him head of the Babylonian department of the Imperial Museum in Constantinople. In 1888 he accompanied the University of Pennsylvania's expedition to Nippur, but returned the following year. Many of the documents found after his departure were sent to him, and in 1900 he returned to Nippur, and soon after was put in charge of the excavations, the results of which had much scientific im-

portance. (See NIPPUR.) His main works are: *Freibrief Nebuchadnezar's I.* (1883); *Assyriaca* (1894); *Old Babylonian Inscriptions, Chiefly from Nippur* (1893—); *Business Documents of Murashû Sons, of Nippur* (1898); and many contributions to the *Theologisches Litteraturblatt* and other theological and Oriental journals.

HILTED (from Eng., AS. *hilt*, Icel. *hjalt*, OHG. *helza*, hilt; probably connected ultimately with *hold*). A term used in heraldry (q.v.), to indicate the tincture of the handle of a sword.

HILTL, hĭl'tl, JOHANN GEORG (1826-78). A German actor and author, born in Berlin. After studying for the stage and acting in Hanover from 1843 to 1845, he was engaged at the Berlin Court Theatre, of which he was the manager from 1854 to 1861. His best acting was in serio-comic parts. He translated many French dramas, and wrote a series of historical novels which had considerable popularity, though they lacked permanent literary value. The best known of these are: *Gefahrvolle Wege* (1865); *Unter der roten Eminenz* (1869); *Der alte Derfflinger und seine Dragoner* (1871); *Das Roggenhauskomplott* (1873); *Die Damen von Nanzig* (1874); and *Auf immer verschwunden* (1878). His works on history are: *Der böhmische Krieg und der Mainfeldzug* (4th ed. 1873); *Der Französische Krieg von 1870-71* (7th ed. 1895); *Preussische Königsgeschichten* (1875); *Unser Fritz* (5th ed. 1891); and *Der grosse Kurfürst und seine Zeit* (3d ed. 1893).

HILTON, WILLIAM (1786-1839). An English painter, born at Lincoln. He was a pupil of Raphael Smith, the engraver, and studied in the Royal Academy, where his first work was exhibited in 1803. In 1827 he was appointed keeper of the academy. Hilton's paintings were better appreciated by men of his own profession than by the general public, and because of his over-use of asphaltum, they have lost in color. Nevertheless the following are in color and composition notable pictures: "Christ Crowned with Thorns" (1825), in South Kensington; "Sir Calepine Receiving Serena" (1831) and "Edith Discovering the Body of Harold" (1834), both in the National Gallery; "Una with the Lion," "The Crucifixion," "The Murder of the Innocents" (1838), and a portrait of Keats.

HILVERSUM, hĭl'vĕr-sŭm. A town in the Province of North Holland, Netherlands, 18 miles southeast of Amsterdam (Map: Netherlands, D 2). It contains a number of textile mills, and is a favorite summer resort for Amsterdam residents. Population, in 1889, 12,393; in 1899, 19,443.

HIMALAYA, hĭ-mä'lâ-yà (Skt., the abode of snow, from *hima*, snow + *ālaya*, abode). In South Central Asia, the most elevated and stupendous mountain system on the globe (Map: India, D 3). It is not, as sometimes represented, a single chain, but a system, consisting of several parallel and converging ranges, with a vast number of rugged, snowy peaks, separated by great elevated valleys and plateaus. On the north the system descends to the elevated plateau of Tibet; on the south to the depression drained by the Ganges and the Indus. The system starts with the Karakoum, in the Pamirs, whence it trends southeast and east, sweeping in a broad curve, convex southward. The mass of the Himalaya proper extends from the great bend of the Indus in the west to the great bend of the Brahmaputra in the east, or from longitude 73° 23′ to 95° 40′ E., a distance of nearly 1500 miles. Their average breadth is about 150 miles. The mean elevation of the range is from 16,000 to 18,000 feet, but 45 of its peaks are now known to exceed 23,000 feet in height. Of these, there are in Kumaon, Nanda Devi, 25,600 feet; in Nepal, Dhawalagiri, 26,826 feet; Mount Everest, 29,002 (the highest known point on the globe); in Kashmir, Mounts Godwin Austen, 28,278; Gusherbrum, 26,378; Masherbrum, 25,600; and Kakapushi, 25,560 feet; in Bhutan, Chumalari, 23,946 feet, and Kutha Kangir, 24,740 feet; and on the borders of Sikkim and Nepal, Kunchinginga, 28,156 feet, for a long time thought to be the second summit of the entire system. The southern base of the Himalaya comprises three distinct regions—first, adjoining the plains of Hindustan, the *Terai*, a jungle or grass-covered marshy plain; next, the great belt of *Saul Wood*, stretching along a great part of the range; and beyond it the *Dhuns*, a belt of detritus, extending to the foot of the true mountains. In the foothills above these regions, which are extremely unhealthy, are placed the sanitaria for troops—Darjeling, Simla, Murree. The first is connected by a mountain railway with the Bengal system. There are no plains and but few lakes of large size in the Himalaya; the chief of the latter are Naini Tal, in Kumaon, 6520 feet, and the lake of Kashmir, 6125 feet above the sea. Small glacial lakes are abundant in the heads of the gorges.

Snow falls at rare intervals in the mountains as low as 2500 feet, but at 6000 feet it snows every winter. The limit of perennial snow in the main or central Himalaya is 16,200 feet on the south and 17,400 feet on the north side; an anomaly probably owing to the dry atmosphere of Tibet, and the small quantity of rain and snow that falls there. The high range of the Himalaya forms a vast screen, which intercepts and condenses nearly all the moisture carried by the southwest monsoons from the Indian Ocean, and deposits it on the southern face of the mountains; hence at Cherra Punji, 4200 feet above the sea, as much as 600 inches of rain has been known to fall in one year. Glaciers are found in every part of the range above the snow-line; one of these, that of Deotal in Garhwal, is 17,945 feet above the sea. Among the largest of the glaciers are the Baltoro (33 miles in length) and Biafo, in the Karakorum Range. The passes in the Himalaya are the most elevated of the globe, and the greater number are upward of 17,000 feet in height. The highest known is Ibi-Gamin Pass into Garhwal, 20,457 feet, and the highest used for traffic is the Parang Pass in Spiti, 18,500 feet above the sea. All the passes above 16,000 feet are closed with snow from November till May. While the upheaval of the system probably commenced in early geologic times, the principal uplift occurred in the middle or late Tertiary period, in the mountain-making epoch which was signalized by the elevation of the alpine system of Europe. The geological structure of the Himalaya consist of crystalline rocks, with granite, gneiss, and a schistose formation, comprising micaceous, chloritic, and talcose schists. Earthquakes are of frequent occurrence in the central range. The Sanpo or Brahmaputra and Indus—which rise in close

proximity to one another on the Tibetan side of the Himalaya—with their magnificent tributaries, derive their chief supplies from the melting of the snows of these mountains, and consequently are in flood at the hottest season of the year, when the moisture they supply is most needed. Trees and cultivated grains ordinarily attain their highest limits in the mountains at 11,800, and shrubs at 15,200 feet above the sea, a limited number of flowering plants attaining to 19,500 feet. The tea-plant can be cultivated along the entire southern face of the Himalaya to an elevation of 5000 feet, but the best is produced at from 200 to 3000 feet above the sea. Tigers and apes are found at an elevation of 11,000, and the leopard at 13,000 feet, while the dog follows the herds over passes 18,000 feet high. Snakes are found at an elevation of 15,000 feet, but the highest limit of the mosquito is 8000 feet above the sea.

On account of the majestic height of this mountain range, and the apparent impossibility of reaching its summit, the imagination of the ancient Hindus invested it with the most mysterious properties, and connected it with the history of some of their deities. In the Purânas (q.v.) the Himalaya is placed to the south of the fabulous mountain Meru, which stands in the centre of the world (see MERU), and described as the king of mountains, who was inaugurated as such when Prithu was installed in the government of the earth. As the abode of Siva, he is the goal of penitent pilgrims, who repair to his summit in order to win the favors of this terrific god. His wife was Mena, whom the Pitris or demigods engendered by the mere power of their thought.

HIMALAYAN SUBREGION. A faunal district of the Oriental region (q.v.), also styled 'Himalo-Chinese,' because its most characteristic forms occur along the lower slopes of the Himalaya Mountains and their extension into China. See INDO-CHINESE SUBREGION.

HIMEJI, hē-mā'jē. The capital of the Japanese Province of Harina, situated in the southern part of Hondo, 34 miles by rail from Kobe and at the junction of three highways (Map: Japan, D 6). It has a well-preserved castle dating from the fourteenth century, and the second in size in Japan. Cotton and stamped leather are among the products. Population, in 1898, 35,282.

HIM'ERA (Lat., from Gk. Ἰμέρα). A city on the north coast of Sicily, founded B.C. 649 by colonists from Zancle (Messana) and exiles from Syracuse. In B.C. 481-80 the tyrant Terillus, being expelled by Theron of Agrigentum, invoked the aid of the Carthaginians. They sent a large army under Hamilcar, but were totally defeated at Himera by the Greeks under Gelon of Syracuse. Thrasydæus, son of Theron, brought a large body of Doric emigrants to the city in 476; but a few years later, after the death of Theron, Thrasydæus was driven from Agrigentum by Hiero, and Himera became free. It seems to have enjoyed great prosperity during the remainder of the fifth century, but in 409 was razed to the ground by the Carthaginians. A new city, Thermæ Himerenses, was founded in B.C. 407 close to the former site. This name was derived from the famous hot spring in which Hercules was said to have bathed. The new city remained in Carthaginian hands until it was taken by the Romans during the First Punic War. It was peculiarly favored by them, and was left a free city under its own laws. In the time of Cicero it was a flourishing town, though not very large. Under Augustus it became a colony. Ergoteles, an Olympian victor, celebrated by Pindar, was a citizen of Himera. Stesichorus the poet was a native of the city, and his statue was preserved at Thermæ in the time of Cicero. Agathocles, the great tyrant of Syracuse, was a native of Thermæ.

HIME'RIUS (Lat. from Gk. Ἱμέριος) (c.315-c.386). A Greek teacher of rhetoric. He was born at Prusa, in Bithynia, and lived for some time at Antioch at the Court of the Emperor Julian, but settled in Athens as a teacher. Among his pupils were Gregory Nazianzen and Basil the Great. He was a pagan, but did not attack Christianity. His works, of which twenty-four orations are preserved (edited by Dübner, 1849), were in a florid, artificial style. They are valuable because of references to events of the time or quotations from a more classic period, especially from the lyric poets.

HIM'EROS (Lat., from Gk. Ἵμερος). In Greek mythology, the personification of longing and desire. He is the companion of Eros and of Aphrodite.

HIMIL'CO (Phœnician, 'grace of Milkar,' Gk. Ἱμίλκων, *Himilkōn*). A Carthaginian general, son of Hanno, who commanded the expedition against Sicily, B.C. 406, and conquered the western part of that island. When Dionysius of Syracuse renewed the war, B.C. 397, Himilco again commanded the Carthaginians, at first with success, but subsequently Dionysius assaulted him when greatly disabled by pestilence, and forced him to capitulate. Himilco abandoned his allies and mercenaries to the mercy of the enemy, and paid a large gratuity for permission to withdraw with his native Carthaginians. The disgrace of this surrender so weighed upon him that soon after returning to Carthage he committed suicide.

HIMILCO, or **HIMILCAR.** An early Carthaginian navigator of uncertain date, who explored the northwest coast of Europe, at the same time that Hanno explored the west coast of Africa. Avienus has preserved some fragments of the history of this voyage, in which mention is made of the Hiberni and Albioni, and of a promontory, Œstrymnis, thought to be Cornwall, and a group of islands, Œstrymnides, thought to be the Scilly Islands.

HIMMALEH, hĭm-mä'lĕ. See HIMALAYA.

HIM'MEL, FRIEDRICH HEINRICH (1765-1814). A German musician, born at Treuenbrietzen. Friedrich Wilhelm II. became his patron and enabled him to study music with Naumann at Dresden. On his return he was made royal chamber composer. In 1794 he went to Italy to continue his studies, producing there the operas *Il primo navigatore* (1794) and *Semiramide* (1795). In the latter year he returned to Germany and became Court kapellmeister in Berlin. In 1798 he went to Russia and brought out at Saint Petersburg his opera *Alessandro*. Subsequently he traveled much throughout Europe, settling finally in Berlin. Of his many popular operas the most successful was *Fanchon, das Leiermädchen* (1804), while of his songs, "An

Alexis" and "Es kann ja nicht immer so bleiben" were best liked. He also composed much Church and instrumental music.

HIM'YARITES. A name formerly used for a people of Southwestern Arabia, the Homerites of Ptolemy. According to tradition they came from a mythical ancestor, Himyar, who lived 3000 years before Mohammed. The more correct name of the people is Sabæan, from Saba, the capital of the district. See SABÆANS; MINÆANS.

HINCKLEY, hĭnk'lĭ. A manufacturing and market town in Leicestershire, England, 13 miles southwest of Leicester (Map: England, E 4). Its chief buildings are the Gothic Church of Saint Mary, the Roman Catholic priory and Academy of Saint Peter, and a town hall. It has manufactures of cotton hosiery and boots. Hinckley stands on old Watling Street, the famous Roman road; it was created a barony soon after the Conquest, and had a castle and a Benedictine priory; its borough privileges were annulled by Edward IV. Population, in 1891, 9600; in 1901, 11,300.

HINCKLEY, THOMAS (1618-1706). Governor of Plymouth Colony from 1681, except during the administration of Sir Edmund Andros, until 1692, when Plymouth was united with Massachusetts. Of English birth, he came to the New England Colonies in 1635, and began to be active in the affairs of Plymouth in 1639, and was successively deputy, representative, and magistrate during 1645-80. In the latter year he was also Deputy Governor. Seven years before his appointment as Governor he held the office of commissioner on the central board of the Plymouth and Massachusetts Colonies, and continued in that position until the end of his governorship, and was afterwards a councilor. Governor Hinckley collected several volumes of papers which are now in the possession of the Boston Public Library.

HINCKS, EDWARD (1792-1866). An Irish Orientalist, son of Thomas Dix Hincks, the Presbyterian divine, and brother of Sir Francis Hincks, the Canadian statesman. Edward was born at Cork, and studied from 1807 to 1811 in Trinity College, Dublin. In 1825 he was appointed rector of Killyleagh, County Down, where, in spite of his seclusion, he undertook studies in hieroglyphics (1833), and wrote for the *Dublin University Magazine* and the *Journal of Sacred Literature*. Simultaneously with Rawlinson he discovered the syllabic character of the Assyrian cuneiform letters, and he had earlier written on the Egyptian hieroglyphics, and according to Brugsch was the first to decipher them correctly. He began an Assyrian grammar, but did not leave materials for its completion.

HINCKS, Sir FRANCIS (1807-85). A Canadian statesman, born at Cork. He went to Canada at the age of twenty-four, entered into business at Toronto, where he also edited the *Examiner* (1838), and became a leader among the Liberals, taking his seat in the first United Parliament in 1841. Three years afterwards, while his party was out of power, he directed the *Montreal Pilot*, and labored always for responsible government, and for the abolition of the clergy reserves and of the seigneurial system of landholding. When Hincks was made Premier of the Canadas in 1851, he negotiated a commercial treaty with the United States, and exerted himself to further the development of mines and railways; but got the country into debt, and, being accused by the Upper Canadian Protestants of favoring the Lower Canadian Roman Catholics, he gradually lost ground, and the Conservatives took the helm again in 1854. He was made Governor of Barbadoes (1855-62), and of British Guiana (1862-69), but afterwards returned to Canada, and was Minister of Finance until 1873, and edited afterwards the Montreal *Journal of Commerce*. He published: *Canada: Its Financial Position and Resources* (1849); *Reply to the Speech of Sir J. Howe on the Union of the North American Provinces* (1855); *Religious Endowments in Canada* (1869); *The Political History of Canada Between 1840 and 1855* (1877); and *The Boundaries Formerly in Dispute Between Great Britain and the United States* (1885).

HINCMAR (806-82). A celebrated churchman of the ninth century. He was born in 806, presumably in Toulouse, as he belonged to the family of the counts of that province. He was educated in the Monastery of Saint-Denis, near Paris, and was intrusted with the framing and carrying out of a plan for the reformation of the monastery. In 845 he was elected Archbishop of Rheims. In this position he had to deal with the case of the alleged heretic Gottschalk (q.v.), whom he treated with great severity. In 862 he became involved in a controversy with Pope Nicholas I. Rothadius, Bishop of Soissons and suffragan of Hincmar, deposed a priest of his diocese, who appealed to Hincmar, as metropolitan, and was ordered by him to be restored to office. Rothadius, resisting this order, and having been, in consequence, condemned and excommunicated by the Archbishop, appealed to the Pope, who ordered Hincmar to restore Rothadius, or to appear at Rome in person, or by his representative, to vindicate the sentence. Hincmar sent a legate to Rome, but refused to restore the deposed bishop; whereupon Nicholas annulled the sentence, and required that the cause should again be heard in Rome. Hincmar, after some demur, was forced to acquiesce. The cause of Rothadius was reëxamined, and he was acquitted, and restored to his see. Under the successor of Nicholas, Adrian II., a question arose as to the succession to the sovereignty of Lorraine on the death of King Lothaire, the Pope favoring the pretensions of the Emperor Louis II. in opposition to those of Charles the Bald of France. To the mandate which Adrian addressed to the subjects of Charles and to the nobles of Lorraine, accompanied by a menace of the censures of the Church, Hincmar offered a firm and persistent opposition. He was equally firm in resisting the undue extension of the royal prerogative in ecclesiastical affairs. Hincmar died at Epernay, whither he had fled from the Normans, December 21, 882. His works were collected by Sirmond (Paris, 1645), reprinted in Migne, *Patrol. Lat.*, cxxv.-cxxvi. Many others of his works are still in MSS. For his life, consult Schrörs (Freiburg, 1884).

HIND (AS., Icel. *hind*, OHG. *hinta*, Ger. *Hinde*, hind; probably connected with Goth. *hinþan*, to catch, related to AS. *huntian*, Eng. *hunt*, possibly connected with Gk. *κεμάς*, *kemas*, gazelle). The female of the red deer, a correlative of 'stag' or 'hart' (q.v.). In strict use, accord-

ing to the ancient laws and customs of venery, it did not become the designation of a female red deer until the third year of its age. Latterly the word has become, outside of England, a synonym of doe.

HIND. A fish. See GROUPER.

HIND, HENRY YOULE (1823—). A Canadian geologist, born in England. He was educated at Leipzig and at Cambridge, and went to Canada in 1846. As geologist for the Dominion Government, he explored large areas in British America and Labrador, and made a geological survey of New Brunswick. He afterwards became a professor in King's College, Nova Scotia. In 1860 he was elected a fellow of the Royal Geographical Society. He is the author of *Northwest Territory*, and of numerous reports on explorations of the British possessions in North America.

HIND, JOHN RUSSELL (1823-95). An English astronomer, born at Nottingham. When a mere boy he devoted himself to astronomy, and at the age of seventeen he was given a position in the Royal Observatory at Greenwich. In 1844 he was appointed member of the commission sent to determine the exact longitude of Valentia. On his return he was appointed observer in Bishop's Observatory, Regent's Park, London. He calculated the orbits of a number of planets and comets, noted many new variable stars and nebulæ, and discovered ten new planetoids (q.v.), viz.: Iris and Flora in 1847; Victoria in 1850; Irene in 1851; Melpomene, Fortuna, Calliope, and Thalia, in 1852; Euterpe in 1853; and Urania in 1854. In 1851 Hind received from the Academy of Science in Paris the Lalande medal, and was elected a corresponding member. In 1852 he received the gold medal of the Astronomical Society of London, and obtained a pension of £200 a year from the British Government. He was superintendent of the *Nautical Almanac* in 1857-91. His scientific papers have generally been published in the *Transactions of the Astronomical Society*, the *Comptes Rendus* of Paris, and the *Astronomische Nachrichten*. His principal popular works are: *Astronomical Vocabulary* (1852); *The Comets* (1852); *The Solar System* (1846); and *Introduction to Astronomy* (1871). He was president of the Royal Astronomical Society in 1880.

HIND AND THE PANTHER, THE. A satirical poem by John Dryden (1687). It is a defense of the Roman Catholic Church in the form of an allegory, in which all characters are represented by animals. The Hind stands for the Roman, the Panther for the Anglican Church. Perhaps the most spirited satire is that on Burnet, represented by the Buzzard.

HINDENBURG, hĭn'den-bo͝orK, KARL FRIEDRICH (1741-1808). A German mathematician, born at Dresden. Educated at Leipzig, he became docent (1771) and professor (1781) in the university there. He edited the *Magazin für reine und angewandte Mathematik*, with Bernoulli (1786-89), and the *Archiv der reinen und angewandten Mathematik* (1794-99); but he is best known as the discoverer of combinatory analysis and as author of *Kombinatorisch-analytische Abhandlungen* (1796 and 1800).

HINDLEY, hĭnd'lĭ. A town in Lancashire, England, three miles southeast of Wigan (Map: England, D 3). Coal-mining and cotton manufactures are important industries. Its chief buildings are the free grammar school and the old parish church, which was desecrated by the Cavaliers during the Puritan Revolution. The municipality operates markets and remunerative gas and water works. Population, in 1891, 19,000; in 1901, 23,500.

HINDMAN, hĭnd'man, THOMAS CARMICHAEL (1818-68). A Confederate officer in the War of Secession. He was born in Tennessee; was educated in the common schools, studied law and removed to Mississippi to practice his profession. As a lieutenant in a Mississippi regiment he took part in the Mexican War, and was a Democratic member of Congress from 1858 to 1861. He was appointed to the command of a brigade in the Confederate Army soon after the Civil War began, and first served under Gen. Simon Buckner in Kentucky. At Memphis he was in command, and was afterwards defeated at the battles of Newtonia and Prairie Grove. Promoted to be a major-general at the battle of Shiloh, he was transferred to Arkansas. After the close of the war he went to the City of Mexico, but finally returned and settled in Arkansas in 1867. The following year General Hindman was murdered by one of his former soldiers in revenge for some disciplinary act during the war.

HINDOOSTAN, hĭn'do͝o-stän'. See HINDUSTAN.

HINDU KUSH, hĭn'do͝o ko͝osh, or INDIAN CAUCASUS. A range of mountains, forming the westward continuation of the Himalaya, being sometimes reckoned a part of that colossal range (Map: Afghanistan, L 3). It extends from the Upper Indus on the east to the Bamian Pass (beyond which the continuing range is generally designated Safed-Koh) on the west, stretching in latitude between 34° and 36° N., and in longitude between 68° and 74° 30′ E., with a length of about 500 miles. Nearly the whole of it is contained in Afghanistan. The Oxus, or Amu-Darya, has its source in its northern ridges, and many tributaries of the Indus flow off from the south. For the first 100 miles west of the Pamirs, it is flat-topped, with passes ranging in altitude from 12,500 to 17,500 feet. Farther westward it becomes higher, and its plateau summit breaks up into peaks of which Tirach Mir, on the frontier of Chitral, is the loftiest, 25,400 feet in altitude. In this part are many passes over which trails or roads are in use. The range, which consists mainly of granites and schists, was probably uplifted in Tertiary time.

HINDU MUSIC. According to the ancient Hindu belief all arts were bestowed upon man by various gods, and music was the gift of Brahma. The early history of music in India is so beset with fables and reaches back to such remote antiquity that it is impossible to trace its real origin. We have, however, unmistakable evidence that several of the hymns of the *Rig-Veda* (about B.C. 1500) were intended to be sung to music. The hymns also mention flutes (*vāna*), cymbals (*karkari*), drums (*dundubhi*), and trumpets (*bakura*). Not only are the early accounts of the origin of music marked by an exuberance of the imagination, but the strictly scientific treatises on the subject of music are not free from this fault. The Hindu works on music are of uncertain date, but seem to be relatively late. Like much of Sanskrit literature, even when dealing with technical subjects, they are written in verse. They exist for the most part as

yet only in manuscript. The most important are the *Saṁgītadarpaṇa* of Damodara, the Saṁgītanārāyaṇa by Narayana, the *Saṁgītaratnākara* of Sarngadeva (edited by Telang, Poona, 1897), the *Rāgavibōdha* of Somanatha (edited by Gharpure, Poona, 1895), the *Rāgamāta* of Kshemakara and many others of less value.

The oldest scale of the Hindus, the *Vēlāvali*, consists of only five tones, F, G, A, C, D, and is identical with that of the Chinese. In the course of time two tones were added, and A was taken as the starting-point. Thus a scale identical with our A major was obtained. A scale was known as *Svaragrāma* or *Saptaka*, and the different tones were designated by the syllables *Sa, Ri, Ga, Ma, Pa, Dhai, Ni*. Each of these syllables denoted not only the fundamental tone, but was applied equally to all its chromatic alterations. Within any scale three tones were designated by special names. These were the first, third, and fifth, known as *Ansa, Graha*, and *Nyāsa* respectively. Their function is stated in the *Saṁgītanārāyaṇa:* "The note Graha stands as the beginning and Nyasa at the end of a song. Ansa is the leading note; it gives to the melody its particular character and is used the most frequently, and the other notes are subordinated to it as to a ruler." The seven tones of the scale were repeated three times in succession, and thus a compass of three *Aṣtan* or octaves was obtained. The different tones were classified as major tones, minor tones, and semitones. Each major tone consisted of four quarter tones, each minor of three quarters, and each semitone of two quarters. These subdivisions were called *śrutis*, of which each octave had 22. Major tones were the first, fourth, and fifth, minor tones the second and sixth, semitones the third and seventh. The *Rāgavibōdha* admits the possibility of no less than 960 modes, but enumerates only 36. Even out of these only 23 are recognized as having practical value. These 36 modes were divided into 6 primary called *Rāgas*, and 30 secondary modes called *Rāgiṇis*. The number of Ragas was determined by the number of seasons, which in India is six. An attempt was made to have each Raga express, as closely as possible, the character of the season to which it corresponded. It also was improper to play a Raga at any other season than the one of which it was the expression. Musical notation by means of a staff was unknown to the Hindus. The different tones were represented by their initial consonants with lines drawn above or below to indicate to which *Aṣtan* or octave the particular tone belonged. Embellishments and marks of expression were represented quite definitely by means of small circles, ellipses, chains, curves, horizontal and perpendicular lines. The end of a phrase was indicated by a lotus-flower.

Of the musical instruments the *Viṇa* (q.v.) was the principal one, and is still used to-day in India. The *Magoudi* was also a stringed instrument with four strings. Among the varied instruments the principal ones were the *Basarće*, a flute with seven holes, and the *śankha*, a kind of trumpet made from a sea-shell. From the perfection of the Vina it can easily be inferred that India was far in advance in the art of music over all other Asiatic countries of antiquity. In spite of the complicated theoretical system, composers employed chiefly the *śrīrāga*, our modern A major. The minor mode occurs also, but very seldom. In the religious cult of the Hindus music was of primary importance. Music, both vocal and instrumental, was strictly regulated by laws. The former was called *Gaṇa*, the latter *Vādya*. Pantomimes were known as *Nṛtya;* and a combination of all was designated by the term *Saṅgīta*. Consult: Jones, "On the Musical Modes of the Hindus," in *Asiatick Researches*, vol. iii. (Calcutta, 1792), reprinted in his *Works*, vol. iv. (London, 1807); Paterson, "On the Grāmas or Musical Scales of the Hindus," ib., vol. ix. (ib., 1807); Bird, *The Original Miscellany, Being a Collection of the Most Favorite Airs of Hindostan* (Calcutta, 1789); Tagore, *Hindu Music from Various Authors* (ib., 1875); Schröder, *Indiens Litteratur und Cultur* (Leipzig, 1887); Day, *The Music and Musical Instruments of Southern India and the Deccan* (London, 1891).

What strikes a student of the original Hindu melodies is the great discrepancy between musical theory and actual practice. Evidently the composers disregarded theoretical speculations and wrote according to the dictates of their ear; for all the melodies are found to be written exactly in our major or minor modes, and can be harmonized accordingly without the least difficulty.

HINDUSTAN, hĭn'dōō-stän', or **HINDOOSTAN.** The land of the Hindus. A portion of India situated north of the Vindhya Mountains in the valley of the Upper Ganges. The name has been used loosely as a designation of the Indian Peninsula. See INDIA.

HINDUSTANI (hĭn'dōō-stä'nē) **LANGUAGE AND LITERATURE.** The *lingua franca* of Northern India. This is in structure an Indian language, descended from a sister dialect of the ancient Sanskrit through mediæval Prakrit vernaculars. Hindustani is divided into nearly sixty subdialects, which in the eastern portion of its district are approximate Bengali, and in the south and west closely resemble Marathi and Gujarati. The territory of Hindustani, which is the vernacular of nearly 100,000,000 people, covers some 248,000 square miles. The standard dialect is the Brāj Bhāsha, spoken in the districts of Delhi, Agra, and Mathura. Hindustani abounds in Turkish, Arabic, and Persian words, as well as in numerous borrowings from Dravidian and Kolarian dialects. In this form it is called Urdu, which in Turkish signifies 'camp.' This term is a relic of the Mohammedan invasions of the country around Delhi in the twelfth century, when conquerors and conquered sought to find a speech which they might each understand. During the nineteenth century the vocabulary of the language was purified to a great extent of the foreign element, and the usage of native words as far as possible has since been preferred. Hindustani without these non-Indian importations is called Hindi or High Hindi.

In structure the language is analytic. In this it resembles the other modern Indian languages, as well as Persian, and in many respects English. It forms cases, tenses, etc., by postpositions, periphrases, and the like. Thus from *ghar*, 'house' (Sanskrit *grha*), is formed the genitive *ghar kā*, ablative *ghar sē*, instrumental *ghar nē*, while the plural of the same cases is *gharōn kā, gharōn sē, gharōn nē*. There are two genders, two numbers, two voices, and nine tenses in common use, e.g. *main dekhtā* 'I see,' *main dekhtā hūn* 'I am seeing,' *main dekhūngā* 'I am going to see,' *main nē*

dekhā hai 'I have seen' (lit. 'by me it has been seen'), and so forth. Hindi is written in the Devanagari alphabet, like Sanskrit and Marathi, while Urdu employs the Perso-Arabic script with three additional characters to represent specifically Indian sounds.

Hindustani literature is very abundant, although for the most part it rises little above mediocrity in character. It begins with the *Prithvirāj Rāsau*, by Chand Bardai (about A.D. 1200), who related in his long poem the history of Prithviraja II., the last Hindu King of Delhi. Much of the literature consists of translations from the Sanskrit, as well as from Persian and Arabic. The most noteworthy specimens of this particular class of work are the *Rāmāyan* of Tulsdas, begun A.D. 1575, and the *Bagh u Bahār*, "Garden and Spring," which Amman of Delhi translated from the Persian collection of stories called the "History of the Four Dervishes" at the beginning of the nineteenth century. History and the drama also find their place in this literature, which is the most important in modern India.

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HINGE (ME. *henge*, from *hengen*, secondary form of *hangen*, to hang). The pivots or joints on which doors, shutters, etc., revolve. The simplest form of hinge is a projection cut upon the substance of which the door is made, and fitted into a hole. This is sometimes done with wooden shutters, and there are examples extant of stone shutters hinged in this manner. The cathedral of Torcello, near Venice, which dates from the eleventh century, still has the windows protected with shutters formed of large slabs of stone, hinged on stone pivots. During the Middle Ages hinges, as well as every other useful article, were made subjects of ornamentation. The earliest ornamental hinges date from about the tenth century. The first examples are cramped and stiff, and the scrolls are frequently terminated with animals' heads. In the Early English and Decorated styles, the hinges and other metal-work were very elaborate and beautiful in design, and frequently extended over the whole of the doors. In the Perpendicular style, hinges were usually very simple in form, the paneling of the woodwork not admitting of much ornamental ironwork. In modern times hinges are chiefly made of brass and iron, and unless intended for decorative effect are fitted on the edges of the doors and shutters, where they are concealed. The revival of mediæval architecture has given an impulse to the manufacture of ornamental metal-work, and hinges of varied and good design are produced.

HINGHAM, hing'am. A town in Plymouth County, Mass., comprising the villages of West Hingham, South Hingham, and Hingham Centre; 17 miles southeast of Boston; on Massachusetts Bay, and on the New York, New Haven and Hartford Railroad (Map: Massachusetts, F 3). It has Derby Academy, a public library, and an old meeting-house which dates from 1681. The government is administered by town meetings. Population, in 1890, 4564; in 1900, 5059. Hingham was settled in 1633, and was known as Barecove until 1635, when it was incorporated under its present name. It was the home of Gen. Benjamin Lincoln, John A. Andrew, and John D. Long, and the birthplace of James Hall, the eminent geologist. Consult Lincoln (and others), *History of the Town of Hingham* (Cambridge, 1893).

HINK'SON, Mrs. KATHARINE (maiden name TYNAN), (1861—). An English novelist and verse-writer, born in Dublin, Ireland. She was educated at the Dominican Convent of Saint Catherine of Sienna at Drogheda, Ireland. In 1893 she married H. A. Hinkson, and took up her residence in London. She is favorably known for her verse contained in *Louise de la Vallière and Other Poems* (1885); *Shamrocks* (1887); *Cuckoo Songs* (1894); *Ballads and Lyrics* (1897); *The Wind in the Trees* (1898); and *Collected Poems* (1901). She also portrayed phases of Irish character in a series of pleasant novels, comprising chiefly: *A Cluster of Nuts*, short tales (1894); *The Way of a Maid* (1895); *O, What a Plague is Love* (1896); *The Handsome Brandons* (1898); *The Dear Irish Girl* and *She Walks in Beauty* (1899); *Three Fair Maids* and *A Daughter of the Fields* (1900); *A Girl of Galway* (1901); *The Handsome Quaker* (1902); *A King's Woman* (1902). For an appreciative estimate of Mrs. Hinkson as a poet, consult William Archer, *Poets of the Younger Generation* (New York, 1902).

HINLICHE, ên-lē'chā, 'Southern People.' A pastoral tribe of Araucania, wandering over the southern pampas of Argentina. They live in portable tents of skins and subsist entirely upon meat derived from their herds of horses, cattle, and sheep. They are skillful artificers in leather and iron, while the women make rugs of ostrich-skins and weave woolen blankets and ponchos of superior quality.

HINNOM, VALLEY OF. A ravine in or near Jerusalem. The precise location has not yet been determined. Scholars differ as to which of the three valleys, Kidron, Tyropœon, or Wady er-Rababi, is likely to have been called the Valley of Hinnom. Jewish and Arab tradition favor the first, which runs east of the temple elevation. A majority of recent investigators prefer the last, which is south of the present city. Much probability, however, seems to attach to the Tyropœon. In Enoch xxvi., the ravine over which the author marvels is evidently the Valley of Hinnom, and it is unquestionably identical with the Tyropœon, lying between Mount Zion and the western hill. Consequently a writer familiar with Jerusalem and living toward the end of the second century B.C. located the Valley of Hinnom in the Tyropœon. The chief objections are that if the city did not in preëxilic times extend beyond the Tyropœon, there ought to be some remains of walls there, and that, if the Tyropœon was within the city, the sacrifices of the first-born to Moloch would have been made in the immediate neighborhood of the Yahweh temple. But whatever the extent of the city, it is highly improbable that important sanctuaries were left

unprotected outside the walls. That Solomon should build temples to Chemosh and Moloch, the gods of the conquered Moabitish and Ammonitish dependencies, was only natural (I. Kings xi. 7). These shrines would not be far from the royal sanctuary. When even kings like Ahaz and Manasseh offered their firstborn, and questions such as those in Micah vi. 6-7 could be asked in Judah touching the expediency of making similar sacrifices to Yahweh, there is no reason to suppose that the inhabitants of Jerusalem objected to having offerings of the firstborn made to Moloch near the Yahweh temple. A later addition to I. Kings xi. 7, found in the Greek version, states that Solomon also built a temple to Ashtaroth. (See ASTARTE.) This is not improbable, but it may simply reflect the memory of the actual existence of such a sanctuary in the valley. The sites had probably been occupied long before Solomon by Canaanitish shrines. The name of the valley is quite obscure. Its full title seems to have been either "Valley of the Sons of Hinnom" or "Valley of the Son of Hinnom." The former is found in II. Kings xxiii. 10, and often in the best manuscripts of the Greek version; the latter in Joshua xv. 8 and xviii. 16, where the abbreviated form Valley of Hinnom is also found, and in II. Chron. xxviii. 3, xxxiii. 6; Jer. vii. 31-32, xix. 2-6, xxxiii. 35. Hinnom was regarded by the Greek translators as a proper name, and many modern authors take the same view. But as the name is changed in Jer. vii. 32, xix. 6, to 'Valley of Slaughter,' it probably originally suggested a pleasant meaning. It has been conjectured that the name of the divinity worshiped in the valley was *Ben Naaman*, 'pleasant son,' which may have been a descriptive title of Tammuz. Another explanation, necessitating no alteration of the consonantal text, is that *hinam* meant in this connection 'sexual enjoyment,' and that the participants in the licentious rites practiced at the shrines and in the groves of this valley were called 'sons of joy.' In the Babylonian Talmud (*Erubin*, 19 a), Hinnom is connected with the word *hinam* used in the sense of levity, licentiousness. The meaning of the root is 'to be jocund,' and the word *hinnom* should probably be connected with it. At one of the sanctuaries in this valley children were passed through the altar-fire to Moloch. It is not evident whether the phrase implies a burnt-offering or an ordeal by fire. But Josiah defiled one of the chief sanctuaries, the Taphet, later pronounced Tophet to suggest *bosheth*, 'shame.' What basis there is for the mediæval rabbinic statement that perpetual fires were kept up in this valley for consuming dead bodies of criminals and carcasses of animals, cannot be ascertained. If Tophet was at the southern end of the Tyropœon, near Siloam, this cremation of refuse would be outside the city limits. The apocalyptic expectation in the second century of a final battle between the nations and Israel outside of the holy city seems to have rested upon this feature of the surroundings. Here the enemy would be consumed, and the pious who should go up to the temple in Jerusalem on Sabbaths and at new moons would look with satisfaction upon the carcasses consumed by fire and worms (Is. lxvi. 23-24). The same idea is found in Enoch xxvii. Gradually the term *Ge Hinnom*, or Aramaized, *Gehenna*, came to be used, not of this valley in Jerusalem, but of the subterranean Tartarus to which it was the entrance; of the unseen place of final punishment of the impenitent; of the sudden destruction of both soul and body; or figuratively, of the inner condemnation of spiritual loss. On the geographical question, consult: Warren's article "Hinnom," in the Hastings *Bible Dictionary;* Conder's article "Jerusalem," in the *Encyclopædia Biblica;* George Adam Smith, *Historical Geography of the Holy Land* (London, 1897). See GEHENNA; HELL; JUDGMENT, FINAL; ESCHATOLOGY.

HINNY (Lat. *hinna, hinnus*, Gk. *ὑννος*, or *ginnus*, Gk. *γίννος*, mule from a stallion and a she-ass). The hybrid produced between a horse and a female ass. It is smaller than a mule, but the body is more bulky in proportion to the legs, and its strength is inferior. It is less valuable than the mule, although more docile. The hinny is rare. It was described by some of the earlier naturalists as a hybrid between the ox and the ass.

HINOYOSSA, hē'noi-ō̆s'sȧ, ALEXANDER D'. The director of Nieuer Amstel, a Dutch colony established on the east bank of the Delaware in 1656, and afterwards Governor of all the settlements on that river until the conquest of New Netherland by the English. Hinoyossa was born and died in Holland, and his activity in the Dutch settlements of America extended from 1656 to 1674. He came to New Amsterdam in 1656 as lieutenant in a small force of soldiers accompanying 150 Dutch emigrants, and succeeded Jacob Aldrichs as director of Nieuer Amstel in 1659. His position was a trying one on account of the conflicts of authority which were continually disturbing the colony, especially in regard to taxation. Appeals to Holland were frequent, and Hinoyossa refused to recognize the authority of Director Stuyvesant, of New Amsterdam, who had the supervision of the commissioners composing the government of the colony. As an investment the latter was not at first profitable, owing to sickness and dissension among its members; but Hinoyossa governed so vigorously and wisely that all attempts by the West India Company to secure control failed. Confident of his own ability and seeing the necessity of a single and undisputed authority, Hinoyossa went to Holland in 1663 to ask for the entire direction of all the Delaware settlements, which was finally given to him. Director Stuyvesant formally transferred his authority, and the Swedes, who had rival settlements there, after a fruitless effort to resist the change also became obedient, and accepted Hinoyossa's control. On the English conquest of New Netherland Hinoyossa returned to Holland and became a soldier in the Republican Army in the great war with Louis XIV.

HINSDALE, hĭnz'dȧl, BURKE AARON (1837-1900). An American educator. He was born in Ohio, and was educated at Hiram College, where he was a pupil of James A. Garfield. In 1861 he entered the Campbellite ministry, preaching in Cleveland and other places, and in 1866 was chosen assistant editor of the *Christian Standard*. Three years later he became professor of history and English literature in Hiram College, and from 1870 to 1882 was its president. After a few years' service as superintendent of schools at Cleveland, Ohio, he was appointed professor of the science and art of teaching in the University of Michigan in 1886. Among his publications

are: *Genuineness and Authenticity of the Gospels* (1870); *Jewish Christian Church* (1878); *Ecclesiastical Traditions* (1879); *The Republican Text-Book* (1880); *Garfield and Education* (1881); *The Old Northwest* (1888); *How to Study and Teach History* (1894); *Teaching the Language Arts* (1896); and *Horace Mann and the Common-School Revival in the United States* (1898). He also edited the *Life and Works of James A. Garfield* (2 vols., 1882-83).

HINTERLAND, hĭn'tĕr-lănt (Ger., back territory). A term that came into general use at the time of the partition of East Africa between Germany and England in 1890. The doctrine of the hinterland is the claim of German diplomats that when a power takes possession of a strip of seacoast, its rights extend inland indefinitely, or until its territory reaches the recognized boundary of some other power.

HINTON. A city and the county-seat of Summers County, W. Va., 100 miles southeast of Charleston; on the New River, and on the Chesapeake and Ohio Railroad (Map: West Virginia, C 4). It is a railroad division headquarters with repair-shops, etc., and has also sawmills and other industrial establishments. Population, in 1890, 2570; in 1900, 3763.

HINTON, James (1822-75). An English aurist and metaphysician, born at Reading. He received his education at the Hospital of Saint Bartholomew, and began to practice in London about 1850 as an ear specialist. Besides lecturing upon his chosen subject in Guy's Hospital, from 1862 to 1874, he published: *Man and His Dwelling-Place* (1859); *Life in Nature* (1862); and *The Mystery of Pain* (1865). Two of his books upon similar subjects were issued posthumously. Ellice Hopkins edited his *Life and Letters* (1878).

HINZPETER, hĭnts'pā'tĕr, Georg Ernst (1827—). A German educator, born at Bielefeld, where he taught after his university course at Halle and Berlin. The Crown Prince's tutor, Hinzpeter became a privy councilor and member of several governmental boards after Wilhelm II. came to the throne, strongly influenced the Emperor's educational policy, and in 1890 was prominent in the Berlin Conference on Higher Education. He wrote *Kaiser Wilhelm II.* (9th ed. 1889).

HIOGO, hyō'gō, or **FIOGO.** A part of the Japanese town of Kobe (q.v.).

HIONG-NU, hyông'nōō'. By this name the Chinese chroniclers designate a people of Turkish or Tatar race who, some two centuries B.C., founded a powerful kingdom in Central Asia, conquered Turkestan, and made inroads into China. The kingdom of the Hiong-Nu lasted until the middle of the first century A.D., when it split into two sections, of which the northern soon disappeared from history. Some identify the Huns with the Hiong-Nu. The Chinese account of this people was published (in translation) in the *Journal of the Anthropological Institute* (London) for 1874. Many ethnologists see in the Hiong-Nu the ancestors of the Turks.

HIOUEN-THSANG, hē-wĕn-tsäng'. A celebrated Chinese Buddhist traveler, who visited 110 places of India in the first half of the seventh century (629-645), and gave an account of the condition of Buddhism at that period in India. His interests being chiefly religious, he did not enter much into details concerning the social and political condition of India. His narrative, however, gives many curious facts which he observed, and, possessing a high degree of trustworthiness, is one of the most important documents for the history of India at that time. Apparently he traveled alone, or with a few occasional companions, and wore the garb of a religious mendicant. It does not appear that the account of his travels was written by himself. The first of the two works relating to them is a biographical notice of him, in which his travels form a principal feature; it was composed by two of his pupils, Hoei-li and Yen-Thsong. The latter bears the title of *Ta-thang-si-yu-ki*, or "Memoirs of the Countries of the West, published under the Thang," and was edited by Pien-ki. Both works have been published in a French translation by the Chinese scholar M. Stanislaus Julien in his *Histoire de la vie de Hiuen-Thsang* (1853), and his *Mémoires sur les contrées occidentales, par Hiuen-Thsang* (1857-58). For his biography, consult Beal, *Life of Hiuen-Tsaing* (London, 1888).

HIP-JOINT. A ball-and-socket joint, formed by the reception of the globular head of the thigh-bone (or femur) into the deep pit or cup in the *os innominatum*, which is known as the *acetabulum* (so called from its resemblance to the vinegar cups used by the Romans). If the variety of the movements of this joint—viz., flexion, extension, abduction, adduction, and rotation inward and outward—and at the same time its great strength are considered, it may well claim to be regarded as the most perfect joint in the whole body.

The ligaments are usually described as five in number: (1) The capsular; (2) the ilio-femoral; (3) the teres or round; (4) the cotyloid; and (5) the transverse. The capsular ligament extends from the edge of the cup to the circumference of the neck upon which the ball is carried, inclosing the bony parts in a strong sheath. The ilio-femoral, or Y-ligament, is merely an accessory band of fibres which give increased thickness to the capsular ligament in front, where strength is specially required. The great use of the capsular ligament is to limit the extension of the hip-joint, and thus to give steadiness to the erect posture. The only other ligament requiring notice is the teres, or round ligament, which is in reality triangular rather than round, and has its apex attached to the head of the thigh-bone, while its base is connected with the cavity of the acetabulum. Its use is not very clearly known, but probably is to support and protect vessels giving blood-supply to the head of the bone. It is sometimes absent in cases in which no special weakness of the joint was observed during life, and is of by no means constant occurrence in mammals. The joint is much strengthened by a large number of surrounding muscles, some of which are of considerable power.

In such a joint as this, although the ligaments materially assist in preventing dislocation, it is obvious that the articular surfaces cannot, under ordinary circumstances, be kept in apposition by them, inasmuch as they must be loose in their whole circumference, to permit of the general movements of the joint. The experiments of Weber have shown that atmospheric pressure is

the real power by which the head of the femur is retained in the acetabulum when the muscles are at rest.

DISEASE OF THE HIP-JOINT. Hip-disease differs in so many points of importance from other joint-diseases, and is so serious an affection that it requires a special notice. Its connection with the scrofulous or strumous diathesis is more distinctly marked than that of most other joint-diseases, and it almost always occurs before the age of puberty. It is essentially a tubercular inflammation of the hip-joint. Its beginning may be often associated with some trivial occurrence, such as over-exertion in a long walk, a sprain in jumping, or a fall.

In the early stage of the disease, the whole of the structures of the joint are inflamed, and by proper treatment at this period the morbid action may be sometimes subdued without any worse consequences than a more or less rigid joint. Usually, however, abscesses form around the joint, and often communicate with its interior; and the acetabulum, and the head and neck of the thigh-bone, become disintegrated, softened, and roughened. In a still more advanced stage, dislocation of the head of the thigh-bone commonly occurs, either from the capsular ligaments becoming more or less destroyed, and the head of the bone being drawn out of its cavity by the action of the surrounding muscles, or from a fungous mass sprouting up from the bottom of the cavity, and pushing the head of the bone before it. It is of extreme importance that the symptoms should be detected in an early stage of the disease, and surgical aid at once be sought.

As the disease advances, abscesses, as already mentioned, occur around the joint, which sometimes, from the tension they exert on the obturator nerve, occasion extreme pain in the inside of the thigh. True shortening of the limb now takes place, which at the same time becomes adducted and inverted. From this stage, if the general health is good, the patient may be so fortunate as to recover with an anchylosed (or immovable) hip-joint; but occasionally a condition of exhaustion comes on, the tubercular process exhibits itself in the lungs and elsewhere, and death finally supervenes from the prolonged septic processes. The duration of the disease may vary from two or three months to ten or more years. The essential factor in the treatment of these cases is complete immobilization of the joint for a protracted period by means of plaster splints or rigid metal braces. With this must be combined nourishing food, fresh air, and sunlight, with general exercise of the body as early as is practicable.

HIPPARCHUS, hĭp-pär'kŭs (Lat., from Gk. Ἵππαρχος) (fl. between B.C. 161 and 126). A Greek astronomer and mathematician. He was born in Nicæa, Bithynia, but his astronomical work was done on the island of Rhodes, and possibly also in Alexandria. Of his personal history nothing is known. He was the founder of genuinely scientific astronomy, and also of a part of that science which lies on the border-land of astronomy and geometry, viz., trigonometry. In this field he computed a table of chords, which, although lost, is known to us through the works of Theon of Alexandria (q.v.), who wrote about A.D. 365. It is probable, too, that this is the Hipparchus who wrote on combinatory analysis, and that the Arabs were correct in attributing to him a knowledge of the quadratic equation. Certain it is that Ptolemy was indebted to him for much of the *Almagest* (q.v.). According to Fabricius, Hipparchus wrote nine separate works; but of these only the *Commentary on Aratus* has come down to us. From the *Almagest* we learn that it was Hipparchus who first discovered the precession of the equinoxes, determined the place of the equinox among the stars, invented solar and lunar theories, invented the astrolabe (q.v.), and drew up a catalogue of upward of 1000 stars, determining the longitude and latitude of each (this catalogue has been preserved in the *Almagest*). As Ptolemy was also an astronomer, there is some difficulty in allotting to each his meed of praise for the discoveries mentioned in the *Almagest*, which difficulty has given rise to some discussion. Consult: Delambre, *Histoire de l'astronomie ancienne* (Paris, 1817); Berger, *Die geographischen Fragmente des Hipparch* (Leipzig, 1870); Wolf, *Geschichte der Astronomie* (Munich, 1877).

HIPPARCHUS (c.555-514 B.C.). The son and one of the successors of Pisistratus, tyrant of Athens. On the death of Pisistratus (B.C. 527), Hipparchus and his older brother, Hippias, kept the government of Athens in their hands. Hipparchus interested himself in art and literature, as his father had done. He was murdered by Harmodius and Aristogiton in 514, at the Panathenæa, probably in revenge for a personal insult, though the Greeks of the next century commonly considered the murderers as patriots and saviors of their country.

HIPPA'RION (Neo-Lat., from Gk. ἱππάριον, pony, diminutive of ἵππος, *hippos*, horse). A fossil horse, somewhat smaller than the Asiatic ass, remains of which have been found in Upper Miocene rocks of North America and in the Pliocene deposits of North Africa, Asia, and Europe. See HORSE, FOSSIL.

HIP'PEL, THEODOR GOTTLIEB VON (1741-96). A German humorist and satirist, born at Königsberg. After traveling in Russia, he settled in his birthplace as tutor and student of law, and in 1786 became Privy Councilor of War and president of the town. He published: *Ueber die Ehe* (1774, edited by Brenning, 1872); *Ueber die bürgerliche Verbesserung der Weiber* (1792); *Lebensläufe nach aufsteigender Linie, nebst Beilagen A. B. C.* (1778-81, edited by Ottingen, 1883); and *Ueber weibliche Bildung* (1801). In these works he attempted to express and popularize the philosophy of Kant's *Kritik*, then unpublished. Of a more satiric and political nature are: *Zimmermann I. und Friedrich II., von Johann Heinrich Friedrich Quittenbaum Bildschnitzer in Hannover* (1790), and *Kreuz und Querzüge des Ritters A. bis Z.* His other works include some hymns: the idyllic *Handzeichnungen nach der Natur* (1790); the drama *Der Mann nach der Uhr* (2d ed. 1771); and *Ueber das Königsberger Stapelrecht* (1791). His collected works were published at Berlin in fourteen volumes (1827-38). Consult his autobiography (Gotha, 1801).

HIP'PIAS (Lat., from Gk. Ἱππίας) (?-c.490 B.C.). A tyrant of Athens, son of Pisistratus, upon whose death (B.C. 527) he assumed the government in conjunction with his brother Hipparchus. According to Thucydides, the government of the brothers was conducted on the same

principle as that of their father, and many distinguished poets, including Simonides of Ceos and Anacreon of Teos, lived at Athens under their patronage. After the assassination of Hipparchus, in B.C. 514, Hippias seized the reins of government alone, and avenged the death of his brother by imposing extraordinary taxes, selling offices, and putting to death all of whom he entertained the least suspicion. At length, however, his despotism was overthrown. The Delphic oracle was bribed to enjoin the Lacedæmonians to free Athens from the Pisistratidæ, and after one or two unsuccessful attempts the tyrant's old enemies, the Alcmæonidæ, to whom Megacles belonged, supported by a Spartan force under Cleomenes, defeated Hippias in the field, captured his children, and compelled him and all his relatives to leave Attica (B.C. 510). As soon as they had departed, a decree was passed condemning the tyrant and his family to perpetual banishment, and a monument commemorative of their crimes and oppression was erected in the Acropolis. After spending some time at Sigeum, Hippias went to the Court of Darius, and incited the first war of the Persians against the European Greeks. He accompanied the expedition sent under Datis and Artaphernes, and persuaded the Persians to land at Marathon. It cannot be determined whether he was killed during the battle or whether he died at Lemnos on his return.

HIPPIAS OF E'LIS (c.460 B.C.-?). A Greek mathematician, writer, diplomat, and philosopher. He was a teacher of renown, a man of great pretense, but a scholar of little originality. His teaching, for which his pupils were compelled to pay heavily, was directed to the practical end of success in a worldly way, to display, and to ability in public address. It is probable that he is the Hippias mentioned by Proclus (on the authority of Geminus) as the inventor of the quadratrix, a curve originally designed, it is thought, for dividing an arc in a given ratio, but which also lends itself readily to the quadrature of the circle. (See QUADRATURE.) This curve, however, usually bears the name of Dinostratus, since he studied it with so much care.

HIPPIDIUM. An extinct ancestor of the horse. See HORSE, FOSSIL.

HIP'PO (Lat., from Gk. Ἵππων, *Hippōn*), or HIPPO REGIUS. A Phœnician colony in North Africa, later a favorite residence of Masinissa, King of Numidia, of which the scanty ruins are yet to be seen, near Bona, Algeria. Hippo was a flourishing trading city under the Roman rule, and in later years the see of Saint Augustine, who died here in A.D. 430, just before the destruction of the city by the Vandals.

HIP'POBOS'CIDÆ (Neo-Lat. nom. pl., from Gk. ἱπποβοσκός, *hippoboskos*, feeding horses, feeding on horses, from ἵππος, *hippos*, horse + βόσκειν, *boskein*, to feed). A strange and important family of dipterous insects which are parasitic upon birds and mammals, and which are popularly known by the name of 'bird-ticks.' This is misleading, since they are not ticks, and are not confined to birds, although the adults live and move quickly about among the feathers and hair of birds and mammals. Unlike most other external parasites of the higher animals, many of them possess wings, although they are otherwise modified as the result of their parasitic life. Their development is very abnormal, and differs from that of all other insects. The eggs hatch and the larvæ develop within the mother, and are extruded only when ready to transform to pupæ. *Hippobosca equina* is a winged species which occurs on the horse, and is known in England as the 'forest fly.' *Melophagus ovinus* is a wingless form, and occurs on the sheep. One of the commonest of the North American species is *Olfersia Americana*, which is found upon certain birds, like the horned owl, certain hawks, and the ruffed grouse. The species of the genus Lipoptena may, while still winged, live on birds, but afterwards they lose their wings, and are then found on mammals.

HIP'POCAM'PUS. See SEA-HORSE.

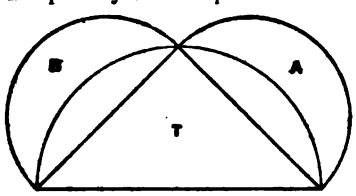
HIP'POCRAS (from Fr. *hippocras*, *hypocras*, from Lat. *Hippocrates*, Gk. Ἱπποκράτης, *Hippokratēs*, a famous Greek physician). An aromatic medicated cordial, formerly much used in Great Britain. It was made of spiced wine, mixed with sugar, lemon, aromatic tincture, or other ingredients.

HIPPOC'RATES (Lat., from Gk. Ἱπποκράτης, *Hippokratēs*) (c.460-357 B.C.). A Greek physician, the most celebrated of antiquity, and justly called 'the father of medicine.' He was the son of Heraclides, also a physician, and belonged to the family of the Asclepiadæ, being either the nineteenth or seventeenth in descent from Æsculapius. His mother, Phænarete, was said to be descended from Hercules. He was born in the island of Cos. He is said to have been instructed in medicine by his father and by Herodicus, and in philosophy by Georgias of Leontini, the sophist, and Democritus of Abdera, whom he afterwards cured of insanity. After spending some time in traveling through different parts of Greece, he settled and practiced his profession at Cos, and finally died at Larissa, in Thessaly. He is said to have passed the age of a hundred. We know little more of his personal history than that he was highly esteemed as a physician and an author, and that he raised the medical school of Cos to a very high reputation. His works were studied and quoted by Plato. Various stories are recorded of him by Greek writers, which are undoubtedly fabulous; and legends regarding him are found in the works of Arabic writers, who term him Bukrat, while the European story-tellers of the Middle Ages celebrate him under the name of Ypocras. The works bearing the name of Hippocrates, and termed the Hippocratic collection, are 72 in number, and include many treatises by his sons, Thessalus and Draco, by his son-in-law, Polybus, and by others. The following are considered authentic: *Epidemics; Regimen in Acute Diseases on Air, Water, and Places; On Wounds of the Head;* parts of the *Aphorisms;* and parts of the *Prognostics;* the work on *Ancient Medicines; Joints; Fractures; The Use of the Lever; Law; Ulcers; Hæmorrhoids; The Sacred Disease; Fistulæ;* and *On the Duty of the Physician*, as well as the *Oath.* Hippocrates divides the causes of disease into two principal classes—the first consisting of the influence of seasons, climates, water, situation, etc., and the second of more personal causes, such as the food and exercise of the individual patient. His belief in the influence which different climates exert on the human constitution is very strongly expressed. He

ascribes to this influence both the conformation of the body and the disposition of the mind, and hence accounts for the difference between the Greek and the Asiatic. The four fluids or humors of the body (blood, phlegm, yellow bile, and black bile) were regarded by him as the primary seats of disease; health was the result of the due combination (or crasis) of these, and illness was the consequence of a disturbance of this case. When a disease was proceeding favorably, these humors underwent a certain change (or *coction*), which was the sign of returning health, as preparing the way for the expulsion of morbid matter, or *crisis*, these crises having a tendency to occur at definite periods, which were hence called 'critical days.' His treatment of diseases was cautious, and what we now term expectant; it consisted chiefly and solely in attention to diet and regimen. Thus he was the inventor of the humoral pathology, so long in vogue in medical schools. He must be judged by the standards of his day. A most careful and keen observer and exact chronicler of symptoms, he was also possessor of a remarkable mental equipment and a man of great nobility and morality.

The works of Hippocrates were translated at an early period into Arabic. They were first printed in a Latin translation in 1525 at Rome, Galen's commentaries on his works being of special value. The first Greek edition (the Aldine) appeared the following year at Venice; an edition by Mercurialis appeared in 1588, one by Foesius in 1595, and one by Van der Linden (still much esteemed) in 1665. An edition under the editorship of Kuhn appeared in three volumes at Leipzig, in 1825-27. The best French edition is that of Littré, in 10 volumes, the first of which appeared in 1839, and the last in 1861. An excellent English translation of *The Genuine Works of Hippocrates* was published in 1849 in 2 vols. by Dr. Adams.

HIPPOCRATES OF CHIOS, kī'ŏs (c.450 B.C.). A Greek geometer, possibly related to the family of the celebrated physician. His early life was devoted to maritime commerce, and the seizure of a vessel by the Athenian customs called him (c.430) to Athens to obtain redress. Failing in his mission, he betook himself to the study of philosophy and to teaching geometry. He wrote the first elementary text-book on geometry, but is known especially for the quadrature of certain



LUNES OF HIPPOCRATES.

figures which are commonly called the lunes of Hippocrates. This is the first known instance of the quadrature of a curvilinear figure. One of the propositions in its simplest form asserts that if semicircles be described upon the three sides of an isosceles triangle, as shown in the accompanying figure, the area of the triangle equals the sum of the areas of the lunes—i.e. $T = A + B = 2A$. It is easily proved that $T = A + B$ even if the triangle is not isosceles. These propositions on the lunes are further interesting as being the oldest extant specimens of geometric proofs by reasoning.

Hippocrates also attempted the problem of duplicating the cube, and reduced it to that of finding two means between one line and another of double its length. He is also credited by Proclus with inventing the process of geometric reduction, consisting in passing from one proposition to another, which being mastered, the one proposed necessarily follows.

HIPPOCRATIC FACE. See FACIES.

HIPPOCRATIC OATH. An oath taken by young men in the early days on entering upon the practice of medicine. In ancient times the oath was ascribed to Hippocrates, and is probably authentic. It runs as follows: "I swear by Apollo, the physician, by Æsculapius, by Hygieia, Panacea, and all the gods and goddesses, that according to my ability and judgment I will keep this oath and stipulation: to reckon him who teaches me this art equally dear with my parents; to share my substance with him and to relieve his necessities if required; to look upon his offspring upon the same footing as my own brothers; and to teach them this art if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and by every other mode of instruction I will impart a knowledge of this art to my own sons, to those of my teachers, and to disciples bound by a stipulation and oath, according to the law of medicine, but to no others. I will follow that system of regimen which, according to my best judgment, I consider best for my patients, and abstain from whatever is injurious. I will give no deadly medicine to any one if asked, nor suggest any such counsel. Furthermore, I will not give to a woman an instrument to procure abortion. With purity and holiness will I pass my life and practice my art. I will not cut a person who is suffering with stone, but will leave this to be done by those who are practitioners of such work. Into whatever houses I enter I will go for the advantage of the sick, and will abstain from every voluntary act of mischief and corruption, and, further, from the seduction of females or males, bond or free. Whatever in connection with my professional practice, or not in connection with it, I may see or hear, I will not divulge, holding that all such things should be kept secret. While I continue to keep this oath inviolate, may it be granted to me to enjoy life and the practice of my art, respected always by all men; but should I break through and violate this oath, may the reverse be my lot." It is said that a similar oath was used in the Middle Ages, after the discontinuance of the use of the Hippocratic oath. Some medical colleges of to-day impose a simpler obligation in the form of an admonition and an affirmation, to which the graduating class assents.

HIPPOCRENE, hĭp'pō-krē'nē (Lat., from Gk. Ἱπποκρήνη, *Hippokrēnē*, from ἵππος, *hippos*, horse + κρήνη, *krēnē*, spring). A fountain on Mount Helicon, about 20 stadia above the Grove of the Muses, and, according to the mythical account, produced by a stroke from the hoof of the horse Pegasus (q.v.). It was sacred to the Muses. It is probably to be identified with the *Krȳopēgadi* ('cold spring'), on the north side of the southeast peak of Mount Helicon. See HELICON.

HIPPODAMIA, hĭp'pō-dā-mĭ'ȧ (Lat., from Gk. Ἱπποδάμεια). Daughter of Œnomaus, King of Pisa, in Elis, and the pleiad Sterope. As an oracle had declared that Œnomaus should be killed by his son-in-law, the King required that each suitor should engage in a chariot-race. The suitor with Hippodamia in his chariot was allowed so much time as Œnomaus needed for a sacrifice to Poseidon. As his horses were a gift of the god, the King always caught the luckless suitor, whom he slew in passing with his spear. Pelops bribed Myrtilus, the King's charioteer, to weaken the linch-pin, and Œnomaus was dragged to death by his own horses. After his victory Pelops threw Myrtilus into the sea, and was cursed by the drowning man for his faithlessness. Hippodamia became the wife of Pelops and the mother of Atreus and Thyestes. She afterwards induced them to murder their half-brother, Chrysippus, and then fled to Midea, in Argolis, where she died. Her body was brought by Pelops to Olympia and interred in the sacred inclosure of the Altis, where she was worshiped in later times. The preparations for the chariot-race formed the subject of the sculptures in the east pediment of the great temple at Olympia, and Hippodamia appears not infrequently on vases.

Hippodamia was also the name of the wife of Pirithous, at whose wedding the conflict occurred between the Centaurs and Lapithæ (q.v.).

HIP'PODROME (Lat. *hippodromus*, from Gk. ἱπποδρομος, race-course, from ἱππος, *hippos*, horse + δρόμος, *dromos*, course, from δραμεῖν, *dramein*, to run). The Greek name for the place set apart for horse and chariot races. The dimensions seem to have varied at different places. In construction and all important points of arrangement it was the counterpart of the Roman circus (q.v.). The dimensions (at Olympia) have recently come to light in a Greek MS. in Constantinople. The total circuit was eight stadia (about .95 mile), but the length of the actual race-course was only six. It is also said that pairs of colts made three circuits, pairs of grown horses or four colts made eight rounds, and the four-horse chariots twelve. As this would make the latter race cover about eight and a half miles, some modern scholars believe that not the circuit, but merely the length of the hippodrome, is meant, and that therefore the length of the contests should be reduced one-half. A race of over eight miles must have been a contest of endurance rather than of speed. The breadth at Olympia was about 350 feet. At Olympia the starting was effected by means of the *aphesis*, a system of stalls arranged along the two sides of a triangle, the apex of which was to the right of the centre line, and apparently so arranged that the distances from the turning-point to the angles at the base of the triangle were equal. The start was effected by setting free the chariots on the extreme right and left, and when they came abreast of the next two, by setting them free also, and so on till all were in motion. The number of starters seems at times to have been very large, as Pindar speaks of 41 chariots as competing at the Pythian games, and Alcibiades alone sent seven chariots to Olympia. The golden age of the hippodrome was during the Byzantine Empire. The blue and green factions in the hippodrome carried their animosity into all departments of the public service, and the Nika riots in Constantinople threatened to dethrone Justinian. The site of the great hippodrome at Constantinople is still called Atoneidan (the horse-place) by the Turks, and the line of the central barrier is marked by the obelisk of Theodosius, the bronze serpents that supported the Platæan tripod, and the column erected by Constantine VII. Consult: Lehndorff, *Hippodromos* (Berlin, 1876); Pollack, *Hippodromica* (Leipzig, 1890); Wernicke and Schöne, in *Jahrbuch des archäologischen Instituts*, ix. (Berlin, 1894) and xii. (ib., 1897); and especially the elaborate article by A. Martin, "Hippodromos," in Daremberg and Saglio, *Dictionnaire des antiquités* (Paris, 1897).

HIP'POGRIFF, or **HIP'POGRYPH** (from Gk. ἵππος, *hippos*, horse + Lat. *gryphus*, griffin, from Gk. γρύψ, *gryps*, from γρυπός, *grypos*, hook-nosed). A fabulous animal, represented as a winged horse, with the head of a griffin.

HIPPOL'ITA. (1) The Queen of the Amazons and the betrothed of Theseus, in Shakespeare's *Midsummer Night's Dream*. In *The Two Noble Kinsmen* she appears as Theseus's wife. (2) A merchant's daughter, the heroine of Wycherley's *Gentleman Dancing Master*.

HIPPOL'YTUS (Lat., from Gk. Ἱππόλυτος). In Greek legend, the son of Theseus (q.v.) and the Amazon Antiope or Hippolyte, a mighty hunter and devoted servant of Artemis, but a despiser of Aphrodite, who wreaked a terrible vengeance on him. Brought up in Troezen, he was first seen by his stepmother Phædra when a young man. She fell in love with him, and when he repulsed her advances committed suicide, leaving a letter to Theseus accusing Hippolytus of an attempt upon her virtue. Theseus besought his father, Poseidon, to avenge him, and Poseidon sent a sea monster, who frightened the horses of Hippolytus so that they ran away and dragged him to his death. Hippolytus was worshiped at Troezen. One version told how Artemis persuaded Asclepius to restore her favorite to life, and this led the Romans to identify him with the deity Virbius of Aricia. The story is best known to us through the *Hippolytus* of Euripides, which has been imitated by Seneca in his *Hippolytus* and by Racine in his *Phèdre*. Consult: Euripides, *Hippolytos*, edited by Wilamowitz-Möllendorf (Berlin, 1891); Kalkmann, *De Hippolyto Euripidis* (Bonn, 1882). On the numerous representations, especially on sarcophagi, consult: Kalkmann, "Ueber Darstellungen der Hippolytos-Sage," in the *Archäologische Zeitung* (Berlin, 1883); Robert, *Antike Sarkophagreliefs*, ii. (Berlin, 1902).

HIPPOLYTUS. The name of several saints and martyrs of the early Church, of whom the most interesting flourished in the early part of the third century. Although a very prominent man in his day, the known facts of his life are few. He was of Greek ancestry and possibly born in Rome, became a presbyter of Rome under Bishop Zephyrinus (198-217), and attracted attention by his great learning. He headed a party in opposition to Zephyrinus, and especially to his successor Calixtus, and was chosen by it their bishop. But as his opposition was probably mostly personal and on questions of policy, when Urban I. succeeded Calixtus, he was reconciled with the Roman Church. However, in 235 he went into exile to Sardinia with Pontianus, Urban's successor, and died there. He

is a saint in the Roman calendar, and his day is August 13th. He was a voluminous author, but his works are now known only by fragments. Of these the most interesting is the so-called *Philosophoumena*, formerly attributed to Origen, but now thought to be the first book of a work by Hippolytus, *The Refutation of All the Heresies*. A manuscript giving books iv.-x., previously unknown, was discovered at Mount Athos in 1842. In them Hippolytus gave personal details which threw new light upon his life. It was first printed in its entirety by Emmanuel Miller (Oxford, 1851), who, however, attributed it to Origen. Baron Bunsen was the first (1852) to assign it to Hippolytus. Hippolytus's works are given in Migne, *Patrol. Græca*, x., and much better by Bonwetsch and Archelis (Leipzig, 1897 sqq.); they are translated in *Ante-Nicene Fathers*, v. Consult Neumann, *Hippolytus von Rom in seiner Stellung zu Staat und Welt* (Leipzig, 1901).

HIPPOMANE, hĭp-pŏm'ā-nē. See MANCHINEEL.

HIPPOM'EDON (Lat., from Gk. Ἱππομέδων). In Greek mythology, the son of Aristomachus of Argos, and one of the seven leaders in the expedition against Thebes in which he was killed by Ismarus.

HIPPOM'ENES (Lat., from Gk. Ἱππομένης). The son of Magareus and descendant of Poseidon. He was the lover of the Bœotian damsel Atalanta, and won her, with Aphrodite's help, by surpassing her in the foot-race in which all suitors were obliged to take part. See ATALANTA.

HIPPO'NAX (Lat., from Gk. Ἱππῶναξ). A Greek poet of the sixth century B.C.; after Archilochus and Simonides, the third of the great iambic poets of Greece. Expelled from Ephesus about B.C. 542 by the tyrant Athenagoras, he took refuge in Clazomenæ. There his deformed figure and malicious disposition exposed him to the caricature of the Chian sculptors Bupalus and Athenis; but he revenged himself by issuing against them a series of such bitter satires that tradition says they hanged themselves. These are in thought and execution inferior to the similar works of his predecessor, Archilochus. His coarseness of thought and feeling, his rude vocabulary, his want of charm and taste, and his numerous allusions to matters of merely local interest, make him a unique figure in Greek literature. He invented epic parody, and the four opening lines of a parody on the *Iliad* have been preserved in *Athenæus* (p. 698f.). He also invented the choliambic or Hipponactean measure, in which a trochee or spondee is substituted for the final iambus in an iambic trimeter. The fragments of his poems are edited by Bergk, *Poetæ Lyrici Græci*, vol. ii. (Leipzig, 1882).

HIPPOPH'AGY (from Gk. ἱπποφάγος, *hippophagos*, horse-eating, from ἵππος, *hippos*, horse + φαγεῖν, *phagein*, to eat). The eating of horse-flesh. That semi-civilized nations eat horse-flesh is well known. In Spain a banquet comprising roasted horse-flesh among the viands is given at the present day.

In 1855 and 1856 there was a good deal of discussion in Paris relative to the formal introduction of horse-flesh into the meat-markets, and some of the more enthusiastic advocates of the plan formed themselves into a society. French skill was exercised abundantly in disguising the somewhat coarse taste and odor of horse-flesh.

In 1866 there was official recognition of the introduction of this kind of food into the market, under such restrictions as were deemed suitable. The prefect of the Seine issued an ordinance in June of that year, recognizing horse-flesh as human food, establishing special slaughter-houses or abattoirs for slaying horses under specific regulations. The animals were to be killed by those specially appointed in presence of a veterinary inspector, who was also to stamp or seal every joint of meat after inspection. All restaurateurs who used horse-flesh were to acquaint their customers with the fact. During the French International Exhibition of 1867 some of the humbler restaurants of Paris made great use of horse-flesh; and during the siege of Paris, in 1870-71, horse-flesh was extensively used as food. At the present time the eating of horse-flesh is not at all uncommon in European countries. It is very largely employed in the manufacture of sausages, and in Paris alone there are at least 193 places where the meat of horses, mules, and donkeys is for sale. The objection to the use of good horse-flesh for food is wholly sentimental, and its cheap price, six to ten cents per pound, is of great advantage for the poorer classes.

HIP'POPOT'AMUS (Lat., from Gk. ἱπποπόταμος, *hippopotamos*, river-horse, from ἵππος, *hippos*, horse + ποταμός, *potamos*, river). A huge, thick-skinned, almost aquatic, kind of mammal of tropical Africa, two living and many fossil species of which constitute the family Hippopotamidæ. This family is closely allied to the swine, and it would be more nearly accurate to call them 'river-hogs' rather than 'river-horses.' They differ from the swine and peccaries, however, in having a broad rounded muzzle, with the nostrils superior and no trace of a terminal disk (see SWINE); in having all the toes touch the ground and nearly equal in size; in the continual growth of the lower incisor teeth; and in other anatomical details. The family seems always to have been confined to the Old World; but remains of various species have been found in the Upper Tertiary rocks of Burma and Algeria, and others, nearer the modern type, in the Pliocene and later formations of India and of Southern Europe. Within the historic period, at least, the hippopotami have been restricted to Africa (unless one may believe, from biblical references to the 'behemoth' (q.v.), that it has inhabited Palestine since the origin of tradition), where it seems to have occupied all the larger lakes and rivers until locally exterminated by man. Anciently it possessed the whole Nile, and was killed by the early Egyptians by means of harpoons; but for centuries none have been seen below the cataracts. When white settlements began at the Cape of Good Hope, 'hippos' lived in the most southern of African rivers, but gradually disappeared, until now the upper Limpopo marks the southern boundary of their habitat. They are likely to die out of the East African rivers speedily, but the endless marshes of the upper Nile and its tributaries, and the vast swamps and waterways of the Congo basin, will preserve the animal indefinitely. These remarks refer to the familiar species (*Hippopotamus amphibius*), in addition to which there exists on the Guinea coast a second species (*Hippopotamus Liberien-*

sis), a pygmy in size and more swine-like in habits.

THE COMMON HIPPOPOTAMUS. This is, next to the elephant, the bulkiest of land mammals. Old males are from 12 to 14 or more feet long, stand nearly four feet high at the shoulder, and weigh about four tons. The body is elongated, barrel-shaped, and the belly nearly touches the ground, while the swollen, ugly head seems too heavy even for the massive neck, and the animals, when out of the water, usually rest the chin upon each other or some support. The body is carried upon short pig-like legs, having four toes upon each foot, each covered with a round, black hoof, and resting flat upon the ground, but connected by webs. The skin is two inches thick in some places, is spongy, like that of a walrus, rough, warty, and covered with a network of fine wrinkles, and it varies in color in the male from dark leather-brown to bluish gray, more or less spotted. The females usually are of lighter tint, and both sexes are lighter on the belly. The skin is naked except for the bristles on the muzzle, and a few tufts of short hair upon the sides of the head and neck, and on the ears and tail. It contains a great quantity of an oily substance which exudes from the pores; and under excitement this flows out copiously and is tinctured with blood, producing the 'bloody sweat' for which this beast is famous. The tail is short and laterally compressed.

HABITS AND FOOD. The hippopotamus is most at home in the water, and aquatic vegetation is its natural fare. To this its organization has become particularly adapted. It swims well, makes long excursions, sometimes into open water, and even goes some distance out into the salt estuaries of rivers. It is able to dive quickly, but its ordinary method of submergence is quietly to sink to the bottom, where it is said that it may walk about, browsing, for several minutes. To this end not only its nostrils, but its small ears are closed by sphincter muscles, keeping out the water; and its infolded lips prevent an inrush of water in feeding. The nostrils and eyes are so high that it need only expose an unnoticeable fraction of the face in order to breathe and look about, while its entire body is safely hidden beneath the surface. The peculiar dentition and digestive organs have reference to this manner of life, and to a diet of coarse herbage. The enormous mouth, which may open to the extent of four feet, is furnished with numerous ivory-capped grinders, and with powerful rooting and biting teeth in front. The larger teeth are

SKULL AND TEETH OF HIPPOPOTAMUS.

the tusks or canines, which are curved backward, and have their ends obliquely leveled off by mutual attrition. These tusks and the incisor teeth continue to grow during the life of the animal, and their points turn downward. In this respect these teeth differ from the pig's, which form roots.

The hippopotamus cuts grass or corn as if it were done with a scythe, or bites with its strong teeth a stem of considerable thickness neatly through; it also tears up the marsh growth by means of its great tusks. Its food consists chiefly of the plants which grow in shallow waters and about the margins of lakes and rivers; and probably it renders no unimportant service in preventing slow streams from being choked up by the luxuriance of tropical vegetation. It often, however, leaves the water, chiefly by night, to feed on the banks, and makes inroads on cultivated fields, devouring and trampling the crops. As great quantities of such fare must be consumed in order to obtain sufficient nutrition, the hippopotamus now possesses an enormous stomach, the axial length of which is eleven feet, while the greater curvature measures fifteen feet. It fills nearly the entire length of the body, and is divided into three distinct compartments, of which the third is cylindrical, with the pylorus almost in the pelvis. It is mainly in this third compartment that assimilation occurs.

These beasts are gregarious; herds of a dozen or twenty gather where food is plentiful, and they seem to remain in one locality all their lives unless much disturbed. During the day they lie hidden, usually asleep, on some marshy islet, and betray their presence, if at all, by their snorting, coughing, or grunting, which in anger becomes a hoarse roar. It is at night that they are most active, feed most, and leave the water to graze on shore or invade neighboring fields of millet and the like. Their excursions sometimes extend seven or eight miles in a night, and regular paths are trodden through the waterside jungle, in which the negroes dig pits or arrange deadfalls for the capture of the animal. Usually only one offspring is born annually, after a gestation of 7½ months. The mother takes it into the water immediately, but, as it is unable to swim, supports it upon her neck until it learns how to take care of itself; she also protects it most assiduously, not only from crocodiles and other enemies, but from the rage of the males, who will kill infants unless prevented. The young nurse under water, and continue to grow for five years, after which they may live twenty-five or more years.

Though the brain of this animal is very small and its life a dull one, it is by no means stupid. It quickly learns, when much hunted, not to expose itself, nor to indulge in a whale-like snort when it rises to breathe. Its scent apparently is very keen, and its vigilance great. Captives learn the names and faces, voices and customs of their keepers, and exhibit much general intelligence. They are naturally very timid, yet curious, and subject to fits of panic or rage. Hence small boats are always endangered by going near them; and even large steamboats have been attacked. A wounded or enraged hippopotamus is regarded by sportsmen as perhaps the most dangerous beast to be encountered. Pure malice seems frequently to dictate their actions. The natives more often get them by strategy than by bold attack. The negroes eat the flesh and fat, and make some use of the hide. By white men the animals are shot mainly for sport and near the coast for the sake of the hide, out of which coverings for handles (shrunk on), bull-whips, and polishing wheels are made; also for the

ivory of the great canine teeth, which sometimes exceed 30 inches in length; but this ivory is not as much valued now as it was early in the nineteenth century, when it was in demand for the making of artificial teeth.

THE PYGMY OR LIBERIAN HIPPOPOTAMUS. Concerning this small species not much is known. It appears to be restricted to the Guinea coast, and to be much less aquatic than its large relative. It wanders and seeks its food in swampy woods, after the manner of a pig, but never gathers in herds. It is about 5½ feet long, 2½ feet tall, and weighs about 400 pounds. In color it is bluish black along the back, paling gradually to greenish white on the ventral parts. The fact that it has only one pair of incisor teeth, instead of two, in the lower jaw, led Leidy to classify it in a separate genus (Chæropsis).

FOSSILS. Remains of the hippopotamus have been found in the Pliocene and Pleistocene deposits of India, Burma, Algeria, and Europe. Hippopotami roamed in herds over England not very long before the period of the earliest human occupation, and the remains of individuals of all sizes have been found in the gravels near Cambridge. Remains of dwarf species, associated with those of dwarf elephants, are found in the cave and fissure deposits of the islands of Sicily and Malta. No remains of fossil hippopotami have yet been found in America.

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See Plate of TAPIRS AND HIPPOPOTAMUS; and Colored Plate of PACHYDERMS.

HIP'PO RE'GIUS. See HIPPO.

HIPPOTH'OON (Lat., from Gk. Ἱπποθόων), The hero of the Attic tribe Hippothoontis. He was the son of Poseidon and Alope, the daughter of Cercyon of Eleusis, and was exposed as a newborn infant, but was suckled by a mare and brought up by shepherds. When Theseus overcame and killed Cercyon, he transferred the government to Hippothoon.

HIPPU'RIC ACID (from Gk. ἵππος, *hippos*, horse + οὖρον, *ouron*, urine), $C_9H_9NO_3$. A compound of great interest, both to the chemist and to the physiologist. It derives its name from its having been first discovered in the urine of the horse, and that fluid, or the renal secretion of the cow, affords us the best and readiest means of obtaining it. The fresh urine is boiled with a slight excess of milk of lime and filtered; the filtrate is evaporated to a small volume, cooled, and acidified with hydrochloric acid, when hippuric acid separates out in the form of fine needle-like crystals. When obtained by a process of slow crystallization, the crystals of hippuric acid are moderately large, at first colorless, but subsequently becoming milk-white, four-sided prisms, which are devoid of odor, but have a faintly bitter taste. They dissolve readily in boiling water and in spirit, but are only sparingly soluble in cold water and in ether. Its chemical name is benzoyl-amido-acetic acid, $C_6H_5CO.NH.CH_2COOH$, and it may be prepared artificially from benzoic acid, C_6H_5COOH, and glycin, NH_2CH_2COOH. When boiled with strong mineral acids, hippuric acid takes up water and splits up again into its chemical components, benzoic acid and glycin. It is a normal constituent of the urine of the horse, cow, sheep, goat, hare, elephant, etc., and most probably is to be found in the urine of all vegetable feeders. In normal human urine, if the food is an ordinary mixed diet it occurs in very small quantity, but is increased by an exclusively vegetable diet, and in the well-known disease diabetes. Although hippuric acid usually occurs in mere traces in human urine, we can artificially produce it at will in the body, and cause it to be eliminated in comparatively large quantity. If we swallow benzoic acid, it seems to take up the elements of glycin in its passage through the system, and thus to form hippuric acid, which appears abundantly in the urine. Hippuric acid is formed in the animal body not only from benzoic acid itself, but from any substance (e.g. kinic acid) that may be readily transformed into benzoic acid. Some such substances are contained in grass, hay, and in many berries, and are also found among the products of the putrefaction of proteids, especially those of vegetable origin. In carnivora the formation of hippuric acid has been shown to take place chiefly in the kidneys; in the herbivora, however, benzoic acid is largely transformed into hippuric acid even if the kidneys have been removed. In birds the ingestion of benzoic acid causes the formation not of hippuric, but of œnanthylic acid. The hippuric acid which occurs in the animal organism exists in combination with bases, chiefly as hippurate of soda and hippurate of lime. The last-named salt can be obtained by the mere evaporation of the urine of the horse.

HIPPURITES, hĭp'pû-rī'tēz (Neo-Lat. nom. pl., from Gk. ἵππουρις, *hippouris*, horse-tailed, from ἵππος, *hippos*, horse + οὐρά, *oura*, tail). A remarkable fossil pelecypod in which one valve is a greatly elongated cone and the other a flattened lid. The lower conical valve was attached to the sea bottom by its apex. The upper lid-like valve is provided on its lower surface with elongated processes that project downward into pits in the cavity of the lower valve, and act as levers to raise the lid. Hippurites shells are exceedingly abundant in the shallow-water deposits of the Middle and Upper Cretaceous in the Mediterranean region of Europe. See RUDISTÆ.

HIPURINA, ē-pōō'rē-nä'. A cannibal tribe of the middle Purus of Western Brazil, one of the most warlike on the river, and estimated at perhaps 2500 souls. They live in long, low houses built of converging poles, and use poisoned arrows with heads notched so as to break off in the wound. They wear only the breech-cloth, but are clean and self-respecting.

HIRADO, hē-rä'dō (in old books FIRANDO). An island in the northwest of the entrance to the Bay of Omura, off the coast of Hizen, Japan, with a capital of the same name containing 10,600 inhabitants. It was made famous in the sixteenth century as the place of welcome to the Portuguese (the first foreigners to visit Japan), and later, in 1600, to the Dutch, and in 1609 to

the English. From 1609 to 1611 the English, and from 1609 to 1640 the Dutch had a trading station here, the latter in 1640 being transferred to the little artificial island of Deshima at Nagasaki. Consult *The Diary of Richard Cocks*, Hakluyt Society (London, 1883).

HI'RAM (perhaps an abbreviation of *Ahiram*, brother of the High One, or, Ahi (a god?) is exalted). (1) King of Tyre. He is represented as David's friend and ally, and assisted him in the building of his palace by contributions of timber and labor (II. Sam. v. 11; I. Chron. xiv. 1). Upon Solomon's accession Hiram sent cedar and other timber and skilled workmen for the building of the temple, in return for which Solomon paid a yearly tribute (I. Kings v. 1-12). The two kings remained constant friends, and Hiram supplied Solomon with a navy (I. Kings ix. 26-28; x. 22). Hiram waged a successful war against Cyprus, and fortified the island of Tyre. The question has been raised whether the same King of Tyre could have been the contemporary of both David and Solomon, both of whom had long reigns. If we assume, however, that David undertook his building operations during the latter part of his reign, there is no reasonable ground for doubt; though it is, of course, possible that, for David's reign, we should substitute the name of Abibaal, the father of Hiram. (2) According to I. Kings vii. 13, seq., a Tyrian artificer who was sent by Hiram, the King of Tyre, to assist in the building of Solomon's temple.

HIRAM COLLEGE. An institution of learning at Hiram, Ohio, founded in 1850 as the Eclectic Institute. It became a college in 1870, and had in 1902 366 students, of whom 162 were enrolled in the college, 135 in the preparatory department, 60 in music, and 9 in oratory. The library contains about 6000 volumes. The value of the college property is $275,000; and the annual income $13,000.

HI'REN. A prostitute in Peele's play *The Turkish Mahomet and Hiren, the Fair Greek*, and in William Barksteed's poem *Hiren, the Fair Greek* (1611). The character became proverbial among Elizabethan dramatists.

HIRING. A contract by which one employs, for a limited time, another's property or labor for some consideration or reward. See BAILMENT; also such titles as AGENT; CARRIER; CHARTER PARTY; LEASE; MASTER AND SERVANT; SHIPPING. Where the thing hired is land or houses, see LANDLORD AND TENANT.

HIRLAS HORN, THE. A long, blue, silver-rimmed drinking-horn, mentioned in a Welsh poem of the same name, written by Owain, Prince of Powys, in the twelfth century. Owain drains it to the health of his assembled chiefs on the night after a battle, as the exploits of each are rehearsed.

HIRN, ẽrn, GUSTAVE ADOLPHE (1815-90). A French physicist, born at Logelbach, near Colmar. When he was nineteen he entered his grandfather's cotton factory as chemist; afterwards he acted as engineer, and began his valuable researches on mechanics, and especially on calorics. He was made a member of the French Academy of Science in 1867; in 1880 founded a meteorological observatory near Colmar; and later devoted himself to astronomy. Hirn was educated in the shop, and his works are marked by much practical criticism of mere academic theory. They include: *Théorie mécanique de la chaleur* (3d ed. 1875-76); *Analyse de l'univers* (1869); *Mémoire sur les anneaux de Saturne* (1872); *Les pandynamomètres* (1876); *Etude sur une classe particulière de tourbillons* (1878); *Recherches expérimentales sur les relations entre la résistance de l'air et sa température* (1882); *La vie future et la science moderne* (1882); and *Constitution de l'espace céleste* (1889).

HIROSAKI, hē'rō-sä'kē. A town of Japan, situated in the northern part of Nippon, 22 miles by rail from Asmori (Map: Japan, G 3). It contains ruins of an old castle and a museum. The chief product is lacquered ware. Population, in 1898, 34,771.

HIROSHIMA, hē'rō-shē'mȧ. The capital of the Japanese Province of Aki and of the Prefecture of Hiroshima, situated at the southwestern end of Hondo, about three miles inland (Map: Japan, C 6). It lies in a beautiful region at the foot of a hill, and contains a number of fine temples, a park, and tea-houses. Opposite the city is situated the sacred island of Miyajima or Itsukushima, with its celebrated Shinto temple. Commercially, Hiroshima is considered the most important place west of Kobe, and forms the centre of the trade in lacquered ware, bronze, and other objects of art. Population, in 1898, 122,306.

HIRPINI, hẽr-pī'nī (from Sabine *hirpus*, wolf). A people of ancient Italy, who inhabited the southern portion of Samnium. They have been considered by some authorities as merely a Samnite tribe, while by others they are looked upon as an independent nation. The country they inhabited was the wild and mountainous district traversed by the Sabatus, Calor, and Tamarus, tributaries of the Vulturnus, and on the east side of the Apennine ridge by the upper course of the Aufidus. In the early history of Rome the Hirpini are found identifying themselves with their Samnite neighbors against their common foes. They seem to have been subdued in the early part of the third century B.C., as in B.C. 268 Beneventum, the key of all their military positions, was colonized by Roman settlers. In the Second Punic War, revolting from their conquerors, they joined the Carthaginian invaders, and though they were unable to recapture their stronghold of Beneventum, they remained faithful to Hannibal till the defeat of Hasdrubal at the Metaurus restored the empire of Italy to his opponents. In the year of that event the Hirpini made peace with their old masters by betraying into their hands the garrisons of their allies. From this time till the outbreak of the Social War, the Hirpini seem to have continued steadfast in their allegiance. On that occasion, however, they set the example of revolt to the allies, and might have become formidable enemies had not the rapid successes of Sulla induced them to repair their error by a complete submission. At the close of this war the Hirpini obtained the franchise, and do not again appear in history as an independent people.

HIRSCH, hẽrsh, AUGUST (1817-94). A German physician, born at Danzig, where he practiced after studying at Berlin and Leipzig. In recognition of his studies on malarial fever and his work, *Handbuch der historisch-geographischen Pathologie* (2d ed. 1881-83), he

was in 1863 made professor at Berlin. In 1873 he was a member of the German Cholera Commission, studied the conditions of Posen and West Prussia, and published a valuable report (1874). He studied the plague in Astrakhan in 1879 and 1880, and in the latter year wrote a report to his Government. His more important writings are: *Die Meningitis Cerebro-spinalis Epidemica* (1866); *Geschichte der Augenheilkunde* (1877); *Geschichte der medizinischen Wissenschaften in Deutschland* (1893); a revision of Hecker's collected writings, under the title *Die grossen Volkskrankheiten des Mittelalters* (1865). He edited *Biographisches Lexikon der hervorragenden Aerzte aller Zeiten und Völker* (1884-88); and with Virchow the *Jahresbericht über die Fortschritte und Leistungen der Medizin* (1866 et seq.).

HIRSCH, Carl (1858—). A German composer, born at Wemding, Bavaria. When only eighteen he became a teacher in the Violin-Makers' School at Mittenwald, and from that time on held many important positions, among them: church music-director at Munich (1885-87); music-director at Mannheim (1887-92); at Cologne (1892-93); at Elberfeld (1893—); and director of the Gesangschule, the Liedertafel, the Philharmonic concerts at Elberfeld. But it is as a composer that Hirsch is best known, his *a-cappella* choruses, which are very numerous, and his cantatas being widely known and used. Of the latter *Die Krone im Rhein* and *Landsknechtsleben* are representative. His songs and ballads are scarcely inferior to his male choruses.

HIRSCH, Emil Gustav (1852—). An American rabbi, born in Luxemburg, the son of a prominent Jewish theologian who in 1866 became minister of the Reformed Congregation in Philadelphia. He studied at the University of Pennsylvania, and in 1872 went to Berlin for post-graduate work. He was rabbi in Baltimore (1877), and in Louisville, Ky. (1878-80), but did his greatest work in Chicago, whither he went in 1880 as minister of the Sinai Congregation. He took some part in politics as a member of the Republican Party; was president of the Chicago Public Library Board (1888-97); and in 1892 became professor of rabbinical literature in the University of Chicago. From 1880 to 1887 he edited the Milwaukee *Zeitgeist*, and then undertook the editorial charge of the *Reform Advocate*. As a lecturer and writer he is closely connected with advanced Judaism and with philanthropy.

HIRSCH, Jenny (1829-1902). A German author and reformer, born at Zerbst, where she was a tutor for several years. She went to Berlin in 1860; wrote for the *Bazar*, under the pseudonym J. N. Heynrichs, until 1864; and about that time became interested in woman's rights and female education. A member of the Women's Congress of 1865 at Leipzig, and for many years a leader in the Lette-Verein, she edited *Der Frauenanwalt* (1870-82); and, with Lina Morgenstern, *Deutsche Hausfrauenzeitung* (1887-92); with Mary Wall wrote *Haus und Gesellschaft in England* (1878); in 1881 published *Fürstin Frau Mutter*, and after it many other tales. Among them are the following titles: *Die Erben* (1889); *Vermisst* (1894); *Löwenfelde* (1896); *Der Amtmann von Rapshagen* (1890); *Schuldig* (1899); and *Camilla Feinberg* (1901). Under the title *Hörigkeit der Frau* (3d ed. 1891), she translated into German Mill's *Subjection of Woman*, and wrote a *Geschichte der 25jährigen Wirksamkeit des Lette-Vereins* (1892).

HIRSCH, Joseph (1836-1901). A French engineer, of Jewish family, born at Lyons. Educated there, at the Ecole Polytechnique and the Ecole des Ponts et Chaussées, he worked on the canal at Sarrebourg (1866), and there invented the Mittersheim siphon for the automatic control of reservoirs. From 1876 to 1898 he was professor of steam machinery at the Ecole des Ponts et Chaussées, and from 1886 until his death at the Conservatoire des Arts et Métiers. He contributed to the *Annales* of the former school; as member of the juries of award at the Exposition of 1878 and 1889 and as president of the jury of 1900, he wrote valuable reports and lectured on the machinery exhibited at these expositions; and was the author of many treatises on machinery, including *Théorie des machines aéro-thermiques* (1874-75). His contributions to Lechalas's *Encyclopédie* should also be mentioned.

HIRSCH, Maurice, Baron de (Maurice de Hirsch de Gereuth) (1831-96). An Austrian Jewish financier and philanthropist. He inherited his father's wealth in 1869, and greatly increased his fortunes by his marriage to the daughter of the senior partner of the banking firm of Bischoffsheim and Goldsmid, Brussels, with whom he had become associated. He also made large sums by building railways in Rumania and Turkey. His fortune was estimated at $200,000,000, and his income at from $15,000,000 to $20,000,000 a year. He gave to charity about $100,000,000 during his life, and the Baroness de Hirsch, on her death in 1899, bequeathed about $15,000,000 to charities. These benefactions were chiefly for the alleviation of the condition of the Jews. He gave not less than $50,000,000 to the Jewish Colonization Association, by which colonies were established in the Argentine Republic. He endowed the Galician schools with $5,000,000, and in 1888 offered $10,000,000 to the Russian Government for schools, provided no distinctions of race or religion should be made in its distribution. His offer was declined. He gave $2,500,000 to establish a fund in New York for educating and Americanizing Russian and Rumanian Jews. The sum of $1,200,000 was added to this fund by the Baroness.

HIRSCH, Max (1832—). A German political economist and politician, born at Halberstadt, in Prussian Saxony. He studied political economy and jurisprudence at the universities of Tübingen, Heidelberg, and Berlin, and then traveled through France and North Africa. As the result of his observations during these travels he published: *Skizze der volkswirtschaftlichen Zustände in Algerien* (1857), and *Reise in das Innere von Algerien, durch die Kabylie und Sahara* (1862). After a later journey through England and Scotland he returned home to organize trades unions among his countrymen. These soon spread all over Germany and through them and their organ, *Der Gewerkverein*, he wielded great influence. He was several times a member of the Reichstag, and was the leading spirit in a number of societies for the benefit of the laboring classes. His publications include: *Was bezwecken die Gewerkvereine?* (15th ed. 1891)

and *Das Invaliditäts- und Altersversicherungsgesetz* (3d ed. 1890).

HIRSCHBERG, hêrsh'bĕrk. A manufacturing town in the Prussian Province of Silesia, situated at the foot of a mountain, 30 miles southwest of Liegnitz (Map: Prussia, F 3). The town is ancient, and is still girt about by a double line of walls. Its Protestant church, a Gothic edifice, is known for its magnitude and its excellent organ. Hirschberg has manufactures of linen, lace, machinery, paper, metal, and tobacco. The town was founded at the beginning of the eleventh century. Population, in 1890, 16,200; in 1900, 17,865, mostly Protestants.

HIRSCHFELD, hêrsh'fĕlt, GUSTAV (1847-95). A German archæologist, born at Pyritz, in Pomerania. He was educated at Tübingen, Leipzig, and Berlin, and was sent by the Prussian Archæological Institute in 1870 to Greece, Italy, and Asia Minor. From 1875 to 1877 he had charge of the excavations at Olympia, and in 1882 traveled again in Asia Minor. He was appointed professor of archæology at Königsberg in 1878. Besides many articles in the archæological journals he wrote: *Tituli Statuariorum Sculptorumque Græcorum* (1871); *Athena und Marsyas* (1872); *Paphlagonische Felsengräber* (1885); *Berichte über alte Geographie* (1885); *Die Felsenreliefs in Kleinasien und das Volk der Hittiter* (1887); *Griechische Inschriften des Britischen Museums* (1893); and contributed to the first two volumes of *Ausgrabungen zu Olympia* (1877-78). *Aus dem Orient* was posthumously published (1897).

HIRSCHFELD, OTTO (1843—). An eminent German classical philologist and historian, born at Königsberg. After having taught at Göttingen, Prague, and Vienna, he was in 1885 appointed to the chair of ancient history in the University of Berlin. Of his historical writings the most important is his *Untersuchungen auf dem Gebiete der römischen Verwaltungsgeschichte* (1876). He rendered especial service to classical learning as editor of Latin inscriptions: *Inscriptiones Galliæ Narbonensis Latinæ* (1888); supplement to the *Corpus Inscriptionum Latinarum*, vol. iii. (ib., 1893); *Inscriptiones Aquitaniæ et Lugdunensis* (1899).

HIRT, HERMAN (1865—). A German philologist. He was born at Magdeburg, wrote on German metres (*Untersuchungen zur westgermanischen Verskunst*, 1889), edited *Schopenhauer Parerga* (1890), and then devoting himself to Indo-Germanic philology made special studies on accent, writing *Indogermanische Accent* (1895) and *Der indogerm. Ablaut, vornehmlich in seinem Verhältnis zur Betonung* (1900). Hirt, who became professor at Leipzig, made valuable contributions to Burgmann and Streitberg's *Indogermanische Forschungen* on the morphology of case endings. In 1902, he published *Handbuch der griechen Laut- und Formenlehre*, the first volume of a series of Indo-Germanic text-books of which he is editor.

HIRTH, hêrt, FRIEDRICH (1845—). A German-American Chinese scholar, born at Gräfentonna. He was educated at the universities of Leipzig, Berlin, and Greifswald (Ph.D., 1869), and from 1870 to 1897 was in the Chinese maritime customs service. In 1902 he was appointed to the professorship of Chinese in Columbia University (New York City). A collection of Chinese manuscripts and printed books made by him is in the Royal Library at Berlin, and another of porcelains of considerable historical importance in the Gotha Museum. As an investigator he conducted researches in Chinese literature by imitation of the methods of classical philology. His chief publications include: *China and the Roman Orient: Researches Into Their Ancient and Mediæval Relations as Represented in Old Chinese Records* (1885); *Ancient Porcelain: A Study in Chinese Mediæval Industry and Trade* (1888); *Text-Book of Documentary Chinese* (2 vols., 1885-88); *Chinesische Studien* (vol. i., 1890); *Ueber fremde Einflüsse in der chinesischen Kunst* (1896); and many papers on subjects connected with Chinese literature.

HIRTIUS, hĕr'shĭ-ŭs, AULUS (B.C. 90-43). A personal friend of Julius Cæsar, under whom he served in Gaul, and who in B.C. 46 nominated him as one of the ten prætors. After the death of Cæsar he became consul, declared against Antony, and headed a reënforcement for Octavius. While leading an assault on Mutina (Modena) he was killed. It is said that he was the author of the eighth book of Cæsar's *Commentaries on the Gallic War*.

HIRUDO, hĭ-rōō'dō, HIRUDINEA. See LEECH.

HI'RUNDIN'IDÆ (Neo-Lat. nom. pl., from *hirundo*, swallow). The swallow family. See SWALLOW.

HIRZEL, hĕr'tsĕl, SALOMON (1804-77). A German publisher and an authority on Goethe. He was born in Zürich, worked in the firm of Weidmann in Leipzig until 1853, and then with his brother-in-law, Karl Reimer, founded an independent publishing house, which brought out Freytag's works, Grimm's *Wörterbuch*, and the publications of the Saxon Academy, the Jablonowski Association, and the Prussian archives. Hirzel made a valuable collection of Zwingliana, which he left to the University of Strassburg. His library on Goethe was willed to Leipzig University. Hirzel wrote: *Der junge Goethe, 1764-76* (with an introduction by Bernays, 1875), and *Verzeichnis einer Goethe-Bibliothek* (1874).

HIS, hês, WILHELM (1831—). A German anatomist. He was born in Basel, studied medicine there, in Berlin, Würzburg, and Vienna, and was professor at Basel (1857-72) and at Leipzig. His earlier researches were histological; afterwards he devoted himself to anatomy and, in a less degree, to embryology. He edited with Braune the *Zeitschrift für Anatomie und Entwicklungsgeschichte* (1875-92), and in 1877 took charge of the anatomical department of the *Archiv für Anatomie und Physiologie*. Among his more important publications are: *Crania Helvetica* (with Rütimeyer, 1864); *Unsere Körperform* (1875); *Anatomie menschlicher Embryonen* (1880-85); *Die anatomische Nomenklatur* (1895); and a reconstruction of the physiognomy of Bach after the discovery of his remains (1895, with Seffner).

HISCOCK, FRANK (1834—). An American lawyer and legislator, born at Pompey, N. Y. He was admitted to the bar in 1855; served as District Attorney of Onondaga County in 1860-63, and was a member of the State Constitutional Convention in 1867. Elected to Congress as a Republican Representative in 1877, he won repute as a debater and leader. From 1887 to 1893 he was a member of the United States Senate.

HISHAM, hĕsh-ăm′. The name of several Ommiad rulers of Spain. HISHAM I. was Emir of Cordova from 788 to 796. He was a vigorous ruler and put down revolts with a firm hand. He also was successful in some expeditions against the Franks. He is, however, remembered chiefly for his personal habits. In disguise he wandered incognito about the capital, succoring the poor and oppressed, caring for the sick, and inquiring into the administration of justice. His charity and justice endeared him to his subjects. —HISHAM II., Ommiad Caliph of Cordova from 976 to 1009, succeeded to the throne before he was twelve. He had little ability and lived in seclusion, while his chief officer, Al Mansur (q.v.), made conquests from the Christians. Hisham was deposed and probably murdered.—With HISHAM III., who was deposed in 1031, and died in retirement in 1036, the Ommiad caliphate in Spain came to an end.

HISPA′NIA (probably connected with Heb. *shāpān*, rabbit, from *shāpan*, to hide). The name by which the Spanish Peninsula, including the modern Spain and Portugal, was known to the Romans. By the Greeks it was called Iberia, and by the Roman poets sometimes Hesperia, the Western Land. The earliest inhabitants of whom we have any knowledge were the Iberians, a race apparently unconnected ethnically or linguistically with any other race of Europe, and of which the modern representatives are the Basques of Northern Spain. But in very early times hordes of Celts crossed the Pyrenees and occupied almost the whole peninsula, pushing back or assimilating the Iberians, whence the natives were generally called Celtiberians by the ancients. The national wealth of the country—especially its silver deposits—early attracted traders and colonists. About the middle of the fourth century B.C. the Greek colony of Emporiæ (Ampurias) was founded on the northeast coast. Phœnician traders early made the circuit of the coasts, and Gades (Cadiz) was one of their permanent trading stations. The Carthaginians, driven from Sicily, Corsica, and Sardinia by the Romans, determined to conquer Spain both as a source of wealth and as a base of operations against Italy. Carthoga Nova (Cartagena) was their principal town, and they soon brought almost the entire country under their sway. From here Hannibal set out to cross the Alps (B.C. 218); but his downfall at the end of the Second Punic War lost the country to the Carthaginians and placed it under Roman control. For a century or two, however, the native tribes continued in a state of semi-independence, until in the time of Augustus, who founded many colonies in Spain, the country was finally Romanized. The peninsula was divided into three provinces: *Hispania Tarraconensis*, with its capital Tarraco (Tarragona) in the north and east; Bætica in the south; and Lusitania, corresponding nearly to the modern Portugal.

HISPANIOLA, hĭs′păn-yō′lȧ. See SANTO DOMINGO; HAITI.

HISSAR, hĭs-sär′. The capital of a district of the Delhi division, Punjab, British India, on the West Jumna Canal, 89 miles northwest of Delhi by rail (Map: India, C 3). It is the seat of a governmental cattle farm with 43.287 acres devoted to pasturage. Hissar was founded in 1354 and has interesting archæological and historical remains. Population, 17,000.

HISSAR-LIK. See TROY.

HISTIÆA, hĭs′tĭ-ē′ȧ (Lat., from Gk. Ἱστιαία, *Histiaia*, dialectic form of Ἑστία, *Hestia*, Lat. *Vesta*), or OREUS. An ancient and important city of Eubœa, on the north extremity of the island in the District of Hellopia. It was probably founded by settlers from the Histiæotis driven out by the advance of the Thessalians. In the period following the invasion of Xerxes it passed into the hands of the Athenian League, but in B.C. 446 joined the rest of Eubœa in a revolt. When the island was reduced by Pericles, the old inhabitants of the town were expelled, and Athenian colonists settled in the neighboring village of Oreus, which soon developed into a flourishing city, and gave the popular name to the colony, though officially it was still called Histiæa. At the end of the Peloponnesian War the descendants of the old inhabitants and other Eubœans replaced the expelled Athenians, and the city remained loyal to Sparta till after the battle of Leuctra, when it joined the second Athenian League. In the war between Philip and the Athenians, Oreus was one of the centres of Macedonian intrigue, and in the confusion after Alexander's death, and later during the Roman wars, it was of considerable strategic importance. In B.C. 200 it was stormed by the Romans. After this it fell into decay.

HIS′TIÆUS (Lat., from Gk. Ἱστιαῖος, *Histiaios*) (?-B.C. 494). A tyrant of Miletus, who guarded the bridge of boats by which the Persians had crossed the Danube when Darius invaded Scythia (B.C. 513). He refused to follow Miltiades's suggestion to destroy the bridge, and, in consequence, was rewarded by Darius with the rule of Mitylene, and with a district in Thrace. Afterwards, however, he was suspected of treason, and was detained at the Persian Court for thirteen years. Tired of this restraint, he secretly instigated the revolt of the Ionian Greeks, and was sent by Darius to suppress it. With his freedom thus recovered he openly made war against the Persians, but was defeated, and finally beheaded by Artaphernes. His head was sent to Darius, who received it with sorrow and buried it with honors.

HISTOIRE COMIQUE DE FRANCION, ē′stwär′ kô′mēk′ de frăn′syôn′ (Fr., Comic History of Francion). A romance by Charles Sorel de Sauvigny (1622), published under the pseudonym of Nicolas du Moulinet. The chief interest of the story is in the information which it supplies of contemporary customs, and in the fact that it is one of the few realistic novels of the seventeenth century. It met with much success, but was always disavowed by its author.

HISTOL′OGY (from Gk. ἱστός, *histos*, web, from ἱστάναι, *histanai*, to stand + -λογια, *-logia*, account, from λέγειν, *legein*, to say). That branch of biological science which treats of the microscopical structure of living organisms, both animal and vegetable. The histology of plants belongs to the domain of botany, that of animals to the domain of human and comparative anatomy. Just as gross anatomy is subdivided into normal anatomy and pathological anatomy, so histology may be subdivided into normal histology and pathological histology. The term histology when unqualified is usually accepted as referring to normal histology.

HISTORY. Although the study of the micro-

scopic structure of plants and animals may be traced to the times of Malpighi (1628-94), who discovered the blood-corpuscles, Robert Hooke, who was the first (1667) to describe plant cells, and Leeuwenhoek (1632-1723), who, with comparatively imperfect optical means, practically laid the foundations of our knowledge of the minute structure of the tissues, no definite progress in histology as a science was made until the beginning of the nineteenth century, when the compound microscope began to assume its present improved form. The great work of Bichat, entitled *Anatomie générale appliqué à la physiologie et à la médecine* (1801), marked an epoch in the development of the science of histology. Although he apparently did little actual work with the microscope, he brought to bear upon the achievements of other investigators the power of his generalizing mind, and was the first to classify tissues according to their structure. After Bichat came an epoch of histological research, during which the microscopic observations of Malpighi and Leeuwenhoek were extended in accordance with the general system of Bichat. The next great step forward was made by two botanists, Hugo von Mohl and Schleiden, who discovered the cellular basis of all plant structure. The discovery of the method of combining lenses so as to render them achromatic gave a new impulse to the study of histology, and a more perfect classification of the tissues of the body was the result, as it placed in the hands of Schwann an instrument which enabled him to demonstrate the law that all animal as well as plant tissues are composed of and develop from cells. Schleiden had already demonstrated this, which may be called the greatest discovery in histology, and therefore he and Schwann are often called the founders of the science of histogenesis, or the study of the origin of tissues, more recently pursued with great success by Reichert, Kölliker, Remak, and others. Then the microscopic anatomy of diseased structures and their mode of development came to be investigated, and the science of pathological histology took its rise. Johannes Müller is regarded as the father of this branch of histology, as he indicated the general direction in which the investigation of diseased growths should be pursued. Afterwards Virchow published his celebrated *Cellular Pathology*, and later the science was still further enriched by the labors of Billroth, Rindfleisch, Von Recklinghausen, Cohnheim, and others.

HISTOLOGY OF ANIMALS.

CELLS. The histological basis of the body structure is the cell. In general terms all tissues may be said to be composed of cells of one kind or another, and these cells are always combined with more or less intercellular substance. This intercellular substance may be very small in amount, as in the epithelial tissues, where it amounts to nothing more than a cementing material holding the cells together, or it may make up the greater part of the tissue, as in some forms of connective tissue. Cells differ in shape. They may be round, oval, cuboidal, spindle-shaped, or irregularly stellate. The intercellular substance differs greatly in structure, and it is upon the differences in density of the intercellular substance that the different degrees of hardness depend. Thus, in mucous tissue the intercellular substance is soft and gelatinous, in cartilage it is dense and firm, in bone it is infiltrated with lime salts, and is extremely hard. It was at first believed that a cell was a little bag filled with fluid, hence its name. Most animal cells are, however, small masses of living matter, called protoplasm, having as a rule no cell-wall. Cells may or may not have nuclei. It is probable that non-nucleated cells are incapable of performing certain of the higher functions of cells, e.g. that of reproduction.

All adult tissues and organs originate in the elementary layers of the embryo. What determines the lines of growth of these different cells, and why some develop to form one kind of tissue, others to form other kinds of tissues, is as yet beyond our knowledge. There are two modes of cell growth or reproduction, direct cell-division, and indirect cell-division or mitosis.

TISSUES. The tissues of the body fall into four great groups: (1) Epithelial tissue; (2) connective tissue; (3) muscular tissue; (4) nervous tissue. It is by combinations of these tissues that the different organs of the body are formed. The most widely distributed of the tissues is connective tissue, which in its various forms, as fibrous tissue, elastic tissue, cartilage, bone, etc., makes up the framework of the body. In combination with one or more of the other tissues it forms the various organs of the body, acting as their supporting framework. Thus, in the nervous system such organs as the brain and cord consist of nervous tissue held together and supported by the peculiar form of connective tissue known as neuroglia. A muscle consists of muscle-tissue bound together by connective tissue; and the various glands of the body, such as the liver or pancreas, consist of a glandular epithelium peculiar to the particular organ held together by connective tissue. See CONNECTIVE TISSUE.

Consult Delafield and Prudden, *Handbook of Pathological Anatomy and Histology* (New York, 1901). The histology of the different tissues and organs may be found described under such titles as CONNECTIVE TISSUE; MUSCLE; EPITHELIUM; NERVOUS SYSTEM; LIVER; KIDNEY, etc. See also CELL; and BLOOD.

HISTOLOGY OF PLANTS.

CELLS. Many plants consist of only a single cell; nevertheless such plants show almost infinite variety in form. The simplest are nearly spherical, but in the desmids and diatoms almost every conceivable shape is to be found and a high degree of differentiation is attained. When cells divide in only one plane and do not separate after each division a chain of cells results; when division takes place in two planes a plate of cells is formed; divisions in three planes give rise to a body several cells in thickness. In the last case considerable differentiation is likely to follow; the cells on the outside become adapted to the work of protection and absorption, some of those on the inside perform the nutritive functions, and others are specially modified for conducting materials. Even in the algæ and fungi there is a division of labor, some cells being modified for the work of protection and absorption, others for conduction, still others for reproduction. In the liverworts and mosses the specialization is carried still further, but it is in the ferns and flowering plants that difference in structure and division of labor finds its highest expression. Such differentiation of cells in form and function gives rise to tissues.

TISSUES. A tissue is a group of connected cells

of like origin and structure. Tissues are therefore classified according to the form of their component cells, the thickness and chemical composition of the cell-walls, the character of their contents, etc. All cells of a very young plant are alike in having thin walls, abundant protoplasm, minute vacuoles or none, and relatively large nuclei. Such cells constitute embryonic, formative, or meristematic tissue, which is found in the higher plants in three places: (1) At the tips of the shoots and roots, where it constitutes the 'growing points,' protected in the shoot by overarching leaves which form a bud, and in the root by the root-cap; (2) one or more thin layers concentric with the stem, by which new layers of wood, cork, and bast are added to it internally; (3) where wounds are made, in which cases the meristem produces tissues that heal the wound.

In all the higher plants tissues are grouped in such a way as to form tissue systems, for which see ANATOMY. Those there described are reduced to three by some: viz. (1) the tegumentary (equivalent to the protective); (2) the vascular (equivalent to the conducting and in part the mechanical); (3) the fundamental, a sort of limbo to which are assigned all the tissues not included in the other two systems. Of all tissues it may be remarked that the cell-walls are subject to thickening as they grow older. This thickening consists of material added to the surface of the primary wall. The successive additions are frequently unlike, and in the mature wall are apt to be distinctly stratified. The thickening is seldom uniform. Sometimes minute regions escape thickening and remain as small pits in the added layers. These pits occur at points where the protoplasm of one cell has not been completely separated from that of the other by the formation of a partition wall, but remains connected there by many very slender strands. In other

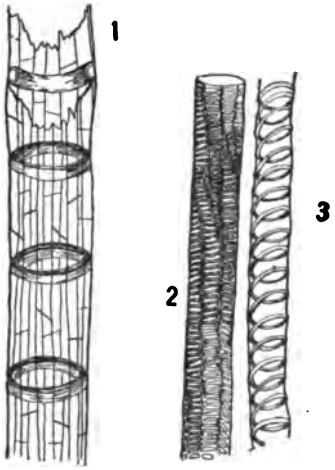

FIG. 1. TRACHEÆ.
1, Annular; 2, pitted; 3, spiral.

cases the thickening is absent from wider areas. This leaves broader and shallower pits, which are symmetrically or irregularly distributed, and give the appearance of sculpturing of the wall (2, Fig. 1). When the thickening is restricted to spiral lines or rings, the thin walls seem to be merely supported by the thickened portions, as in spiral and annular vessels (1, 3, Fig. 1).

Only the more important kinds of tissues are here described. (1) *Parenchyma:* Cells of very various form, but mostly nearly equal in the three dimensions, usually with a thin cellulose wall containing (so long as they are functional) living protoplasm, and almost invariably separating more or less from one another to form intercellular spaces. In elongated organs parenchyma cells are likely to become elongated. The parenchyma of the leaf and the cortex of the stem may develop into very irregular forms (Fig. 2). In water plants and others in which the paren-

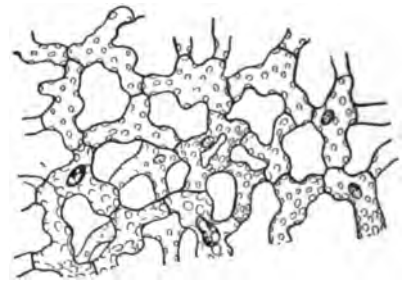

FIG. 2. IRREGULAR PARENCHYMA.
From a leaf, with only chloroplasts and nuclei shown.

chyma develops extensive intercellular spaces (aërenchyma) the cells may become branched, some even being regularly stellate (Fig. 3). Parenchyma cells sometimes have thick walls, and thus form a transition to the sclerenchyma (see below), from which, however, they may be

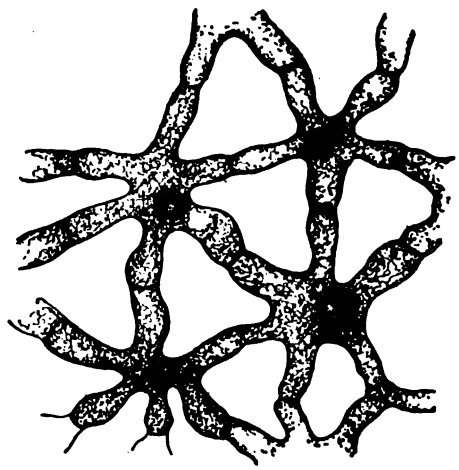

FIG. 3. STELLATE PARENCHYMA.
From stem of Juncus.

distinguished by the presence of living cell contents and sometimes reserve food. Such parenchyma occurs in the rhizome of many ferns. Parenchyma forms the chief nutritive and storage regions of all plants, and is especially abundant in herbaceous plants. In fleshy leaves, fruits, stems, etc., the parenchyma is greatly developed at the expense of other sorts of tissue and is there used for storage of reserve food. The outer walls of parenchyma cells, which form the surface (i.e. the epidermis), undergo a peculiar change, being infiltrated with cutin, by which they are rendered almost impervious to water. Parenchyma cells of tabular form arise from the phellogen, which

have all their walls cutinized. They constitute a tissue known as *cork* (Fig. 4).

(2) *Collenchyma* differs from parenchyma, of which it is hardly more than a variety, in the

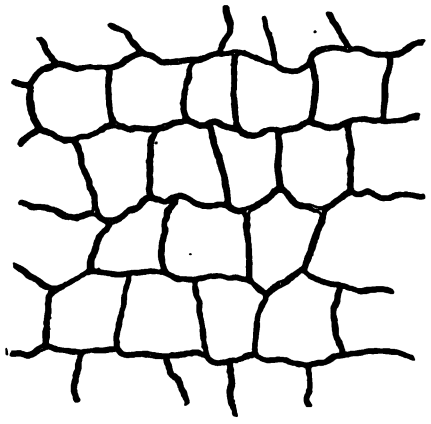

FIG. 4. CORK TISSUE.
Longitudinal section from bottle-cork.

elongation of the cells, the absence of intercellular spaces, and the thickening of the angles of the cells where three or more walls join (Fig. 5). These thickened parts are more highly refractive than other parts of the wall, and have a very peculiar bluish-white lustre. Collenchyma occurs

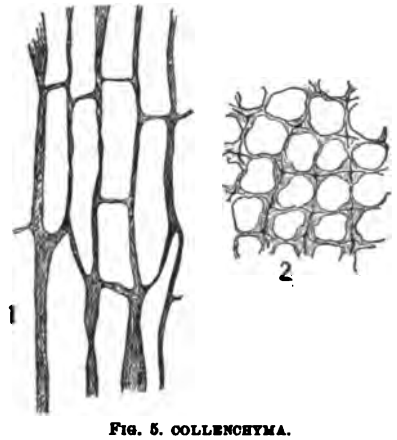

FIG. 5. COLLENCHYMA.
1, Longitudinal section; 2, transverse section.

only in elongated organs (stems, petioles, etc.), where it forms a strengthening tissue beneath the epidermis.

(3) *Sclerenchyma* occurs in two forms, in one of which the cells have their three dimensions almost equal; in the other they are greatly elongated (Fig. 6). In both the wall is excessively thickened, sometimes so much so that the lumen is nearly obliterated. In all cases the protoplasm disappears at maturity, and the tissue is of use to the plant only by its mechanical strength. The short-celled sclerenchyma is common in the stone fruits (peach and cherry), in the shell of various nuts, in the gritty parts of the flesh of pears, quinces, etc., and in the hard portions of bark, many dry fruits, and seeds. Elongated sclerenchyma cells are most abundant in stems and leaves, in which they form continuous strands or bands, closely associated with the vascular bundles. They are often called bast-fibres, but do not always belong to the bast or phloem bundles. The individual cells taper at each end, the ends of adjacent cells above and below overlap, and thus give to the strands great flexibility and a tensile strength which in many cases exceeds that of the best steel. The cells are relatively very

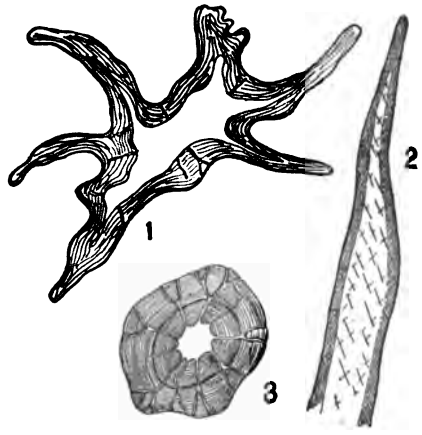

FIG. 6. SCLERENCHYMA.
1, Irregular form (idioblast) from leaf of tea; 2, surface view of a fibre showing tapering end and oblique pits; 3, transverse section of a fibre showing concentric structure of wall with pore-pits.

long, 1 to 4 millimeters in jute, 10 millimeters or more in hemp, 20 to 40 millimeters in flax, and as much as 220 millimeters in 'ramie,' with diameters from .01 to 0.4 millimeter. The strands of

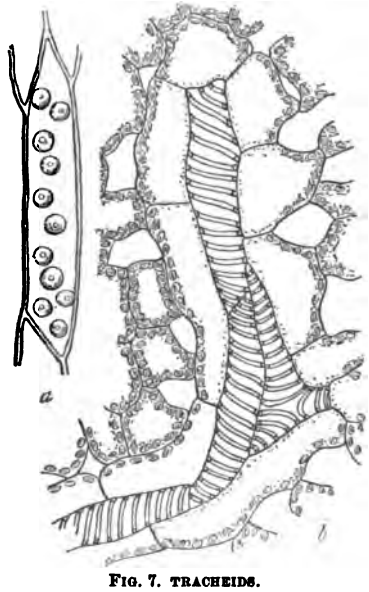

FIG. 7. TRACHEIDS.
a, from stem of pine; b, forming the termination of a xylem bundle in a leaf of *Impatiens parviflora*.

sclerenchyma fibres constitute the so-called fibres of commerce, the finer ones of which are used for textile fabrics and the coarser for cordage, etc.

(4) *Tracheæ* and *tracheids*. Tracheids are usually elongated cells, whose walls have become lignified (by which they are made very pervious

to water) and thickened in spiral or annular lines or in reticulate patterns (Fig. 1). At maturity the protoplasm disappears, leaving only the cell-wall of service to the plants. Tracheæ are similar to tracheids in the sculpturing of their walls, but instead of being single cells they are formed by the fusion of a row of cells lying originally end to end, the end walls being resorbed as the lateral walls thicken and the protoplasm disappears. At maturity the long empty tubes thus formed show little trace of the cells from which they originated. In angiosperms they constitute the greater part of the xylem bundles, changing to tracheids as the bundles grow smaller and come to an end (Fig. 7*b*). But in gymnosperms (pines and their allies) tracheæ are formed only in the primary xylem, almost all the secondary xylem being tracheids with characteristic circular-bordered pits (Fig. 7*a*). Tracheæ and tracheids are the most efficient tissues for the transport of water in the larger plants.

(5) *Sieve tubes* are cell fusions formed by the partial resorption of the end walls of a row of young cells. The end partitions and sometimes the lateral walls which adjoin other sieve tubes become perforated, forming a so-called 'sieve

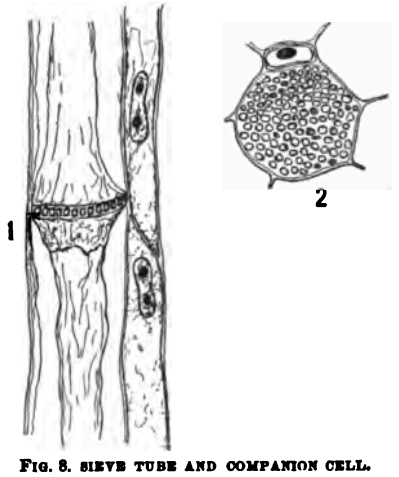

FIG. 8. SIEVE TUBE AND COMPANION CELL.
1, In longitudinal section; 2, in transverse section showing a sieve plate.

plate,' through which the contents of the sieve tubes (a slimy mixture of soluble proteids, carbohydrates, and other foods) pass freely. Sieve tubes are found in the phloem bundles, in which they constitute the most efficient tissue for the transport of foods (Fig. 8).

(6) *Latex tubes* are long, much-branched tubes, with free or anastomosing branches, which contain the milky or colored sap in certain plants. There are two sorts, articulated and non-articulated. A non-articulated tube arises by early differentiation of certain cells in the embryo, which push their way among the other developing tissues by independent growth. The articulated tubes arise by the fusion of rather indefinite rows of cells, either longitudinal or transverse, which form a network of irregular tubes. Latex tubes are found in the phloem bundles, or just outside these bundles in the cortex of stems, and accompany them into the leaves, where they ramify widely. Their terminals come into close relation with the nutritive cells. (See illustration under LATEX.) They seem to constitute a transportation system for foods. See GROWTH; ANATOMY OF PLANTS; CELL; ROOT; STEM; CONDUCTION; LATEX.

HISTOLOGICAL TECHNIQUE.

The methods of histological observation were at first extremely crude, consisting merely in tearing apart the tissues and examining them under the microscope. Such handling, of course, largely destroyed the relations of the different elements of the tissues to one another. The cutting of thin sections of tissue with a razor was soon introduced, this being much facilitated by the previous hardening of the tissues in some suitable solution. Such sections were, however, difficult to study, owing to their transparency and the fact that the different tissue elements possess nearly the same index of refraction. The staining of sections was the next great improvement in technique. At first a single stain was used, the denser elements taking a darker shade than those of less dense structure. The discovery of what is known as differential staining, whereby the different tissue elements are stained different colors, and the introduction of an instrument for section cutting, known as the microtome (see further below), together with improvements in the microscope, have been the main factors in the recent rapid development of the art. At present the most commonly used technical procedures in the examination of tissues and organs is as follows:

The first step is *fixation*. By this is meant a rapid killing of the tissue in such a way as to allow it to retain as nearly as possible the same form and relation as in the living tissue. Among the more common fixatives may be mentioned alcohol of various strengths, formalin in from 5 per cent. to 20 per cent. solutions, osmic acid, usually in 1 per cent. solution, Müller's fluid (2.5 grams of potassium bichromate and 1 gram of sodium sulphate, dissolved in 100 cubic centimeters of water), Fleming's fluid (a mixture of osmic, chromic, and acetic acids in water), chrom-acetic acid (1 per cent. solution in water), and corrosive sublimate in saturated aqueous solution. Many other fixatives are used for special purposes; thus, osmic acid is employed for the demonstration of fat and myelin. The small slices of tissue employed are allowed to remain from 12 to 48 hours in a large amount of fixative. Fixed tissues which have been fixed by any other agent than alcohol are then subjected to prolonged washing with running water. The next step is *hardening*. The fixing agents also act as hardening agents if allowed to act sufficiently long. Many fixatives, however, have a detrimental effect upon the tissues if their action is too prolonged. It is, therefore, quite common to transfer the tissues after proper fixation to some new fluid for the purpose of hardening and preservation. The almost universal hardening and preserving agent is alcohol, but formalin, too, in from 5 per cent. to 10 per cent. aqueous solution, is now extensively used. The first alcohol bath for plant tissues should be 35 per cent. or weaker, while many animal tissues will stand 50 per cent. This should be followed consecutively by 50 per cent., 70 per cent., 90 per cent., and 97 per cent. alcohol. For long preservation 80 per cent. alcohol is the most satisfactory. Next in the process is *imbedding*. By this is meant the impregnation of the tissues with a liquid which afterwards hardens, thus holding the tissues in

a firm mass, which can be easily cut. For this purpose paraffin and celloidin are most commonly used. In paraffin imbedding, the tissue is first immersed in any pure solvent of paraffin, then passed to a warm solution of paraffin in the solvent, and finally left in pure melted paraffin, until thoroughly impregnated. In celloidin imbedding the tissue is transferred from alcohol to a mixture of alcohol and ether, and then placed in a solution of celloidin in a mixture of equal parts of alcohol and ether. After impregnation the paraffin is allowed to harden by cooling, or the celloidin to thicken by exposure to the air and consequent evaporation of the alcohol and ether, after which it is immersed in chloroform for hardening. The operator then proceeds to cut sections by means of the *microtome*. This instrument consists essentially of a knife-carrier, which can be made to slide back and forth past a clamp to which the specimen is attached. The imbedded specimen is fastened to a block, usually of wood, clamped in the microtome. The clamp is so arranged that the blocked specimen can be raised any desired fraction of a millimeter, thus bringing any thickness of it above the knife. In paraffin-cutting the knife is kept dry; in celloidin section-cutting it is kept flooded with alcohol. The sections are then stained for the purpose of bringing out sharply the different tissue elements. For staining the nuclei, carmine, hæmatoxylin, and various aniline dyes are commonly used. For demonstrating the other tissue elements other dyes may be used, eosin being much used. The procedure in staining celloidin sections with hæmatoxylin and eosin is as follows: The sections are first allowed to remain for several minutes in an aqueous solution of hæmatoxylin; then they are thoroughly washed with 97 per cent. alcohol, and placed for several minutes in an alcoholic solution of eosin; they are then again washed in alcohol and cleared in oil of origanum or bergamot containing a little eosin. From the clearing bath the specimen is lifted to a glass slide, the excess of oil is removed by means of blotting-paper, a drop of a solution of Canada balsam is placed upon the specimen, and the whole is covered with a thin glass, called the cover-glass. By the drying and hardening of the balsam a permanent 'mount' of the specimen is secured.

The above methods of procedure are illustrative of those applicable to general histological material. The examination of special tissues and organs requires the use of special methods of technique. This is especially true in regard to the nervous tissues, for the study of which some very elaborate methods have been devised, some of which will be found described in the article NERVOUS SYSTEM.

For histological methods as applied to plant tissues, consult Chamberlain, *Methods in Plant Histology* (Chicago, 1901); for methods in animal histology, consult Lee, *Microtomist's Vademecum* (London, 1890).

HISTORICAL ASSOCIATION, AMERICAN. A society of historical students and writers, founded at Saratoga, N. Y., in September, 1884, at the suggestion of Herbert B. Adams, of Johns Hopkins University. Its original membership was 40, but within a year it had increased to 250, and in 1889 it received a definite standing and recognition by an act of Congress incorporating it in the District of Columbia. The society has exerted wide influence in directing and stimulating historical research, and its publications and monographs have covered a broad field of historical study. Allied with the society is the American Society of Church History. This organization, founded in March, 1888, became the Church History Section of the Historical Society in 1889. Another important branch of the society is the Historical Manuscripts Commission, which prepares valuable manuscripts for publication. The society holds annual meetings, and publishes an annual report through the Smithsonian Institution at Washington. These reports include historical articles and bibliographies, and the society publishes in addition many monographs. As examples of the latter may be mentioned: *Federal Land Grants in the United States*, by George W. Knights; *Church and State in the United States*, by Philip Schaff; *Willem Usselinx*, by J. F. Jameson; *The Continental Congress*, by Herbert Friedenwald; and *The Study of History in Schools*, by a special committee of seven, appointed by the society. The presidents of the society have included eminent American historians. They have been: Andrew D. White, George Bancroft, Justin Winsor, William F. Poole, James Schouler, George F. Hoar, Edward Eggleston, and Alfred T. Mahan. The membership is about 1400.

HISTORICAL SOCIETY, ROYAL. A learned association in London, founded in 1868, and incorporated July 31, 1889, with the object of promoting the study of history. Its membership, which is international, numbers about 600, divided into Fellows, Honorary Fellows, and Corresponding Members. On May 2, 1896, the Royal Historical Society amalgamated with the Camden Society (q.v.). The Royal Society publishes annual volumes of Transactions and Documents, which are distributed without charge to members.

HISTORIC GEOLOGY. See GEOLOGY.

HISTORY (Lat. *historia*, Gk. *ἱστορία*, history, from *ἵστωρ*, *histōr*, learned, from *ἰδέναι*, *eidenai*, Skt. *vid*, OHG. *wizzan*, Ger. *wissen*, to know). A systematic narrative of past events, or, in the light of modern historical scholarship, the science of the progressive development of human society. The social and economic conditions of peoples, their racial affinities and physical environment, exercise determining influences upon their history, and find expression in their thought, their art, and their politics. History deals with the social structure in its successive forms and recognizes as inseparable allies all sciences which contribute to a knowledge of man as a social being, and in his relation with the physical world.

As a science, history is primarily inductive. It proceeds from a body of concrete facts, which critical study links together according to the sequences of time and causation. Afterwards deductive processes may be used, but always sparingly and cautiously.

Historical method comprises four processes: the collation of facts; the arrangement of these facts, according to the sequences of time and causation; criticism, by which the value of the facts is determined; and their interpretation in accordance with the results of arrangement and criticism. These processes are all simple; they are the ordinary processes of scientific research, but in carrying them out the human equation

becomes so large an element of the problem as to make it essentially different from the problems of the physical world, and for this reason history can never be an exact science.

History depends upon human evidence, and its investigation must follow the laws governing the reception of human evidence. These are found to a considerable extent in the body of principles developed by jurisprudence for the reception of evidence in the courts. The historical material is contained in several categories: (a) Remains—such as buildings, walls, roads, statues, pictures, medals, coins, implements—whatever, indeed, man has made and used and which may thus throw light upon his civilization and his deeds. These may be studied directly, when accessible, or through the reproductions easily obtainable by means of modern processes.

(b) Documents. Under this head are included official and business papers and letters written with an immediate practical purpose.

(c) Literatures. This class includes a great body of material of the highest value—the writings through which are expressed the ideas of the peoples, their philosophy, poetry, science, and religion.

(d) Traditions. Much of this class is preserved in the literatures; much of it must be gathered from other sources.

(e) Laws. These, especially public law, are found in codes and treatises, and are of great value in determining many questions.

(f) Contemporary writings with historical purpose—annals, chronicles, biographies. Under these heads can be classified the original material on which secondary historical work, the written history of a nation or an age, is based and by examination of which its accuracy must be tested.

This material may also be divided into two great classes of evidence—conscious and unconscious. It will be seen that some of this material must have been prepared consciously to influence the opinion of contemporary or succeeding generations. In this class are proclamations, statements, writings, narratives, told with intention concerning events within the narrator's own knowledge, or reported to him by others. Such evidence must be taken with qualifications attaching to all ex-parte testimony. On the other hand, the evidence may be given unconsciously, as in documents of record, writings or other remains, prepared with no other purpose beyond that of direct utility. A striking example of this class of evidence is found in the little cylinders and tablets of clay, preserving in the business records, impressed upon them in cuneiform characters, so much of the social history of the Babylonians of thousands of years before the Christian Era. All these materials of human history must be subjected to searching inquiry as to their original purpose, and the circumstances under which they were made. The development of history into scientific form has been the work of ages, and owes its final impulse to the great improvements in methods in the physical sciences during the eighteenth and nineteenth centuries, although it developed along with the development of the human society whose life it records. The historical idea requires for its existence a background and a consciousness on the part of society of itself and of its continuity; of its relations to a past and a present. The growth of this social self-consciousness has been a matter of time. It is interesting to notice, on the other hand, how the study of their history has sometimes aroused in a people the consciousness of their own national life, which before was dormant. An example of this may be found in the Balkan States, which were roused not many years ago into determined revolt against Turkish rule by the teaching of their national history through the efforts of a few patriotic scholars.

The new outlook upon the natural world given by the physical sciences and the change in historical methods gave rise to a controversy in the last century, in which certain philosophical thinkers of the highest ability undertook to maintain that "human actions are governed by laws as fixed and regular as those which rule in the physical world." Auguste Comte, Henry Thomas Buckle, and Herbert Spencer are the distinguished sponsors of this theory. Buckle, in his *History of Civilization in England*, the first volume of which was published in 1857, elaborated this idea with a profundity of learning, but with much inconsistency of reasoning. Such literary historians as Charles Kingsley and James Anthony Froude entered the discussion on the other side, and John Stuart Mill, in his *System of Logic*, made a very sane and able contribution to it. The strongest and most extreme presentation of the opposite side of the controversy is, perhaps, that made by Froude in his lecture of 1864 on "The Science of History." He maintained with great eloquence that the determination of human movements upon any basis of scientific accuracy was impossible. This old controversy is closed now in the light of a better understanding of what the science and scientific method really are, but it is of interest historically as marking one stage in the development of the science of history.

The development of history down to the nineteenth century may be traced through the work of a very few writers and scholars. The first of all historians was the Greek Herodotus, who lived in the fifth century B.C. He was, however, only a narrative writer, recording with great accuracy those events which came within the scope of his personal knowledge, but mingling with his narratives much which came to him only by hearsay, and to which he applied no critical canons. Thucydides, the next of the great historians, is justly estimated as one of the greatest historians of all time. He recorded events with remarkable conciseness, and first applied philosophical reasoning to the historical narrative. Among narrative historians the accomplished Xenophon deserves a place. Polybius, with a wider outlook, followed in the footsteps of Thucydides. Of the Romans, Cæsar, Livy, and Tacitus show a high development of the historical sense, the two former confining themselves to the narrative field, and the last claiming a place in the class of historians like Thucydides, who endeavored to find the meaning of history beneath the mere sequence of events. The historians of the later Roman Empire were, for the most part, apologists for, or eulogists of, the emperors who were their masters, and establish no landmark of importance. During the Middle Ages there was no historical writing worthy of the name in Europe. The historical writing of the time is contained in the annals and chronicles preserved

in the monasteries, which were very little more than diaries from day to day, kept without any discrimination by men whose outlook upon the world was of the narrowest. Einhard, in the reign of Charlemagne, Otto of Freising, in that of Frederick Barbarossa, and a few others, alone rise a little above the dead level, which offers material for historical research, but no true history. The awakening of a broader and more vigorous scholarship in the period of the Renaissance produced a new school of political and historical thinkers, who built upon the revived classical models. They are found in Italy, where Machiavelli and Guicciardini wrote historical works that are admirable in thought and style, and in France, Spain, and England, where the example of Italy was followed as in other fields of culture. In the eighteenth century the Englishman Gibbon, who devoted his life to his great work, *The Decline and Fall of the Roman Empire*, left one of the masterpieces of historical scholarship—a work that stands to-day as the most thorough and scholarly presentation of the history of the later Empire and of the Middle Ages. Voltaire, Hume, Montesquieu, and Robertson are brilliant names in the progress of historical thought of the same century. It remained, however, for the nineteenth century to develop history into a systematic science. With Niebuhr began a rational study of classical history, which has been carried on by Mommsen and Curtius for Roman and Greek history respectively. The greatest impulse, however, for the study came from the class-rooms of Leopold von Ranke (1795-1886). Ranke grasped the fundamental idea of historical science with a rugged sincerity, both of theory and practice, and impressed his spirit upon a large body of enthusiastic students in Germany and America. Waitz, Droysen, von Sybel, von Holst, Treitschke, and others have followed with greater or less ability along the path over which he led the way. In France within the last half century historical work and instruction have developed with great rapidity, and Monod, Duruy, Henri Martin, Lavisse, Rambaud, and many others have exemplified the French genius for clear and scientific thinking, and for condensed lucidity of statement. In less degree the other Continental countries have contributed to the development of the science. In England, along with such brilliant literary historians as Macaulay, Kingsley, and Froude, we have a body of eminent scientific scholars, of whom Freeman, Green, Stubbs, Creighton, and Gardiner are distinguished representatives. In America, whose scholars have drawn largely from the German and French schools, there has also been a noticeable development in historical writing and in critical scholarship. Succeeding the earlier school, which included Bancroft, Prescott, and Motley, there has grown up in the United States a modern school, trained in the best university methods of research, and enrolling in different kinds of historical work hundreds of vigorous and enthusiastic scholars. Francis Parkman, Justin Winsor, and John Fiske left behind them a body of historical writings of a very high order. Henry Adams, James Schouler, Captain Mahan, John Bach McMaster, and James Ford Rhodes are contemporary American historians whose studies in the history of their own country are of permanent value, and many more names might be added. From the lecture rooms and seminaries of Europe and America a constant impulse to wise and thorough study and use of historical material goes forth from earnest and able teachers. Numerous periodicals are devoted to the advancement of historical research. Most noteworthy of these are the *Historische Zeitschrift* in Germany, the *Revue Historique* in France, the *English Historical Review* in England, and the *American Historical Review* in the United States.

It is the tendency of the modern school of historical students to rely more upon the thorough study of true sources of history, rejecting the myths, traditions, and second-hand accounts, which have so often formed much of the material of writers of so-called history. Collections of written sources form a very considerable part of the historical publications of to-day, and guides and commentaries to these collections of sources are constantly being issued to enable the student to find his way intelligently through the mass of material which the source collections present. In this direction Germany, under the leadership of Ranke, led the way. The massive and constantly growing collection of sources of German history, known as the "Monumenta Germaniæ Historica," is in itself a monument of scholarship and research, and in France, England, and the United States similar collections have been published, and are in process of publication from year to year. The well-known Rolls Series in England is nearly as notable a collection as the German *Monumenta*. Even in historical instruction in the schools, the simpler and more interesting sources have been put in available form for elementary students, and are used with great success to enliven the historical narrative, and to give an appreciation of the true nature of historical research. This tendency to explore the actual evidence critically has done much to clear history of the fable, myths, and traditions which made much of it unreliable, and to render it real to the student.

Divisions of History. History is commonly divided chronologically into three great periods—Ancient, Mediæval, and Modern. While there is complete continuity in the course of history, each one of these periods has certain characteristics distinguishing it from the others, and making it convenient to treat each as a unit. In the first period the beginning and growth and decline of the great civilizations of antiquity are comprised. Here are considered the old East, Egypt, Mesopotamia, and Syria, Greece, and Rome. In these remote ages were laid the foundations of civilization, the elements of which were handed on from the valleys of the Nile and Euphrates to the Greeks and Romans, who fashioned them into instruments available for later generations. The Roman Empire welded together all the diverse elements of the ancient world. Ancient history is usually regarded as ending when the irruption of the Germanic barbarians from Northern and Central Europe into the highly developed Roman civilization caused the downfall of the old Empire in the fifth century of our era, and ushered in several centuries of confusion. The world that had been so thoroughly organized by the Roman was materially modified in its structure by the individualism for which the German stood, in contradistinction to the principle of imperial unity

emphasized in the Roman world. Out of this stormy mingling of conflicting ideas in the Middle Ages came modern Europe, which rests politically upon a combination of the German and Roman principles. The Middle Age is regarded as closing about the end of the fifteenth century, when the fall of Constantinople had removed the last shadow of the old Roman world, when the discoveries of Columbus had immeasurably widened the European horizon, and the revolt was beginning against ecclesiastical imperialism. The national idea slowly took form out of the feudalism of the Middle Ages, and modern nations gradually arose, with the result of bringing into being a legal code for the regulation of international relations. The internal confusion of the Middle Ages had separated Europe from the rest of the world, but with the revival of learning and the interest in new things, known in history as the Renaissance, came a larger acquaintance with that older world of the East which, while less progressive, had its own civilization, institutions, and history. The conflict of the religions and civilizations of the East and West produced the Eastern question, in which are contained so many of the most difficult problems of modern international politics. The opening of the New World in the period of discovery introduced a new factor of the greatest importance in the world's history—the future great power of the Western Hemisphere, which had as its heritage the civilization of Europe, but was unhampered by immemorial traditions and institutions, and by conflicting national interests. The same pregnant era that saw these new elements thrown into the world's life saw also the renewal of the old conflict between the German idea of liberty and the Roman idea of unity in the Protestant revolt against the control of the Roman Church. This conflict shaped much of the world's history for three centuries. The expansion of population in the older countries, the development of commerce, the increasing knowledge of the world, and the growing ambition of nations conscious of their own possibilities and increasing rapidly in power and wealth, together with the religious persecutions generated by the Protestant revolution, brought about the opening and settlement of new and hitherto inaccessible regions, resulting in the widening of national interests, enormous increase in the power and resources of the great nations, and a development of national rivalries on a scale hitherto unknown. There has also come an insistence on the part of civilized peoples that barbarian races shall submit to civilization and not obstruct the progress of world development. History has until recently concerned itself almost exclusively with the Occidental nations, regarding the Orient only as it has come in contact with the West. Now, however, the histories of India, China, Japan, and all other peoples that have enjoyed organized life have assumed importance in view of their bearing upon the larger problems of the age. Such has been the movement of the great current of history which has expanded in volume with the expansion of the race. Within these wide boundaries the histories of different countries may be studied in detail; and the study of history may be still further specialized along the lines of social, economic, political, or constitutional fields, or in those of art, literature, or thought. These special fields become increasingly important as history grows in complexity, so that light is needed upon its phases in detail.

The true spirit of history is nowhere better expressed than in Ralph Waldo Emerson's essay on *History*. See also Frederic Harrison, *The Meaning of History* (London, 1894); Lord Acton's inaugural address as regius professor at Oxford (London, 1895); W. S. Lilly, "The New Spirit in History," in *Nineteenth Century* (October, 1895); White, "The Study of History," *Atlantic Monthly* (January, 1870); Freeman, *Methods of Historical Study* (London, 1886); Droysen, *Grundriss der Historik*, trans. by Andrews as *Outlines of the Principles of History* (Boston, 1893); Adams, *Manual of Historical Literature* (3d ed., New York, 1889); Bernheim, *Lehrbuch der historischen Methode* (Leipzig, 1894); Langlois and Seignobos, *Introduction to the Study of History*, trans. from the French by G. G. Berry (New York, 1898); Froude, *Short Studies on Great Subjects* (New York, 1893). On the pedagogical aspects of the subject, see Hall (ed.), *Methods of Teaching History* (Boston, 1883-85), a collection of papers by well-known educators: Channing and Hart, *Guide to the Study of American History* (Boston, 1896), very full bibliographies; Committee of Seven of the American Historical Association, *The Study of History in Schools* (New York, 1899); publications of the New England History Teachers' Association. The publications of the American Historical Association contain many papers relating to history in general in its different aspects.

HIS'TRIOMAS'TIX (Neo-Lat., from Lat. *histrio*, actor + Gk. *μάστιξ*, *mastix*, scourge). A comedy produced not later than 1599, of which John Marston was at least a collaborator, and printed in 1610.

HISTRIOMASTIX, THE PLAYER'S SCOURGE, OR ACTOR'S TRAGÆDIE. A tract violently attacking the drama, by William Prynne, a Puritan, published in 1632. It gave great offense, and the author was fined, deprived of his Oxford degree, and, losing both his ears, was sentenced to life imprisonment.

HIT (Gk. Ἴς, *Is*). A town of Asiatic Turkey, situated among deserts and salt marshes on the right bank of the Euphrates, in the Vilayet of Bagdad, and 110 miles west-northwest of the city of that name (Map: Turkey in Asia, K 6). It is remarkable for the asphalt and naphtha pits in the neighborhood, from which asphalt is believed to have been obtained for the construction of the walls of Babylon. At present the chief products of the place are asphalt, naphtha, salt, and lime. Population, about 5000.

HITA, ē'tä, GINES PEREZ DE. See PEREZ DE HITA, GINES.

HITCH. See KNOTTING AND SPLICING.

HITCH'COCK, CHARLES HENRY (1836—). An American geologist, the son of Edward Hitchcock. He was born at Amherst, Mass. After graduating at Amherst College (1856), he was assistant to the Geological Survey of Vermont (1857-61); State Geologist of Maine (1861-62), and of New Hampshire (1868-78). His report on his work in New Hampshire, containing a folio atlas of maps, profiles, and sections, is considered his most important publication. Incidental to

the survey was the maintenance of a meteorological station throughout the year on the summit of Mount Washington, whence daily statements of the weather conditions were issued before the United States Signal Service had begun its weather predictions. Hitchcock's publications comprise more than one hundred and fifty papers, chiefly concerning New England geology, crystalline schists, and ichnology. He was appointed professor of geology at Dartmouth College in 1896, and in 1883 was president of the American Association for the Advancement of Science. He was made a member of the Imperial Geological Institution of Vienna, and was one of the original and most active members of the Geological Society of America. He was the first to suggest the locality of the great terminal glacier in the United States.

HITCHCOCK, Edward (1793-1864). A scientist and educator who contributed greatly to the development and popularizing of geological science in America. He was born in Deerfield, Mass., where for a time he served as principal of the academy. From 1814 to 1818 he published the *Country Almanac*, and in the latter year entered Yale Theological Seminary, from which he was graduated in 1820. After serving as pastor of the Congregational Church in Conway, Mass., he was appointed professor of chemistry and natural history in Amherst College. As president of that institution from 1845 to 1854 he improved its financial condition, and greatly extended its usefulness. When he resigned the presidency, he retained the professorship of natural theology and geology, holding this office until his death. Throughout the latter part of his life he devoted much time to geological research. In 1830 he was appointed State Geologist of Massachusetts, and under his direction the first geological survey of any extensive area was completed. The results of this work were published by the State Government in several voluminous reports. In 1836 he received the appointment of geologist of New York, but resigned the position. He served as geologist of Vermont from 1857 to 1861, and in 1850 was commissioned by the State of Massachusetts to examine the agricultural schools of Europe. He was one of the founders of the Massachusetts Agricultural College, and of Mount Holyoke Seminary, and was the first president of the American Geological Society. His extensive collection of fossil footprints of the Connecticut Valley was presented to Amherst College. The most important of his works are: *Economical Geology* (1832); *Report on the Geology, Mineralogy, Botany, and Zoölogy of Massachusetts* (1833); *Elementary Geology* (1840); *Geology of Massachusetts* (1841); *History of a Zoölogical Temperance Convention in Central Africa* (1850); *Religious Lectures on Peculiar Phenomena of the Four Seasons* (1850); *Religion of Geology and Its Connected Sciences* (1851); *Religious Truth, Illustrated from Science* (1857); *Ichnology of New England* (1858); *Report on the Geology of Vermont* (1861); and *Reminiscences of Amherst College* (1863).

HITCHCOCK, Ethan Allen (1798-1870). An American soldier and mystic. He was a grandson of Ethan Allen, was born at Vergennes, Vt., and was educated at West Point. After garrison service, he was instructor in tactics at West Point (1824-27), and commandant there (1827-29). He served against the Indians in Florida in 1836 and 1840, and in the last campaign of the Mexican War. For his service in Mexico he was brevetted brigadier-general (1847). He commanded the Pacific Division from 1851 to 1854, and in the next year resigned because of a quarrel with Jefferson Davis, then Secretary of War. At the outbreak of the Civil War he was appointed major-general, and served at first on special duty under the Secretary of War, and later as commissioner of exchange. He was also confidential adviser to the President. Hitchcock was a mystic, and wrote: *Remarks upon Alchemy and the Alchemists*, arguing that they were religious philosophers, and that truth was the philosopher's stone (1857); *Swedenborg, a Hermetic Philosopher* (1858); *Christ, the Spirit*, in which the Gospels are treated as symbolical writings of the Essenes (1860); *Red Book of Appin, and Other Fairy Tales* (1863); *Remarks on the Sonnets of Shakespeare* (1865 and 1867); *Spenser's Colin Clout Explained* (1865); and *Notes on the Vita Nuova of Dante* (1866), in all of which he gives hermetic explanations of the matter of these books.

HITCHCOCK, Ethan Allen (1835—). An American politician, born in Mobile. For several years he was in business in Saint Louis. In 1897 he was sent as United States Minister to Russia, and subsequently was made Ambassador upon a corresponding change in the Russian diplomatic service. In 1898, upon the retirement of Cornelius M. Bliss, he was appointed Secretary of the Interior. He entered upon the office in 1899. —His brother Henry (1829-1902) was born near Mobile, Ala., and was one of the foremost lawyers and citizens of Saint Louis.

HITCHCOCK, Roswell Dwight (1817-87). An American clergyman and educator, born in East Machias, Me. He graduated at Amherst College in 1836, and at Andover Theological Seminary in 1838, and studied at the universities of Halle and Berlin in 1847. After his graduation from the theological school he was a tutor at Amherst until 1842. He preached a year in Waterville, Me., and in 1845 was installed over the First Congregational Church in Exeter, N. H. He resigned in 1852 to accept the professorship of revealed religion at Bowdoin College. Three years later he resigned at Bowdoin to become professor of Church history at Union Theological Seminary, of which he was elected president in 1880. He was on the editorial staff of the *American Theological Review* for seven years, traveled in Egypt and Palestine, and was elected president of the Palestine Exploration Society in 1871, and vice-president of the American Geological Society in 1880. He published: *The Life, Character, and Writings of Edward Robinson* (1863); *Complete Analysis of the Holy Bible* (1869); *Socialism* (1879); *Carmina Sanctorum*, with Dr. Zachary Eddy and Rev. Lewis W. Mudge (1885). A collection of sermons, *Eternal Atonement*, was published posthumously (1888).

HITCHIN, hĭch'ĭn. A town in Hertfordshire, England, 14 miles northwest of Hertford (Map: England, F 5). It was the original seat of Girton College; it has a free school, founded 1622; and its fine old parish church contains an historical crypt, interesting monuments, and an "Adoration of the Magi" by Rubens. Hitchin has large breweries, and a trade in corn, malt, and

flour. Straw-plaiting is carried on, and the cultivation of lavender for its essential oil, extensively used in perfumery, dates from 1568. Hitchin is recorded in the Domesday Book. It was given to Harold by Edward the Confessor, and came into the possession of William the Conqueror. Population, in 1891, 8860; in 1901, 10,072.

HITOPADESA, hē-tō'pa-dā'shā (Skt., salutary instruction), or BOOK OF GOOD COUNSEL. The name of a celebrated Sanskrit collection of fables, the contents of which have passed into almost all the civilized literatures of the world. The collection itself, in the form in which we possess it, is founded on older works of a kindred nature; and its preface expressly mentions 'the *Panchatantra* and another work.' For a convenient list of editions and translations and a sketch of the subject, consult Lanman, *Sanskrit Reader* (Boston, 1884). Two good editions with English notes are published in India by Peterson (Bombay, 1895); and by Godabole and Parab (ib., 1896). See PANCHATANTRA; SANSKRIT LITERATURE.

HITTEREN, hĕt'tĕr-*en*. An island off the west coast of Norway, situated at the entrance to the Throndhjemsfiord (Map: Norway, C 5). It covers an area of nearly 200 square miles (including some adjacent islets), and has a population of about 3000. It is covered with low but rugged hills, reaching 1000 feet, among which are numerous lakes and streams. The inhabitants are mostly engaged in fishing.

HITTITES. A name that properly designates a rather promiscuous group of nations whose settlements extended from the westerly portions of Asia Minor to Armenia, northward close to the Caspian Sea, and southward to the watershed between the Euphrates and the Orontes. Besides this we also find references in the Old Testament to Hittites in Southern Palestine around Hebron (Gen. xxiii.), and Hittites are likewise frequently mentioned among the pre-Israelitish inhabitants of Palestine, and alongside the Canaanites, Amorites, Hivites, Perizzites, and Girgashites. It is quite impossible, however, to determine absolutely whether the same group (or subdivision of the same group) is intended in all cases. The indications are in favor of separating the Hittites of Central Palestine from those in the south and from the Hittites of Northern Syria and Asia Minor. The geographical nomenclature of the Old Testament is frequently vague, and Hittite is a term which is variously used by different writers. So far as the Hittites, whom tradition places around Hebron, are concerned, we are limited in our knowledge to the account of Abraham's purchase of the field of Machpelah from the sons of Heth (Gen. xxiii.), and to incidental references, such as Gen. xxvi. 34, which point to scattered Hittite settlements as far south as Gerar and Beersheba. They are on friendly terms with Edomites and Hebrews, but there is nothing to indicate their ethnic relationship to those two groups. Equally unsatisfactory is our knowledge of the Hittites of Central Palestine. We encounter them merely as one in the confederated group of pre-Israelitish inhabitants of Canaan proper, and considering the uncertain character of Hebrew traditions when it comes to specific names of peoples, there is no special value to be attached to this grouping. When we reach the days of David we find ourselves on safer historical ground. The presence of Uriah the Hittite (husband of Bathsheba) in the army of David (II. Sam. xxiii. 39) is a valuable indication that at this period a group known as the Hittites was still recognized, and there is no valid objection against regarding these Hittites as descendants of those whom tradition places around Hebron, which, it will be recalled, is also the centre of David's political activity. In Solomon's days (I. Kings xi. 1) we learn of alliances with Hittites, and here at last we have the Hittites of the north whose historical importance far outranks those of the south. The 'kings of the Hittites' to whom the writer in II. Kings vii. 6 refers are powerful rulers who as early as 1600 B.C. had established themselves on the Orontes, and whom the Egyptians, when under Thothmes I. they began their series of Asiatic campaigns, found to be most formidable enemies. While obliged to submit to Egypt for a while, the Hittites maintained a spirit of independence, and centuries afterwards the Babylonians and Assyrians were checked in their advance toward the west by the Hittites gathered at Carchemish, Kadesh, Marash, Hamath, and elsewhere. It is not until the days of Sargon II. (B.C. 721-705) that these Hittites along the Orontes are finally subdued and disappear from the horizon of history. Hittites, however, are not limited to Northern Syria. Monuments have been found in Cappadocia, Paphlagonia, Lycaonia, and Phrygia which by their general art, costumes of the personages sculptured on them, and above all by the character of the inscriptions accompanying the monuments, are identical with numerous Hittite remains found at Carchemish, Marash, and Hamath. It is the existence of these monuments spread over so large a district that enables us to form an idea of the important part played in ancient history by the Hittites. The inscriptions themselves have not yet been fully deciphered, but a beginning has been made, and enough is now known to warrant the assumption that between c.1200 and 800 B.C. Hittites formed the controlling element in Central and Western Asia Minor; and it also appears quite certain that the spread was gradual from the region of Cilicia to the north, northeast, northwest, and west. These Hittites appear to have been of a mixed ethnic type, of Turanian and Semitic elements, with a general tendency toward the prevalence of the Semitic over the non-Semitic.

According to Jensen, indeed, the Hittite language is Aryan in character; but this view is open to serious objections, and it is more likely that the Hittite language will be found to be affiliated with the Semitic stock. There is also a possibility of a direct connection between Hittite characters and Egyptian hieroglyphics, though it is not possible to speak with certainty on this and numerous other points connected with the Hittites. Further researches and explorations in Hittite districts are needed, and above all the discovery of a key that will enable scholars satisfactorily to interpret the inscriptions. The Hittite script, it may be added, is partly pictorial and partly syllabic. By virtue of its pictorial character it is possible to determine the general meaning of a Hittite inscription much more readily than to determine how it is to be read.

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HITTORF, ê'tôrf', JACQUES IGNACE (1792-1867). A French architect, born in Cologne. He went to Paris in 1810 to study art, and from 1819 to 1830 was architect to the King. He was long engaged in the construction of public buildings, and at the embellishment of such public places as the Bois de Boulogne and the Champs Elysées. His chief work is the Church of Saint Vincent de Paul, in Paris. He published: *Architecture antique de la Sicile* (1826-30); *Architecture moderne de la Sicile* (1826-35); *Architecture polychrome chez les Grecs* (1851), all of which are still considered valuable contributions to the literature of architecture.

HITTORF, hit'tôrf, JOHANN WILHELM (1824—). A German physicist, born at Bonn. He has been since 1852 professor of chemistry and physics at Münster. Hittorf's earliest important researches were in electrolysis, and he was able to extend Faraday's work, his method of determining the mobility of ions being of the greatest importance to physical chemistry. In addition to his work in electrolysis, Hittorf made elaborate investigations of the various phenomena attending the passage of electricity through gases. In 1862 with Plücker he discovered that different spectra could be obtained from the same substances under different conditions of temperature. Later (1869), in studying the passage of electricity through tubes containing a rarefied gas, he observed that by increasing the exhaustion of the tube the dark space between the negative pole and the negative glow became wider, and that when the discharge from the cathode struck against the glass considerable fluorescence was produced. Hittorf also ascertained that these rays could be deflected by a magnet, and anticipated Crookes, who in 1878 published his famous researches with the vacuum or Crookes tubes and named the rays thus produced radiant matter. He investigated the allotropic occurrence of selenium and phosphorus, and in the case of the latter substance he was successful in producing a crystallized form, black in color and with a metallic lustre. Hittorf's many valuable papers on physics and chemistry are to be found for the most part in Poggendorff's and Wiedemann's *Annalen der Physik* (Leipzig, current).

HITZIG, hits'ik, EDUARD (1838—). A German alienist, grandson of the biographer and jurist Julius Eduard Hitzig. He was born in Berlin, studied medicine there and in Würzburg, and in 1875 became professor of psychiatry at Zürich. Four years afterwards he became professor in Halle, where he established an independent clinic for nervous and mental disorders, the first in Prussia. He wrote: *Untersuchungen über das Gehirn* (1874), the result of long research on cerebral physiology and pathology, and especially on localization of the various functions; *Ueber traumatische Tabes* (1894); and *Der Querulantenwahnsinn* (1895).

HITZIG, FERDINAND (1807-75). A German biblical scholar. He was born June 23, 1807, at Hauingen, Baden, and educated at Heidelberg, Halle, and Göttingen. In 1833 he was called to Zürich as professor of theology, with a special view to the exegesis of the Old Testament; but his lectures embraced also the New Testament and the languages of the East. In 1861 Hitzig returned to Heidelberg as professor. The first work which established his fame was his *Der Prophet Jesaia übersetzt und ausgelegt* (1833). Besides a translation of the Psalms, with a commentary (1835-36), he furnished for the *Exegetisches Handbuch zum alten Testament* the commentaries on the minor prophets (1838), on Jeremiah (1841), Ezekiel (1847), Ecclesiastes (1847), Daniel (1850), and the Song of Solomon (1855), with a translation of all the prophetical books as a supplement (1854). He died at Heidelberg, January 22, 1875. For his biography, consult Steiner (Zürich, 1882).

HITZIG, JULIUS EDUARD (1780-1849). A German criminal jurist and biographer. He was born in Berlin, studied law at Halle and Erlangen, and from 1799 to 1835 was connected more or less closely with the criminal courts of Warsaw and Berlin. To this period belong the *Zeitschrift für die preussische Kriminalrechtspflege* (1825) and *Annalen für deutsche und auslandische Kriminalrechtspflege* (1828), both founded by him. At Warsaw he had been intimate with the poets Mnioch and Werner, and in Berlin he was even more prominent in literary circles as founder of the 'Mittwochsgesellschaft,' a literary club. Hitzig was editor of the *Presszeitung* (1840-44), and author of biographies of Werner (1823), of Hoffmann (1823, 3d ed. 1839), and of Chamisso (1839-40). With Häring, in 1842, he began to publish a *Neue Pitaval;* in 1826 he had brought out *Gelehrtes Berlin im J. 1825.*

HIVE-BEE. The honey-bee. See BEE.

HIVES. A name popularly given to the eruption known as urticaria or nettle-rash (q.v.). The eruption appears as white rounded elevations or long wheals, which turn red later, especially after scratching or rubbing, for the prurigo is intense. The use of lobsters or crabs has caused hives in some people. Certain drugs, such as the balsams, often cause it. After unloading the bowels, local treatment with dilute acids or bichloride of mercury will give relief. Alkalies and salicylates, taken internally, cut an attack short.

HIVE SYRUP, *Syrupus Scillæ compositus.* The compound syrup of squills, a plant growing on the northern coast of the Mediterranean Sea. The bulb is the officinal portion. It is generally dried for use, but is sometimes imported packed in sand, in a partially undried state. The syrup is prepared usually by taking of squill a moderately coarse powder; senega, a moderately fine powder; tartrate of antimony and potassa; sugar; diluted alcohol; and water. The whole is carefully mixed according to formulæ laid down in the Pharmacopœia. In its action it is an emetic, and combines the virtues of senega,

squill, and tartar emetic, of the last of which it contains but one grain to the fluid ounce. It is also diaphoretic, expectorant, and in large doses cathartic. It was originally devised for the treatment of spasmodic croup and hives, whence comes its popular name. Great care must be taken, in employing it, not to allow its sedative operation to proceed too far. In overdoses it has been known to produce a fatal inflammation of the stomach and bowels, since tartar emetic is highly poisonous.

HI'VITES (probably connected with Ar. *hayy*, family, or Heb. *Hawwah*, Eve, or else from *hawwah*, serpent, in allusion to the clan-totem). One of the peoples driven out of Palestine by the Hebrews (Ex. iii. 8 et al.) and placed in the list (Gen. x. 17) among the sons of Canaan. Several of the biblical passages in which Hivites are mentioned present an uncertain text, as e.g. Joshua ix. 7, xi. 3; II. Sam. xxiv. 7. Hebrew writers seem to have confused Hivites, Horites (q.v.), and Hittites (q.v.), so that we cannot be quite certain even whether such a people as the Hivites ever existed.

HIZEN, hē'zen. One of the nine provinces of the island of Kiushiu, Japan, famous in history and for its kaolin and the production of porcelain. It is rich in tea, tobacco, vegetable wax, and coal, but not in cereals, though in quality its rice is reckoned the best. Its chief towns are Saga and Nagasaki (q.v.). Arita and Imari, both situated in this province, are famed for their ceramic ware. It was formerly divided among ten daimios (q.v.). It is now mostly within the Nagasaki ken. Consult: Rein, *Japan* (London, 1884), and for the ceramic industries of the province, Brinkley, *Japan: Its History, Arts, and Literature*, vol. viii. (Boston, 1901-02).

HJÄRNE, yär'ne, HARALD GABRIEL (1848—). A Swedish historian, born at Klastorp. He was educated at Upsala, where he became docent (1872) and professor (1889). His studies on the relations between Russia and Sweden are of particular importance. He wrote: *Polens nordiska politik närmast före kongressen i Stettin 1570* (1884); *De äldsta svensk-ryska legationsakterna* (1884); *Från Moskva till Petersburg*, a sketch of Russian civilization (1888-89); *Unionsfrågan* (1892); *Sveriges statsskick under reformationstiden 1520-1611* (1893); *Medeltidens statsskick* (1895); and *Svensk-ryska förhandlingar 1564-72* (1897).

HOACTZIN, hō-äkt'sĭn (South American name), or HANNA. A bird (*Opisthocomus cristatus*) of Guiana and Brazil, possessing many conflicting characteristics of structure, so that its place in classification has been greatly in dispute. Some writers have regarded it as nearly related to the plantain-eaters; others to the curassows. Most recent writers have placed it with or very near the Gallinæ, but generally as a separate order, the Opisthocomi. It has the general shape of a curassow, but in size is much smaller; is olive-color, varied with white above and deep bay below; and has a long pendent crest of loose yellow feathers. The tail is long and broadly tipped with yellow. It lives in bands in the forest, frequents the borders of streams, feeds upon leaves and fruits, rarely leaving the lower trees and bushes, flying weakly, and uttering a 'sharp grating hiss' as a call note. It feeds largely on a species of arum, which gives its flesh and whole body a vile musky odor, so that it is known in British Guiana as 'stink-bird.' On the Amazon it is called *cigano*, or 'gypsy.' Its nest is rudely built of sticks on

THE HOACTZIN.

some low bush, and the eggs, three or four in number, are whitish with reddish-brown blotches. The character and actions of the young are, however, the most remarkable thing about this extraordinary bird. They are hatched naked, and possess at birth well-developed claws on both

YOUNG HOACTZIN.
Showing hand-like use of immature wings.

the index (forefinger) and pollex (thumb) digits of the fore limb. Soon after hatching, the nestlings begin to crawl about by hooking these claws about twigs or any object accessible, and so use their wings precisely as feet, holding on also by the bill. This is an interesting reminder of the condition of the wing in the most ancient of birds (see ARCHÆOPTERYX), which used its anterior digits in much the same way. The young hoactzin, however, sheds its claws after a few days. Consult Newton, *Dictionary of Birds* (London and New York, 1896), where many further references are given.

HOADLEY, hōd'lī, GEORGE (1826-1902). An American lawyer, and Governor of Ohio, born in New Haven, Conn. He was educated in the public schools of Cleveland, where his father had settled in 1830, and at Western Reserve College, then at Hudson, Ohio, where he graduated in 1844. He studied law at the Harvard Law School, was admitted to the bar in 1847, and two years later became a partner in the law firm of Chase & Bull at Cincinnati, in which Salmon P. Chase was the senior member. In 1851 he was chosen by the Legislature judge of the Superior Court of Cincinnati; in 1855 became city solicitor; and in 1859, upon the reorganization of the Superior Court, was elected judge, and was re-elected in 1864. Originally a Democrat, he took a prominent part in the 'Barnburner' movement, was a War Democrat, and finally during the war allied himself with the Republican Party. He resigned from the bench in 1866 to resume his law practice. In 1872 he was active in the Liberal Republican revolt, but dissatisfaction with the nomination of Greeley caused him to remain in the party. In 1876, however, he allied himself with the Democratic Party on the tariff issue, and was one of the counsel for Tilden before the Electoral Commission. In 1883 he was the party's candidate for Governor of Ohio, being elected over Joseph B. Foraker by 12,000. Two years later he was in turn defeated by Foraker for reëlection to the same office. From 1887 until his death he practiced law in New York City.

HOADLY, BENJAMIN (1676-1761). A Church of England prelate. He was born at Westerham, Kent, November 14, 1676. He graduated B.A. at Cambridge 1696, became preacher in London in 1701, Bishop of Bangor in 1715, of Hereford in 1721, of Salisbury in 1723, and of Winchester in 1734. He attracted attention by controversies with the Nonconformists, and with the High-Church Party of the Church of England. His principles were developed in his *Essay on the Origin of Civil Government* (1709). The accession of George I. in 1714 brought Hoadly's views into favor with the Court, and he received advancement. In 1717 the so-called *Bangorian Controversy* arose. It began by Hoadly's publication of his views on the text, "My kingdom is not of this world;" in regard to which he maintained that Christ had left behind Him no such authority as that claimed by churches, and that this was the best way of answering the pretensions of the Church of Rome. These views gave great offense both to High Church and Dissenters. He was attacked from all quarters, and the controversy raged for three years. He died at Chelsea, London, April 17, 1761. His works were published with a life by his son, John Hoadly (London, 1773).

HOANG-HO, HWANG-HO, hwäng'hō', or YELLOW RIVER. Next to the Yang-tse-kiang, the largest river of China. It rises in a marshy plain in the District of Kuku-nor, Tibet, west of Lake Charing-nor and only a short distance north of the upper course of the Yang-tse-kiang. Its course is exceptionally tortuous. After flowing eastward to near the boundary of Tibet, it changes its direction first to the northwest and then to the northeast, in which latter direction it flows through the Chinese Province of Kan-su. Leaving the Province of Kan-su, it crosses the Great Wall into Mongolia. There it flows at first northeast and then east as far as the western boundary of the Chinese Province of Shan-si, where it turns sharply to the south, and, passing the Great Wall again, flows between the provinces of Shen-si and Shan-si, forming their boundary line. At about latitude 35° N. it turns sharply east, which direction it maintains as far as the city of Kai-fung, in the Province of Ho-nan. From that point it flows in a northeastern direction until it falls into the Gulf of Pe-chi-li about latitude 38° N. Its total length is probably over 2500 miles, and its basin is estimated at 400,000 square miles. The chief tributaries of the Hoang-ho are the Tao-ho from the south, the Wei-ho from the west, and the Ta-tung-ho from the north. The Hoang-ho is navigable for small vessels for a short distance from its mouth and in some parts of its middle course. The course of the river has changed repeatedly, and the present mouth was that of the Ta-tsin until 1853. Prior to that time the course of the river below K'ai-fung was southeasterly, and its mouth in the Province of Kiang-su in about latitude 34° N. The sediment which is transported in large quantities by the Hoang-ho raises its bed, thereby causing inundations. These have been so frequent and so disastrous that the river has come to be known as 'China's sorrow.' In order to guard against the inundations, a vast system of dams and dikes has been maintained from time immemorial.

HOAR, hōr, EBENEZER ROCKWOOD (1816-95). An American jurist. He was born at Concord, Mass., the son of Samuel Hoar, graduated at Harvard in 1835, and was admitted to the bar. He was a judge of the Court of Common Pleas from 1849 to 1855, and of the State Supreme Court from 1859 to 1869. In 1869-70 he was Attorney-General of the United States. He was a member of the Joint High Commission that framed the Treaty of Washington in 1871, and was a Republican member of Congress in 1873-75.

HOAR, GEORGE FRISBIE (1826—). An American legislator, born at Concord, Mass. He graduated at Harvard in 1846, studied law in the Dane Law School, Harvard, and then opened an office in Worcester. He was an ardent member of the Free Soil Party, and later of the Republican Party, almost from the time of its organization; and in 1852 he was elected one of its representatives in the Massachusetts Legislature. Though his ambition at this time was for a legal rather than a political career, he was induced to accept other nominations, which resulted in his serving in both branches of the State Legislature and in the United States House of Representatives, of which he was a member from 1869 until 1877, when he was chosen Senator by his State. During his last year in the House he was a member of the Electoral Commission (q.v.), chosen in 1876, which decided that Hayes had been elected President over Tilden. He presided over the Republican National Convention of 1880, which nominated Garfield and thus ended the bitter contest between Grant and Blaine. He was always a consistent opponent of 'imperialism' from the days when he aided Sumner in his opposition to the annexation of Santo Domingo; and, though he supported President McKinley for reëlection, he strongly opposed his policy in the Philippines, which he considered subversive of

American ideals. During his service in the House Mr. Hoar was one of the managers of the Belknap impeachment trial, and after his election to the Senate he was chairman of the committees on the judiciary and on privileges and elections, and a member of the committees on engineering bills, civil service and retrenchment, library claims, Nicaragua claims, and rules, as well as chairman of the select committees on woman suffrage, and relations with Canada. Among the non-political offices to which he was appointed are: Regent of the Smithsonian Institution (1880), president of the American Antiquarian Society, president of the American Historical Association, president of the Board of Trustees of Clark University (1900), and trustee of the Peabody Fund.

HOAR, SAMUEL (1778-1856). An American lawyer and legislator. He was born at Lincoln, Mass.; graduated at Harvard in 1802; was admitted to the bar in 1805, and soon became a prominent lawyer. He was a State Senator in 1825 and again in 1833, and was a Whig member of Congress from 1835 to 1837. In 1844 he was sent by the Massachusetts Legislature to South Carolina to dispute before the courts the constitutionality of certain laws of that State authorizing the imprisonment of free negroes coming into it. He was, however, not allowed to plead, but was forcibly expelled from Charleston by the public authorities, the South Carolina Legislature by special act authorizing the expulsion.

HOARE, Sir RICHARD COLT (1758-1838). An English antiquary, born at Stourhead, in Wiltshire. At twenty-five he married Lord Lyttelton's eldest daughter, and, after her death, two years later, traveled extensively over Europe. He wrote descriptions of his travels in Ireland and in Italy; a translation of Giraldus Cambrensis (1808); and, most important among his works, a *History of Ancient Wiltshire* (1821), succeeded by an incomplete *History of Modern Wiltshire*, dealing with the southern section only (1822 and 1843).

HOAR FROST. See FROST.

HOARHOUND. See HOREHOUND.

HOARSENESS. See THROAT, DISEASES OF.

HO'BART. The capital of Tasmania, situated on the Derwent, near its entrance into Storm Bay, on the south coast of the island (Map: Tasmania, D3). Besides the Government official buildings, Hobart has a college, a technical school, two cathedrals, hospitals, a free library, museum, and art gallery. Its naturally excellent harbor and quay with three patent slips accommodate ships of the largest size. It has considerable manufactures, a large export and import trade, railway communication with Launceston, and steamship communication with Sydney, Melbourne, New Zealand, and London. It is the seat of a United States consul and the see of Anglican and Catholic bishops. With Mount Wellington as a picturesque background, regularly laid out and well-lighted streets, a good spring-water supply, street railroads, fine parks and drives, Hobart is a favorite summer resort for Australians. The mean temperature for the year is 52.3°, being 42.1° in winter, and 63.1° in summer. Population, 1891, 30,608; 1901, 31,317. It was founded in 1804.

HOBART, GARRET AUGUSTUS (1844-99). An American lawyer and politician, Vice-President of the United States. He was born at Long Branch, N. J.; graduated at Rutgers College in 1863; was admitted to the bar three years later, and practiced his profession with success at Paterson, N. J., where he made his home until death. He was city counsel there in 1871; was a member of the State Assembly from 1873 to 1878, and of the State Senate from 1879 to 1885, presiding over both of those bodies. He was five times successively delegate-at-large from New Jersey to the Republican National Convention; was nominated at Saint Louis in 1896 for Vice-President on the ticket with William McKinley, and was elected to that office. To a greater extent, perhaps, than any of his predecessors in the Vice-Presidency, he made that office one of real influence and power. He was the intimate friend and counselor of President McKinley, and exercised a strong influence on the conduct of public affairs. He was interested in many banking and other business corporations, and accumulated a large fortune. He died before the expiration of his term of office, on November 2, 1899.

HOBART, JOHN HENRY (1775-1830). A Protestant Episcopal bishop of New York. He was born in Philadelphia, Pa., and was the descendant in the fifth generation of a Puritan family of New England, originally established by Joshua Hobart at Hingham, Mass. He was left fatherless in his first year and was carefully trained by his mother. He graduated at Princeton in 1793, and was tutor from 1795 to 1798, when he took orders in the Episcopal ministry. His first charges were in Philadelphia, New Brunswick, N. J., and Hempstead, L. I. In 1800 he was appointed curate of Trinity Church, New York; in 1801 was ordained priest, and after showing marked ability in parish work, in various official capacities, and as the author of several ecclesiastical manuals, was elected Assistant Bishop of New York in 1811, and assistant rector of Trinity Parish in the following year. In 1816 he became rector of Trinity and Bishop of the diocese. In 1821 he was appointed professor of pastoral theology and oratory in the New York General Theological Seminary of the Protestant Episcopal Church, of which institution he was one of the founders. Ill health caused a suspension of his labors, and he spent the years 1824-25 in Europe, studying social, moral, and religious conditions. His return in 1826 was marked by renewed literary and pastoral activity, and on his annual visitation he traveled 3000 miles, heedless of the scanty transportation facilities, in his anxious watchfulness over the growing institutions of his ever-increasing diocese. The labors of his visitations, however, at length proved too much for his declining health, and a sudden failure of his powers was followed by his death at Auburn, N. Y., September 12, 1830. His writings, which went through many editions, include: *Companion for the Altar* (1804); *Festivals and Fasts* (1804); *Clergyman's Companion* (1805); *Controversial Essays* (1806); *Apology for Apostolic Order* (1807); *The Christian's Manual* (1814); *The State of the Departed* (1814); and *A Comparison of the United States With England* (1826). He also edited D'Oyley and Mant's "Family Bible" (2

HOBBEMA

"THE AVENUE OF MIDDLEHARNIS," FROM THE PAINTING IN THE NATIONAL GALLERY, LONDON

vols., 1818-20). Consult: Berrian, "Memoir," attached to the *Posthumous Works of Bishop Hobart* (New York, 1833); McVickar, *The Early Professional and Closing Years of Bishop Hobart* (New York, 1836).

HOBART, JOHN HENRY (1817-89). An American Episcopal clergyman and author, the youngest son of John Henry Hobart (q.v.). He was born in New York City, graduated at Columbia College, and was ordained in 1841. After having a charge at Baltimore, he was assistant in Trinity Church, in New York City, for fifteen years, and afterwards became rector of Trinity Church, Fishkill, N. Y. He published: *Instruction and Encouragement for Lent* (1859); *Mediævalism* (1877); and *Church Reform in Mexico* (1877).

HOBART COLLEGE. A college, situated at Geneva, N. Y., under Episcopal auspices. It was projected in 1812, and named after Bishop Hobart, through whose efforts it was organized. A provisional charter was secured in 1821, and a full charter in 1825, under the title of Geneva College. In 1852 the name was changed to Hobart Free College, and in 1860 to Hobart College. The college offers academic courses leading to the degrees of Bachelor of Arts, of Philosophy, and of Letters. It had, in 1902, 19 instructors, 100 students, a library of about 40,000 volumes, property valued at $676,895, including grounds and buildings worth $167,480, and an annual income of $31,670.

HOBART PASHA, pä'shä' (AUGUSTUS CHARLES HOBART-HAMPDEN) (1822-86). An English admiral in the Turkish service. He entered the British Navy in 1835; distinguished himself in the Crimean War, and when he retired in 1863 was captain. During the American Civil War he was a blockade-runner, and had many narrow escapes. In 1867 Hobart entered the Turkish service as naval adviser to the Sultan. His first service was in suppressing the Cretan rebellion, for which he was promoted an admiral with the title of pasha. He reorganized the Turkish fleet, which he commanded on the Black Sea against Russia, in the War of 1877-78, and in 1881 was appointed marshal of the Empire. Although his name was twice struck from the British navy list for operating against powers friendly to Great Britain, in disregard of the Foreign Enlistment Act, he was finally restored in 1885 with the rank of vice-admiral. His book, *Sketches of My Life* (1887), published posthumously, is a mixture of fact and fiction.

HOBBEMA, hôb'bâ-mä, MEINDERT (1638-1709). A Dutch landscape painter. His birthplace is unknown, although seven towns, Amsterdam among them, claim the honor. The date of birth, 1638, is verified by the statement in the record of his marriage at Amsterdam, October 2, 1668, that he was thirty years old at that time. Hobbema passed most of his life at Amsterdam, where he seems to have been a pupil of Ruysdael (q.v.). As such well-known contemporaries as Berchen, Vandevelde, and Lingelbach are said to have painted the figures in his landscapes, it seems likely that he was appreciated by the artists of his day. The general public, however, ignored his work, and he died at Amsterdam in poverty, December 14, 1709.

Hobbema and Ruysdael are the greatest landscape painters of the Dutch school; their art marks its consummation. Ruysdael is usually considered the greater of the two because his subjects are grander; he painted rocky gorges, torrents rushing through ravines, stormy autumn scenes, while Hobbema preferred the gentler aspects of nature, such as quiet woodland scenes, pools of water with subtle sunlight effects, romantic water-mills and streams. In subtlety of technique he was the equal, probably the superior, of Ruysdael. His pictures are rich in warm and golden tones, and his color has a transparent quality, with brilliant effects reflected in sky and water. His technique is bold in touch, but careful in finish of details. No one has better portrayed the magical effects of sunlight. He is more absolutely true to nature than Ruysdael; his trees are more individual, with greater variety of foliage and color. It was not until the eighteenth century that his merit was appreciated. The English were the first to acknowledge it, and therefore far the greater number of his best works are now in the private collections of England. Hobbema also exercised great influence upon the English landscape painters of the latter eighteenth century, especially upon Old Crome. At present his works are much sought after, and their high value has caused forgeries of signatures and dates upon his paintings. It is therefore impossible to date them with accuracy.

Of all public collections the National Gallery is richest in works of Hobbema, possessing five of his landscapes. The best known of these is the "Avenue Near Middelharnis, Holland," one of the towns claiming to be his birthplace. The effect of its aërial perspective is very remarkable, as is also the glowing light from the sky. Another fine picture in the National Gallery is the "Ruins of Breberode Castle," faithfully rendered, just as it now stands on the road to Haarlem. The Glasgow Gallery is rich in his pictures, and Amsterdam has several, including the famous "Water-Mill." There are also good examples in the Louvre, and in the galleries at Brussels, Berlin, Dresden, Frankfort, and Vienna. The Metropolitan Museum, New York, possesses a "Landscape View in Holland." Consult Michel, *Hobbema et les paysagistes de son temps en Hollande* (Paris, 1890).

HOBBES, hŏbz, JOHN OLIVER (PEARL RICHARDS CRAIGIE) (1867—). An English novelist, born in Boston, Mass. Her father removed to England while she was very young, and she was educated there by private tutors and later in Paris and at University College, London. She was married in 1887 to Reginald W. Craigie, but the marriage proved an unhappy one, and she secured a divorce in 1895. Among her publications are the novels: *Some Emotions and a Moral* (1891); *The Sinner's Comedy* (1892); *A Study in Temptations* (1893); *The Gods, Some Mortals, and Lord Wickenham* (1895); *A Bundle of Life* (1894); *Robert Orange* (1900); *The Serious Wooing* (1901); and *Love and the Soul Hunters* (1902); and the plays, *Journeys End in Lovers' Meeting*, for Miss Ellen Terry (1894); *The Ambassador* (1898); and *A Repentance* (1899). Her style is cynical, brilliant, and epigrammatic, especially in dialogue.

HOBBES, THOMAS (1588-1679). An English philosopher and political theorist. He was born at Malmesbury, on April 5, 1588, the son of a

clergyman. At the age of fifteen he went to Oxford and studied the usual course of Aristotelian logic and physics. At the age of twenty, having taken his degree and quitted Oxford, he was recommended to Lord Cavendish, afterwards Earl of Devonshire, as tutor to his eldest son. Thus began an intimate connection with that great family which lasted through his long life.

In 1610 he went abroad with his pupil, and made the tour of France and Italy. After his return he still continued to live with the Earl of Devonshire's family, and his residence in London afforded him opportunities of becoming acquainted with Bacon, Ben Jonson, and the other distinguished men of the time. Meantime he was occupied with classical, political, and philosophical studies, and prepared for publication his first work, a translation of Thucydides, which came out in 1628. His interest in Thucydides was largely political. For many years he still derived his income from tutorial work, but gave his leisure to study. The political disturbances of the time made him desirous of political stability and order, which he believed could but be obtained by unquestioning recognition of the absolute power of the sovereign. This power, according to Hobbes, is neither original nor divine, but was delegated by the subjects in a compact which created the State and gave rise to all moral and political obligation. Primitive man did not live in any social or political organization. Every one was at first bent on securing his own selfish ends, but came to see that the warfare which inevitably resulted from the clash of unregulated interests was suicidal. A contract was made whereby this war of each against all—*bellum omnium contra omnes*—was brought to a close, a civil government established, and loyalty pledged to the sovereign power thus constituted. Whatever laws this power lays down are the measure of right and wrong. These views were published in various works: *De Cive* (1642); *Humane Nature* (1650); *De Corpore Politico* (1650); *Leviathan, or the Matter, Form, and Power of a Commonwealth* (1651).

After the meeting of the Long Parliament in 1640 Hobbes had returned to Paris, from his dread of the civil troubles. In 1647 he was appointed mathematical tutor to the Prince of Wales, afterwards Charles II.; but the character of his writings, especially after the publication of the *Leviathan*, so offended the Royalist clergy, in common with all other sects, that Charles was induced to part with him, and he took alarm for his personal safety and abruptly fled in 1651 to Paris; but after a short stay there, knowing that he had caused much irritation in France by his bitter attacks on the Papacy, he returned to England, where he was allowed to live quietly. Very different was his position after the Restoration; for although Charles granted him a pension of £100 a year, the dislike to his views was so general that they were condemned by the House of Commons in 1666, and he was in danger of still severer measures. His connection with the Earl of Devonshire, with whom he lived in the latter part of his life, was no doubt a powerful protection to him. His old age was fruitful in additions to his writings, and was marked by some sharp controversies. His last works were a translation of Homer and a history of the civil wars. He died on December 4, 1679.

All his Latin works were collected and published by himself (Amsterdam, 1668), and by Molesworth (5 vols., London, 1839-45). His English works were edited by Molesworth (11 volumes, including index, London, 1839-45). F. Tönnies edited and published *Behemoth, or the Long Parliament* (London, 1889).

In philosophy and psychology Hobbes was a sensationalist, and, at least at times, a materialist. All change for him is motion, hence sensuous perception is motion, and pleasure is also motion. Just why motion should appear in the form of consciousness is an inexplicable mystery. Sense-impressions, in their combinations and transformations, give rise to memory and thought. This takes place according to definite laws. The order of succession of memory-idea is that of the original sense-impressions, while the impressions originally in combination tend to reappear in the same combination; this fact he called the law of contiguity. Indeed, Hobbes is commonly regarded as the 'father of associational psychology.' Hobbes's ethics was hedonistic. It is man's desire for pleasure that made him in the first instance establish civil authority, but it is the supremacy of that authority which makes it binding now. Consult: Tönnies, "Anmerkungen über die Philosophie des Hobbes," four articles in *Vierteljahrsschrift für wissenschaftliche Philosophie* (Leipzig, 1879-81); Robertson, *Hobbes* (Edinburgh, 1886); Wille, *Der Phänomenalismus des Thomas Hobbes* (Kiel, 1888); Lewis, *Ueber den Individualismus bei Hobbes* (Halle, 1892); Sneath, *The Ethics of Hobbes* (Boston, 1898); Stephen, *Hobbes* (London, 1903); Graham, *English Political Philosophy from Hobbes to Maine* (New York, 1900).

HOBBY (OF. *hobe*, from *hober*, to move, from ODutch *hobben*, to toss, *hoppen*, to hop, AS. *hoppian*, Ger. *hopfen*, to hop). A small European falcon (*Falco subbuteo*), formerly trained in falconry to fly at pigeons and partridges. The nearest North American species is the pigeon-hawk.

HOB'HOUSE, JOHN CAM. See BROUGHTON, Baron.

HOB'KIRK'S HILL, BATTLE OF. A battle fought at Hobkirk's Hill, about two miles north of Camden, S. C., on April 25, 1781, during the American Revolution, between an American force of about 1400, under General Greene, and an English and Tory force of about 950, under Lord Rawdon. The latter, leaving his strong position at Camden, attacked the Americans with great gallantry, and after some stubborn fighting gradually forced them from the field, Greene's plan of battle being deranged by the unexpected retreat of a brigade upon which he had placed implicit reliance. The victory gave no strategic advantage to Rawdon, who on May 10th evacuated Camden and retreated toward Charleston. The loss of the Americans in killed, wounded, and missing was 271; that of the English and Tories, 258. This engagement is also known as the second battle of Camden. Consult: Carrington, *Battles of the American Revolution* (New York, 1877), and Dawson, *Battles of the United States* (New York, 1858).

HO'BOKEN. A city in Hudson County, N. J., on the Hudson River, opposite New York, of which it is a suburb, and adjoining Jersey City. It is the terminus of the Hamburg-American, North German Lloyd, Netherlands-American, and

Thingvalla steamship lines, and of the Delaware, Lackawanna and Western Railroad (Map: New Jersey, D 2.) The city lies at the base of the Palisades, the principal streets running north and south, parallel to the river. In the eastern section rises a hill. The site of Stevens Institute of Technology (q.v.) is fronted by Hudson Park. In the latter is a soldiers' monument; and in Church Square Park are situated the public library and a firemen's monument. Saint Mary's Hospital is a noteworthy structure. Hoboken is a great shipping place for coal. The most important manufactures comprise foundry and machine-shop products, lead pencils, leather goods, silk, wall-paper, and caskets. The government is administered by a mayor, elected every two years, who appoints assessors, and school, health, fire, and library commissioners, and, with the consent of the council, police commissioners, of which board he is the president. The council is unicameral and elects the city clerk and assistants, and inspectors. All other administrative officials are chosen by popular vote. The municipal income and expenditures annually amount to about $1,910,000 and $1,810,000, respectively, the main items of expense being $75,000 for the fire department, $115,000 for the police department, $150,000 for operation of the water-works, and $175,000 for schools. Population, in 1870, 20,297; in 1890, 43,648; in 1900, 59,364, including 21,400 persons of foreign birth and 100 of negro descent.

The land on which Hoboken stands was part of the patroonship granted to Michael Pauw in 1630, and was then called Hobocan Hacking, 'the land of the tobacco-pipe,' in allusion to the fact that Indians carved pipes from a kind of stone found here. A house was built about 1640 by Arendt Teunisson Van Putten, and a straggling settlement grew up; but the present city really dates from 1804, when John Stevens, 'the founder of Hoboken,' bought the land and laid out a town. During the first quarter of the nineteenth century the Elysian Fields in Hoboken were the favorite pleasure resort for New Yorkers, and became noted as the meeting-place of Federalist politicians. Hoboken was incorporated as a town in 1849, its population then being about 2000, and in 1855, with a population of about 6700, it was chartered as a city. In 1900 a fire at the wharves of the North German Lloyd Steamship Company caused the loss of about 200 lives, and destroyed property, including three steamers, valued at $5,000,000. Consult Winfield, *History of the County of Hudson* (New York, 1874).

HOB'SON, JOHN ATKINSON (1858—). An English educator and author, born at Derby. He was educated at Lincoln College, Oxford; from 1880 to 1887 was classical master in schools at Faversham (Kent) and Exeter, and from 1887 to 1897 was lecturer in English literature and economics for the University Extension Delegacy and the London Society for the Extension of University Teaching. From the time of the appearance of his *Problems of Poverty* (1891, No. 2 in the "Social Questions of To-day" series) he became known as one of the more prominent British economists of the recent school, and a very effective writer. His other publications include: *The Physiology of Industry: Being an Exposure of Certain Fallacies in Existing Theories of Economics* (1889; with A. F. Mummery); *The Evolution of Modern Capitalism* (1894); *Coöperative Labour upon the Land, and Other Papers* (1895); *The Problem of the Unemployed: an Enquiry and an Economic Policy* (1896); *John Ruskin, Social Reformer* (1898), a very careful and interesting analytical treatise in vindication of Ruskin's humanization of political economy, and containing also valuable accounts of the industrial experiments furthered and directed by Ruskin; *The War in South Africa: Its Causes and Effects* (1900); *The Economics of Distribution* (1900), an important attempt to reconcile and systematize the various theories of price and value; *Capitalism and Imperialism in South Africa* (1900; a monograph reprinted from the *Contemporary Review*); *The Psychology of Jingoism* (1901); and *The Social Problem; Life and Work* (1901), in which he develops socialistic theories to the extent of maintaining the necessity of the acquisition of monopolies by municipalities, commonwealths, or nations. He also contributed extensively to technical and popular reviews.

HOBSON, RICHMOND PEARSON (1870—). An American naval constructor, born in Greensboro, Ala. He entered the Southern University in 1882, but three years afterwards accepted an appointment to the United States Naval Academy, where he graduated in 1889, and then took a post-graduate course at the Ecole Nationale Supérieure des Mines and the Ecole d'Application du Génie Maritime, in Paris. He served on various naval stations and at the New York and the Newport News navy-yards, and in 1897 he was ordered to Annapolis to organize a post-graduate course for those officers who intended to enter the construction corps. During the war with Spain he was present at the bombardment of Matanzas, and took part in the expedition against San Juan de Puerto Rico; but his great achievement was the sinking of the collier *Merrimac* across the entrance to Santiago Harbor before daylight, on June 3, 1898, in order to 'bottle up' Cervera's fleet. He did not succeed in accomplishing the desired result, but the daring of the exploit made popular heroes of all concerned in it. After the war he raised and refitted several of the Spanish war-ships which had been sunk in Cuban and Philippine waters. He resigned from the Navy in 1903. Among his publications are *The Disappearing Gun Afloat*, and *The Sinking of the Merrimac*.

HOBSON'S CHOICE. A term used to signify that a person must take what is offered or go without, i.e. 'This or none.' The phrase arose at Cambridge, in Milton's time, where one Tobias Hobson kept stables and used to let out horses to the students. Every customer was courteously given his choice of horses, but he invariably found that he was obliged to take the horse which happened to be nearest the door or go without.

HOC'CLEVE, or **OCCLEVE,** THOMAS (1370?-1450?). An English poet. Concerning his life very little is known. For twenty-four years he was clerk in the Privy Seal Office, London. His principal work, *De Regimine Principum* (Concerning the Duties of Kings), mainly a digest of a Latin treatise under the same title by Ægidius Colonna, consists of 5488 lines in Chaucer's seven-line stanza. In the prologue, which comprises about a third of the work, Hoccleve men-

tions some incidents of his life. He says he was poor and his pension not paid; and laments the death of Chaucer, who is called the "floure of eloquence." The rest of the long poem is devoted mainly to moral reflections on the manners of the time. On the margin of one of the MSS. Hoccleve drew in colors the well-known portrait of Chaucer, his 'maister dere.' Hoccleve also wrote several other poems, among which is the beautiful orison to the Virgin, beginning "Mother of God and Virgin undefouled." This last poem may be only a copy from Chaucer. Consult *Works*, ed. F. J. Furnivall for the Early English Text Society (London, 1892-97).

HOC'CO (native name in Guiana). A native name applied by Buffon to curassows in general, but apparently applicable and now restricted especially to the Mexican species (*Crax alector*), also called 'royal pheasant' by the Mexicans. Consult Sumichrast, "Native Birds . . . of Vera Cruz," in *Memoirs of the Boston Society of Natural History*, vol. i., pt. iv. (Boston, 1869). See CURASSOW.

HOCHBERG, hōg'bĕrk, BOLKO, Count von (1843—). A German patron of music and dramatic composer, whose earlier music appeared under the pseudonym 'J. H. Franz.' He was born at Castle Fürstenstein, in Silesia; studied law at Bonn and Berlin, and soon gave up the diplomatic service to devote himself to music. Hochberg founded in 1870 the Silesian musical festivals, to the success of which he greatly contributed. In 1886 he was appointed general superintendent of the Court theatre of Berlin, and in 1897 he was made an hereditary member of the Prussian House of Lords. Besides symphonies, songs, and string quartets, he composed *Claudine von Villabella* (1864) and *Der Wärwolf* (1876).

HOCHE, ôsh, LAZARE (1768-97). A general of the French Revolution. He was born June 25, 1768, at Montreuil, near Versailles. In 1784 he entered the Army, but joined the National Guard at Paris in 1792 as a sergeant of grenadiers. Owing to his military experience and soldierly qualities, he rapidly obtained promotion. In 1793, after distinguishing himself under Leveneur, he was made Adjutant-General of the Army of the North. Some hasty words, caused by the arrest of his chief, Leveneur, brought about Hoche's arrest, but he was acquitted by the revolutionary tribunal at Douai and restored to his command, and aided Souham in the defense of Dunkirk. Having succeeded in repulsing the Duke of York, Hoche was made a general of division and given the command of the French forces on the Moselle, and in spite of the numerical superiority of the enemy succeeded in driving the Austrians out of Alsace, after defeating them at Weissenburg (December 26, 1793). His important services were requited, however, by suspicion and arrest, and had it not been for the downfall of Robespierre Hoche would probably have perished on the guillotine. On being set at liberty he received the command of the army operating in the west, and completely defeated the émigré army of invasion near Quiberon Bay in July, 1795. He was next intrusted with the task of suppressing the royalist revolt in La Vendée, and at the head of an army of 100,000 men succeeded in pacifying the country in less than a year. In December, 1796, he commanded the army destined for the invasion of Ireland, but adverse conditions of wind and weather scattered his ships and made the expedition a failure, though a part of the fleet succeeded in reaching the Irish coast. Hoche was then made commander of the Army of the Sambre and Meuse, and in the spring of 1797 won several victories over the Austrians. The preliminaries of Leoben put an end to his activity, and on September 19, 1797, he died very suddenly at his camp at Wetzlar, though not by poison, as some have supposed. There are numerous biographies of Hoche, the best being: Desprez, *Lazare Hoche, d'après sa correspondance* (Paris, 1858); Dutemple, *Vie politique et militaire du général Hoche* (Paris, 1879); Font-Réaulx, *Le général Hoche* (Paris, 1890); Griffiths, *French Revolutionary Generals* (London, 1891).

HOCHKIRCH, hōg'kĕrk, or **HOCHKIRCHEN.** A village in the District of Bautzen, in Saxony. It was the scene of a battle between the Austrians and Prussians (October 14, 1758) during the Seven Years' War. Frederick the Great of Prussia, with an army 30,000 to 40,000 strong, having taken up an almost untenable position at Hochkirch, was surprised in the night-time, under cover of a thick fog, by Marshal Daun, with 65,000 Austrians, and compelled to retire to the heights of Drehsa. Here he was again attacked by the Duke of Aremberg, and after a conflict of five hours' duration, again retired. He lost 9000 men killed and wounded, and 100 guns. He himself and almost all his generals were wounded. The Austrians lost 6000 men. On May 21, 1813, a battle took place here between the French and the Allies. See BAUTZEN.

HÖCHST, hēgst. A town in the Prussian Province of Hesse-Nassau, at the confluence of the Nidda and the Main, 7½ miles northwest of Frankfort (Map: Germany, C 3). Höchst has one of the largest paint-factories in Germany, employing about 2500 men. There are also large porcelain-works, established in 1740, and manufactures of tobacco, gas, and water-mains, machinery, oilcloth, gelatin, and furniture. Höchst was made a city in 1400. Population, in 1890, 8455; in 1900, 14,121.

HÖCHSTÄDT, hōg'stĕt. See BLENHEIM.

HOCHSTETTER, hōg'stĕt-tĕr, FERDINAND VON (1829-84). An Austrian geologist, born at Esslingen, Württemberg. He was a member of the *Novara* expedition in 1857, and made a special study of the geology of New Zealand and the gold-fields of Australia, the results of which were published in the account of the expedition and in a small work on New Zealand. After his return to Europe he was appointed a professor at the Vienna Imperial Polytechnic Institute, and afterwards director of the Imperial Museum of Natural History. He wrote an authoritative work on the geology of Turkey and the Ural region, and published, together with Hann and Pakorny, the *Allgemeine Erdkunde*.

HOCK'DAY (from AS. *hēah*, high + *dæg*, day). The second Tuesday after Easter; formerly a popular festival in England observed as late as the sixteenth century. Hockday and Michaelmas (q.v.) were the rent-days in rural England. Hocktide or Hockdays included Hock-Tuesday and the day before. The origin of the festival is uncertain.

HOCK, HOUGH (AS. *hōh*, OHG. *hahsa*, Ger. *Hechse*, hock; ultimately connected with Lat. *coxa*, thigh, Skt. *kakṣa*, armpit). The joint between the knee and the fetlock in a horse's hind leg. *Hock-joint*, the hinge formed by tibia and astragalus.

HÖCKERT, hĕk'ĕrt, JOHANN FREDRIK (1826-66). A Swedish genre and historical painter, born at Jönköping. He studied art at Stockholm, went with Boklund to Munich (1846-49), from 1851 to 1857 studied in Paris, and traveled extensively in the Netherlands, Spain, Italy, and Northern Africa. His importance in Swedish art lies especially in his coloring. He was styled the 'Swedish Delacroix,' and in this point must be held one of the greatest artists of his country during the century. Höckert's best pictures are scenes of life in Lapland, where he had traveled in 1849 with the botanist Andersson. Besides, he painted a few portraits and many historical pictures such as "Christina Ordering the Execution of Monaldeschi" (1853); "The Rescue of Gustavus Vasa" (1858); and the uncompleted canvas "Burning of a Palace in Stockholm, 1697." Better known are: "Service in a Lapland Chapel," which received a gold medal at the Exposition of 1855, and is now at Lille; "Interior of a Hut in Lapland" (1858), at the Stockholm Museum; and the "Rättoiks Maiden," a Swedish genre canvas, now at Göteborg.

HOCK'ET (OF. *hoquet*, *hocquet*, *houquet*, hiccough; so called from the broken effect). One of the very oldest forms of composition, much in vogue during the twelfth and thirteenth centuries. After the fourteenth century the hocket seems to have disappeared entirely. It was a composition for two or three voices where one voice suddenly, and at irregular intervals, interrupted the other voices. It really was more contrapuntal trickery than a serious art-form. The English *catch* (q.v.) is very much like the hocket.

HOCKEY (also *hawkey*, *hookey*, apparently from *hook*, in allusion to the hooked club with which the game is played). A game played by opposing teams of eleven each, now divided into five forwards, three half-backs, two backs, and a goal-keeper, on a ground one hundred yards long by fifty or sixty wide. The playing space is indicated by white side lines and end or goal lines. The goals, one at each end, consist of two upright posts twelve feet apart and a horizontal bar seven feet from the ground. In front of each goal is a semicircular white line fifteen yards from it, curving back to a point twelve feet from each goal-post. No goal counts unless the ball was last hit, by one of the attacking side, inside this semicircle. The shape of the hockey-stick is not regulated, except that it must have no sharp edges or metal on it, and it must be able to be passed through a ring two inches in diameter. It is usually curved at the bottom end, and weighs in the neighborhood of 25 ounces. The ball is an ordinary cricket-ball painted white. The play is started from the centre of the ground by a bully, i.e. one player of each side takes position on opposite sides of the ball. Each strikes the ground on his side of the ball, and then each strikes his opponent's stick three times, alternately, over the ball. Either of the two can then strike the ball. When it is driven over the end lines by the attacking party, it is brought back to within 25 yards of the goal-line and started by another bully. When a defending party hits it over the goal-lines the penalty is a free hit by the attacking party from the corner flag. There are various penalty bullies. A goal is scored when the ball has been driven in a lawful manner, i.e. by a stroke in which the stick does not rise above the shoulder, and from within the prescribed 'striking circle' between the goal-posts and under the cross-bar. The ball may be caught and immediately dropped, or stopped with any part of the body; but must not be carried, or kicked, or knocked, except with the stick. When a ball passes the side lines it is rolled along the ground from the spot where it crossed by one of the opposite side to that of the player who last touched it. The game is usually played for seventy minutes in two halves, the players changing ends at the interval.

The game remained in an unorganized condition in England, its original home, until 1883, when the first modern rules were reduced to definite shape by the Wimbledon Club. In 1886 the Hockey Association was organized, followed in rapid succession by many county associations. Ireland and Wales also have national associations, and since 1894 international matches have been played yearly. In the United States, except as played on the ice, the game still remains imperfectly organized.

ICE HOCKEY. The old winter game of hockey, or shinney, is the basis of the modern game of ice hockey, but the modern game is more scientific than its English and Scotch predecessors. The old game was played on more or less frozen ground, and the players cared more about action than rules, and, in the beginning, no restrictions existed as to the number on each side, the shape or proportion of the sticks, the size or material of the ball, the size of the playing space, or even the manner of making a goal. Order was brought out of chaos by the McGill University team and the Victorias of Montreal, and by other clubs cooperating with them, between 1881 and 1884. In 1887 the Hockey Association of Canada was formed, and the game fairly entered on a new career. Since then various local associations have been formed, among which the most prominent are the Manitoba and Northwest Amateur Hockey Association and the Ontario Hockey Association. The emblem of supremacy among the various leagues is 'the Stanley Cup,' presented by Lord Stanley, a former Governor-General of Canada. The game was introduced in the United States by a Canadian studying in Baltimore: thence it spread to Yale, Cornell, and other colleges, in a zone limited by natural conditions or by the presence of rinks of artificial ice. Around New York the important teams have combined to form 'the Amateur Hockey League,' whose series of matches may be considered the special feature of the season's play. The Western Pennsylvania League centres around Pittsburg; and the game flourishes also in Chicago, Baltimore, Philadelphia, Washington, and other large cities.

Though among the first to play the game, the colleges have not until recently taken up the sport as an intercollegiate one. Now, however, it occupies an important position in the winter games of the larger Eastern colleges. Wherever there is a possibility of sufficient practice, college teams rival in excellence the best of the clubs. In England and Scotland ice hockey found

a ready field, but it is sadly limited there by the absence of adequate rinks. The rules of the game vary slightly with the various local associations, and the rules of each must be consulted in actual play. Consult Heathcote and Trebutt, *Skating, Curling, and Ice Sports* (London, 1892).

HOCKING. A river in Ohio, rising near Lancaster, Fairfield County (Map: Ohio, F 7). It flows southeast through a picturesque region, and empties into the Ohio River below Parkersburg, West Virginia, after a course of 80 miles. Boat navigation is possible for about 70 miles, and can be continued through the Hocking Canal, which passes along its shore.

HOCKING, Silas Kitto (1850—). An English novelist, born at Saint Stephen's, Cornwall. He entered the Wesleyan ministry and held several pastorates, but resigned in 1896. His novels, beginning with *Alec Green* (1878), which have a strong flavor of Methodism, have been very popular. The hero of *God's Outcast* (1898) is a Methodist minister who married the wrong woman. *Israel Pendray* (1899) is an account of Wesley's preaching in Cornwall. *Mistress Nancy Molesworth* (1899) is a story of adventure in Cornwall in 1745. Among his other novels are *The Awakening of Anthony Weir* (1901) and *Gripped* (1902).

HODEIDA, hō-dĕ'ī-dȧ. An important seaport of Yemen, Arabia, situated on the coast of the Red Sea, about 100 miles north of Mocha (Map: Turkey in Asia, Q 13). Its roadstead is somewhat obstructed by coral reefs, but its commerce is nevertheless very important, it being the chief centre of the Arabian coffee trade. Hodeida is the chief landing-place for Mecca pilgrims from Africa. Population, estimated at 25,000.

HODELL, hō'dĕl, Frans Oscar Leonard (1840-90). A Swedish dramatist and poet, born at Stockholm. He was in early life an actor, then editor (1870) and proprietor of the *Söndagsnisse*, a humorous journal. He was the author of a number of plays, such as the popular *Andersson, Petersson, och Lundström* (1866), and wrote also some verses and ballads, under the title, *Visor och kupletter* (1873).

HODGE. (1) In *Gammer Gurton's Needle*, the husband of Gammer Gurton, whose breeches she was mending when the needle was lost. (2) The conventional class name for the English farmer or countryman.

HODGE, Archibald Alexander (1823-86). An American Presbyterian theologian and author, the son of Charles Hodge (q.v.). He was born at Princeton, N. J.; graduated at Princeton in 1841, and was an assistant professor there from 1844 to 1846. In 1847 he graduated at the Princeton Theological Seminary, and for three years was missionary at Allahabad, India, under the auspices of the American Presbyterian Missionary Society. After 1851 he held pastorates in Maryland, Virginia, and Pennsylvania, and in 1864 was called to a church in Allegheny, Pa., where, until 1877, he was also professor of didactic theology in the Western Theological Seminary. In 1878 he succeeded to the chair of didactic, exegetical, and polemic theology at Princeton, made vacant by the death of his father, to whom he had been appointed assistant professor the year before. He was a trustee of Princeton College, and edited for a period the *Presbyterian Review*. His published works include: *Outlines of Theology* (1860; new ed. 1879); *The Atonement* (1868; new ed. 1886); *Life of Charles Hodge, Professor in the Theological Seminary, Princeton* (1880); *Manual of Forms, Conformed to the Doctrine and Discipline of the Presbyterian Church* (1883); and *Popular Lectures on Theological Themes* (1887).

HODGE, Charles (1797-1878). An American Presbyterian theologian and historian, of Scotch-Irish descent. He was born in Philadelphia; graduated at Princeton in 1815, and at the theological seminary there in 1819, became assistant professor in his alma mater the following year, and with the exception of an interval of two years (1826-27) in Europe, studying at the universities of Paris, Halle, and Berlin, was connected with its faculty until his death. From 1822 he was professor of Oriental and biblical literature, and from 1840 professor of didactic and exegetical theology, polemic theology being added in 1852. In 1872 the semi-centennial anniversary of his professional life was commemorated at Princeton by the foundation of the 'Charles Hodge professorship,' with an endowment of $50,000. He was also the recipient of a gift of $15,000. In 1846 he was moderator of the Presbyterian General Assembly, and in 1858 was one of the revisers of the *Book of Discipline*. He was editor of the *Biblical Repertory*, which he founded in 1825, expanding the title four years later to *The Biblical Repertory and Princeton Review*. It was the organ of the old school of Presbyterian theology until 1871, when the journal became the *Presbyterian Quarterly and Princeton Review* of the new Presbyterian School, and Professor Hodge retired from the editorship. His chief work, *Systematic Theology* (3 vols., 1871-72), is still considered one of the best interpretations of the Calvinistic doctrine. Other important works are: a *Constitutional History of the Presbyterian Church in the United States* (2 vols., 1840-41); *The Way of Life* (1842); and *What is Darwinism?* (1874). He also published several commentaries. Consult: *The Semi-Centennial Commemoration of the Professorship of Charles Hodge, D.D., LL.D., September 24, 1872* (Philadelphia, 1872); and Hodge, *Life of Charles Hodge, Professor in the Theological Seminary, Princeton* (New York, 1880).

HODGE, Frederick Webb (1864—). An American ethnologist, long connected with the Smithsonian Institution. He was born at Plymouth, England, but came to America in 1871, and was educated in the public schools and in Columbian University. In 1886 he was made secretary of the Hemenway Archæological Expedition, and in this position he traveled through Arizona and New Mexico until 1889, when he joined the Bureau of Ethnology of the Smithsonian Institution. His work here was the preparation of a *Cyclopedia of Indian Tribes*. In 1895, 1897, and 1899 he explored New Mexico and Arizona again, and on the second trip he scaled the Enchanted Mesa. In 1901 he became executive officer of the Smithsonian Institution. His more important works are: *List of Publications of the Bureau of Ethnology*, written while he was librarian of that department (1894); *The First Discovered City of Cibola* (1895); a pamphlet on *Coronado's Route from Culiacan to Quivira* (1899); and his contributions to the *American Anthropologist*, of which he was managing editor.

HODGE, HUGH LENOX (1796-1873). An American physician, born in Philadelphia, the brother of Charles Hodge. He graduated at Princeton in 1814, studied medicine, and began to practice in 1820. During the cholera epidemic of 1838 he successfully employed a system of treatment largely based on observations made during a two years' residence in India. In 1835 he was appointed professor in the University of Pennsylvania, and retained his connection there until 1863.

HODGES, JOHN SEBASTIAN BACH. An American clergyman of the Protestant Episcopal Church, born in Bristol, England (son of Dr. Edward H. Hodges, organist of Trinity Church, New York City). He came to this country in 1845, and was educated in Columbia College and at the General Theological Seminary of New York. After short periods of ministerial service in Newark, N. J., and in the West, he became rector of Saint Paul's Church, Baltimore, in 1870. His musical compositions, which include chants, anthems, and hymn tunes, are widely known. His chief work is the *Book of Common Praise* (1886), compiled as a companion to the *Book of Common Prayer*.

HODGINS, hŏj'ĭnz, JOHN GEORGE (1821—). A Canadian educator. He was born in Dublin, but was brought to Canada as a child and was educated there. He graduated at Victoria College, Coburg, and studied law afterwards at Toronto University. In 1844 he became connected with public education, and in 1876 was made Deputy Minister for Ontario. His publications include a number of school books.

HODGKIN, hŏj'kĭn, THOMAS (1831—). An English banker and historian. He was born at Tottenham, studied at the Friends' Grove House School there and at University College, London. He studied law, but poor health forbade him to practice, so he busied himself at banking and built up a large firm, Hodgkin, Barnett & Co., with offices throughout England. In 1874 he gave himself up to literary work. His more important writings are: the extremely valuable *Italy and Her Invaders* (1880-99); *Letters of Cassiodorus* (1886); *The Dynasty of Theodosius* (1889); *Life of Theodoric* (1891); *Life of George Fox* (1896); and *Life of Charles the Great* (1897).

HODGKINSON, hŏj'kĭn-son, EATON (1789-1861). An English civil engineer, born at Anderton, Cheshire. After a rather desultory schooling in which he displayed an aptitude for mathematics, he undertook a course of scientific investigation that soon won him distinction. His first important work was on strains and the strength of materials, on which subject he read a paper before the Literary and Philosophical Society of Manchester in 1822. In 1828 and in 1830, respectively, he gave to the same society the results of his researches on the forms of the catenary in suspension bridges, and on the strength and best forms of iron beams. In 1847 he was appointed professor of the mechanical principles of engineering at University College, London. From 1847 to 1849 he was one of the royal commissioners engaged in inquiring into the application of iron in railroad structures. From 1848 to 1850 he was president of the Manchester Literary and Philosophical Society. He was a member of the Geological Society, of the Royal Irish Academy, and an honorary member of the Institute of Civil Engineers. He made investigations as to the temperature of the earth in deep mines which were of especial interest. His experiments on the strength of materials, and especially his determination of the 'neutral line' in the section of fracture, with the resultant designs for beams, mark an important step in the science of modern engineering. He published *Researches on the Strength and Other Properties of Cast Iron* (1846). Consult the "Life of Eaton Hodgkinson," in the *Memoirs of the Manchester Literary and Philosophical Society*, third series, No. ii. (Manchester, 1862).

HODGSON, BRIAN HOUGHTON (1800-94). An English Orientalist and zoölogist, born at Lower Beeches, and educated at Haileybury. He entered the English civil service at Calcutta in 1818, and remained in it until 1843, when he was removed, apparently without cause, by Lord Ellenborough. Hodgson then lived for a few months in Europe, but soon returned to India, and lived practically alone at Darjiling (1845-58), where he made important additions to the classified fauna of India. Besides his zoölogical specimens he made valuable collections of Indian manuscripts and of ethnological material. These collections he distributed generously among European museums, giving especially to the British Museum. His written studies were on the ancient texts of India, especially the literature of Buddhism, on the modern vernacular and the subject of 'national education,' on the ethnology of the hill tribes, on Hindu law and practice, especially in Nepal, and on zoölogy. Among his works, besides scores of articles in reviews and governmental bulletins, may be mentioned: *Literature and Religion of the Buddhists of the North* (1841); *Letters on National Education for the People of India* (last ed. 1847); *Aborigines of India* (1847); *Essays on the Language, Literature, and Religion of Nepal and Tibet* (1874); and *Miscellaneous Essays Relating to Indian Subjects* (1880). Consult Hunter, *Life of Brian Houghton Hodgson* (London, 1896).

HODGSON, JOHN EVAN (1831-95). An English painter. He was born in London, and educated at Rugby. He spent some years in Russia before entering the Royal Academy in 1855. His first picture, "The Notice of Ejectment," was exhibited in 1856. He first painted domestic and historical pictures, but in 1868 a visit to Northern Africa interested him in subjects of Moorish life, to which he chiefly confined himself from this time on. Among his earlier pictures are: "Arrest of a Poacher," "Canvassing for a Vote," "A Rehearsal of Music in a Farmhouse," "Return of Sir Francis Drake from Cadiz," "First Sight of the Armada," and "Queen Elizabeth at Purfleet." His later works include an "Arab Story-Teller" (1869); "An Eastern Question," "A Shipwrecked Sailor" (1881); "Robert Burns at the Plough" (1887). In 1879 he was elected member of the Royal Academy, and in 1882 he was appointed its librarian and professor of painting. He died June 19, 1895, at Cobleskill, Buckinghamshire.

HODGSON, SHADWORTH HOLLOWAY (1832—). An English metaphysician, born in Boston, Lincolnshire, and educated at Rugby and Oxford. In 1880 he became president of the Aristotelian Society for the systematic study of philosophy,

was frequently reëlected, and in his addresses to the society and its proceedings gave much of his best work. Besides these, various contributions to *Mind* and the miscellaneous works, *The Principles of Reform in Suffrage* (1866), and *Outcast Essays and Verse Translations* (1881), mention should be made of the preliminary studies entitled: *Time and Space* (1865); *The Theory of Practice* (1870); and *The Philosophy of Reflection* (1878); and of the summing up of his metaphysic, *The Metaphysic of Experience* (1898), the most forcible and valuable of his works, in which he claims that "metaphysic like pure mathematic is fontal and preinductive," and as a phenomenist takes a strong stand against the *Noumenon*.

HÓDMEZŐ-VÁSÁRHELY, hōd'mĕ-zĕ-vä'-shär-hĕly'. A city in the Province of Czongrád, Hungary, on the Hód (Moon) Lake, 16 miles northeast of Szegedin (Map: Hungary, G 3). Among its principal buildings are the town hall, hospitals, and a gymnasium. It has risen into considerable prominence as an agricultural and trading centre, the inhabitants of the city and neighborhood being actively engaged in stock-raising and the cultivation of wine and tobacco. The industrial establishments include breweries and an oil-factory. Population, in 1890, 55,475; in 1900, 60,883; mostly Magyars.

HOD'OGRAPH (from Gk. ὁδός, *hodos*, way + γράφειν, *graphein*, to write). A velocity curve, representing the acceleration of a given motion. In Fig. 1, V_1, V_2, V_3.... represent the velocities

FIG. 1.

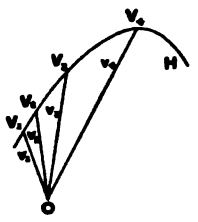


FIG. 2.

of a point P, which moves along the curve C, at the various positions P_1, P_2, P_3.... In Fig. 2, OV_1, OV_2, OV_3.... are drawn parallel and equal to V_1, V_2, V_3.... The curve H, formed by joining the points V_1, V_2, V_3, is called the hodograph of the motion of P. If V describes the curve H, while P describes the curve C, then the velocity of V at any point, laid off on the tangent of the curve H at that point, represents the acceleration of the point P both in magnitude and direction. Thus the velocity of the hodograph is the acceleration of the original motion.

HOD'SON, WILLIAM STEPHEN RAIKES (1821-58). An English soldier, born near Gloucester. In 1845 he joined the army in India and participated in the Sikh War. Two years afterwards he had command of native troops, and distinguished himself during the mutiny as leader of the irregular cavalry called Hodson's Horse. He held a civil office in 1849-52, but was more successful as a soldier, and died the death of one at Lucknow.

HO'DY, HUMPHREY (1659-1707). A Church of England divine. He was born at Odcombe, Somersetshire, January 1, 1659; graduated B.A. at Oxford, 1679; became fellow of Wadham College there, and in 1697-98 regius professor of Greek. He died near Bath, January 20, 1707. He participated on the Government side in the controversy over the bishops and their followers who refused to accept William and Mary as their legal sovereigns—the so-called Nonjurors; and also in that about the rights and powers of Convocation, contributing the valuable *History of English Councils and Convocations and of the Clergy's Sitting in Parliament* (London, 1701). But his lasting reputation rests upon his work on the Hebrew text, the Septuagint, and Vulgate version of the Bible, *De Bibliorum Textibus* (1705). His life, written largely by himself, appears in Jebb's edition of his *De Græcis Illustribus* (London, 1742).

HOE (from OF. *houe, hoe*, from OHG. *houwa*, Ger. *Haue*, hoe, from OHG. *houwan*, Ger. *hauen*, AS. *hēawan*, Eng. *hew*). An agricultural implement used for stirring the soil, drawing up earth to plants, thinning plants in drills, clearing the ground of weeds, etc. There are two classes of hoes—*draw-hoes* and *thrust-hoes*. In the former the blade is almost at right angles to the handle; in the latter, almost in the same plane with it. The thrust-hoe, or Dutch hoe, is chiefly used for killing weeds, and for stirring ground to a very slight depth. The draw-hoe is much used in gardening, and is, in some countries, very extensively used in place of the spade in agriculture. It is always employed in the thinning (singling) of turnips. Hoes intended for tilling the ground, instead of the plow and spade, are much larger and heavier than those ordinarily used, are raised much higher, and brought down to the ground with greater force, somewhat like the pickaxe. Hoes for stirring very stiff soils are sometimes made with prongs instead of a blade.

HOE. The name of a family prominently identified with the manufacture and improvement of the printing-press in America.—ROBERT (1784-1833) was born in Leicestershire, England. He was indented to a joiner, in 1803 emigrated to the United States, worked for a time at his trade, and subsequently was an associate of his brothers-in-law, Peter and Matthew Smith, in the manufacture of a hand printing-press invented by the former. In 1823 he became sole proprietor of the business. A skillful mechanic, he constructed and introduced the original Hoe press, and was, it is thought, the earliest American machinist to utilize steam as a motive power in his plant.—RICHARD MARCH (1812-86), son of the foregoing. He began the practical study of printing-press manufacture in 1827, and in 1833 became the senior partner of the Hoe firm. He devised numerous ingenious improvements in the presses, and also produced a fine quality of steel saw. In 1841 he, in connection with his brothers, Peter Smith Hoe and Robert Hoe, took over the entire direction of the business. A rotary press, widely known as 'Hoe's lightning press,' was brought out by him in 1846, and forthwith was very extensively adopted for newspaper work. (See PRINTING.) Afterwards he invented the web perfecting press, which superseded his former invention and prints upon both sides of the sheet, and includes complicated apparatus for cutting and folding. (See PRINTING.) Constant improvements were made by him in the output of his works.—ROBERT (1839—), a son of Robert Hoe, 2d, succeeded to the headship of the firm, which

retains its preëminence among printing-press makers. He was one of the organizers and first president of the Grolier Club, the well-known New York organization for the promotion of book-making as an art. He edited Maberley's *Print Collector* (1880). See PRINTING.

HOE, RICHARD (1825—). A widely known Dutch pianist, organist, and composer, born at Amsterdam. A brilliant exponent of the modern romantic German school, he received many decorations and foreign orders for his services to the cause of music. In 1856 he was director of the Amstels Männerchor; 1857, director of the Society for the Promotion of Music; 1862, city musical director of Utrecht; 1869, cathedral organist; 1875, director of the School of Music. He was elected officer of the French Academy in 1878. Hoe is perhaps better known in America as a composer of part songs for male or female voices. His compositions include an oratorio, two operas, two symphonies, masses, songs, chamber music, orchestral music, etc. His male choral works are standard with all the leading männerchor.

HOEFER, hē'fĕr, EDMUND (1819-82). A German novelist. He was born at Greifswald, was educated there, and in the universities of Heidelberg and Berlin. His first stories appeared in 1845, and from that time onward he wrote many novels marked by excellence of characterization, such as: *Schwanwiek* (1856); *Bewegtes Leben* (1856); *Norien. Erinnerungen einer alten Frau* (1858); *Die Honoratiorentochter* (1861); *Altermann Ryke* (1865); *Ein Findling* (1868); *Der Junker* (1878); and *In der letzten Stunde* (1881). The eighth edition of his *Wie das Volk spricht* was published in 1876.

HOEFNAGEL, hōōf'nä'gel, JORIS (1545-1618). A Dutch miniature painter, born at Antwerp. He was a pupil of Jan Bol at Mechlin, and for some time was at the Court of Bavaria. He then went to Prague, and finally to Vienna. His masterpiece is in the museum there, a Roman missal done for the Archduke Ferdinand. It is elaborately ornamented, and he worked on it for eight years (1582-90). Another fine work of Hoefnagel's is a miniature view of Seville (1573), in the Brussels Museum.—His son JAKOBUS (1575-?) was Court painter to the Emperor Rudolph II.

HOENSBROECH, hēns'brĕk, PAUL, Count (1852—). A German theologian, born at Castle Haag, in the District of Geldern. When nine years old he entered the Jesuit school in Feldkirch. Afterwards he attended the Jesuit college at Stonyhurst, in England, and then studied law and history at the universities of Bonn, Würzburg, and Göttingen. In 1876 he set out on his travels through France, Portugal, Spain, Northern Africa, and Italy, and in 1878 entered the Society of Jesus. While a member of the Society he wrote: *Der Kirchenstaat in seiner dogmatischen und historischen Bedeutung* (1889), and *Christ und Widerchrist. Ein Beitrag zur Verteidigung der Gottheit Christi und zur Charakteristik des Unglaubens in der protestantischen Theologie* (1892). In 1893 he left the Jesuit Order, and published a work entitled *Mein Austritt aus dem Jesuitenorden* (1893), which led to a bitter attack upon him by the Ultramontane press. Two years later he joined the Evangelical Church. His later writings include: *Moderner Jesuitismus* (1893); *Der konfessionelle Friede und die deutschen Jesuiten der Gegenwart* (1896); and *Das Papsttum in seiner socialkulturellen Wirksamkeit* (vol. i., 3d ed., 1901; vol. ii. 1902).

HOERNLE, hērn'le, RUDOLF AUGUSTUS FREDERIC (1841—). An English Orientalist and prominent authority on Indian antiquities and languages. He was born at Agra, in East India; was educated at Esslingen, Stuttgart, Basel, and Tübingen; became a missionary of the English Church at Mirat in 1865; and taught for four yeras at the Jay Narain's College in Benares. He entered the governmental educational service in 1881, after several years as principal of the mission college at Calcutta, and until 1899, when he retired and returned to England, was principal of the Calcutta Madrasah. He edited: *Chaṇḍa's Grammar of the Ancient Prākṛit* (1880); *The Prithirāj Rāsau* (1886); and *The Uvāsagadasāo with Abhayadeva's Commentary* (1888-90); translated *The Suśrutasamhitā, or the Hindu System of Medicine* (1897 sqq.); and wrote, among other linguistic works of considerable importance, *A Comparative Grammar of the Gaudian Languages* (1880), and with Grierson, the incomplete *Comparative Dictionary of the Behārī Language* (1885 sqq.).

HOËVELL, hōō'vĕl, WALTER ROBERT VAN, Baron (1812-79). A Dutch author and colonial statesman, born at Deventer. He studied theology at Groningen, and in 1836 went to Bavaria, where in the following year, he founded the *Tijdschrift van Nederlandsch-Indië*. For the emancipation of the slaves and for the spread of Christianity in the Dutch Indies van Hoëvell accomplished much, especially by his writings. He also edited and translated various Malaysian poems, among which *Sjair Bidasari* (1843) deserves mention. But his greatest work was in colonial politics. From 1849 to 1854 he published *Reis over Java, Madura en Babi*, which joined a keen criticism of governmental methods of the time with a brilliant description of East Indian scenery and life. Returning to Holland in 1848, he was elected to the House of Deputies, where for thirteen years he was leader of the Liberal Colonial Party. His parliamentary speeches delivered during this period (published 1862-66) are models. Van Hoëvell was named Councilor of State in 1862. His sketches, *Uit het Indische leven* (1860, 2d ed., 1865), met with immense success, and in 1868 were published in German.

HOEVEN, hōō'ven (HOOF'EN), JAN VAN DER (1802-68). A distinguished Dutch naturalist. He was born in Rotterdam; studied medicine and natural history at Leyden and Paris; became professor of zoölogy at Leyden in 1826, and held this position until his death. His most important work is his *Handbook der Dierkunde* (2 vols., 1827-33). An English translation, by Professor Clark of Cambridge, under the title *Handbook of Zoölogy*, was issued, with important additions by both the author and the editor, in 1856-58.—His elder brother, CORNELIS PRUYS (1792-1871), was professor of medicine in the University of Leyden, and author of several important works, including: *De Historia Medicinæ* (1842); *De Historia Morborum* (1846); and *De Historia Medicamentorum* (1847).

HOF, hôf. A town of Bavaria, situated on the Saale, in Upper Franconia, 32 miles northeast of Bayreuth (Map: Germany, D 3). It has an attractive thirteenth-century church, recently restored, with some interesting contents, and an old Gothic Rathaus. There are a gymnasium, opened in 1546, and a hospital dating from 1260. The numerous textile manufacturing establishments produce chiefly cotton and woolen goods. There are also exported machinery and other iron and steel products, chemicals, vinegar, pottery, and leather. Hof, with its industrial activities, is well equipped with commercial unions and banks. It has electric lights, water-works, and canal communication. The town was founded about the end of the eleventh century. The original name was Regnitzhof. It was almost destroyed by fire in 1823. Population, in 1890, 24,455; in 1900, 32,781; mostly Protestants.

HOFDIJK, hôf'dîk, WILLEM JACOBSZOON (1816-88). A Dutch poet and author, born at Alkmaar. His first work, a romantic poem, *Rosamunde* (1839), attracted the attention of van Lennep, who obtained for him a clerk's position in the Government offices at Alkmaar. Afterwards he taught Dutch history and literature in the gymnasium at Amsterdam. His works, which are in verse and prose, include the studies in Dutch history: *Geschiedenis der Nederlandsche Letterkunde* (1856); *Historische Landschappen* (1856); *Geschiedenis des Nederlandschen Volks* (1865-72); *Willem Frederik Hendrik, Prins der Nederlanden* (1880); and the poems: *De Bruidsdans* (1842); *De Jonker van Brederode* (1849); and *Kenne merland. Balladen* (1850-52). He also wrote some poetical dramas, without much success.

HOFER, hō'fĕr, ANDREAS (1767-1810). A patriot leader of Tyrol. He was born at Sankt Leonhard, in the valley of Passeier, November 22, 1767. His father was landlord of the inn 'Am Sand,' and the son carried on the business, becoming known as the 'Sandwirt.' In 1796 Hofer led a body of sharpshooters against the French on Lake Garda; in 1805 he fought against Ney in the valley of Passeier, and after Tyrol had been abandoned to France by the Peace of Pressburg he was chosen as one of the secret deputation which was sent to Vienna to represent to the Archduke John the sufferings of the people, and their wish to be reunited to Austria. But Austria was powerless, and in virtue of Napoleon's decree Tyrol was made part of Bavaria. The patriots, however, did not lose heart, and at the desire of the Archduke, Baron von Hormayr prepared for them a plan of insurrection. The rising took place in 1809, on the renewal of war between Napoleon and Austria. On April 11th Hofer defeated the Bavarian allies of France at Sterzing, and after they had rallied during the early part of May, he beat them again in the neighborhood of Innsbruck, forcing them to evacuate Tyrol. Napoleon, however, dispatched three armies to subdue the rebellious peasantry, who had been abandoned by the Austrians by the armistice of Znaim (July 12, 1809). At first Hofer concealed himself in the valley of Passeier; but later speedily renewed the defense of Tyrol, and defeated the combined French and Bavarian forces under Lefebvre at Berg Isel (August 13, 1809), driving them from the country. For two months Tyrol was free, and Hofer acted as head of the Government, but the Treaty of Vienna (October 14, 1809) resulted in a fresh invasion. The French and Bavarians poured into the country, and, after an heroic struggle, Hofer was obliged to take refuge in the mountains. Two months later (January 28, 1810) he was betrayed into the hands of the French, conveyed to Mantua, and there shot, by order of Napoleon, after a summary trial. His family were indemnified for the loss of their property by the Emperor of Austria in 1818, and his son was ennobled. Hofer has been made the hero of tragedies by Auerbach and Immermann, and there are numerous patriotic songs about him in Tyrol. Consult: Hormayr, *Das Land Tyrol und der Tyrolerkrieg von 1809* (Leipzig, 1845); Heigel, *Andreas Hofer* (Munich, 1874); Egger, *Geschichte Tyrols* (Innsbruck, 1870-80); Stampfer, *Sandwirt Andreas Hofer* (Freiburg, 1891).

HOFF, hôf, JAKOBUS HENDRIKUS VAN 'T (1852—). A Dutch chemist and coeditor of the *Zeitschrift für physikalische Chemie*, born at Rotterdam. He studied at the universities of Delft, Leyden, Bonn, Paris, and Utrecht, and in 1876 became a teacher in the veterinary school at Utrecht. Two years later he was made a professor at the University of Amsterdam, and in 1896 was called to the University of Berlin. He was the founder of stereochemistry, and one of the most prominent investigators in the new physical chemistry. Among his publications are: *La chimie dans l'espace* (1875), translated by Arnold Eiloart as *The Arrangement of Atoms in Space* (1898); *Vorlesungen über theoretische und physikalische Chemie* (1898-1900; vol. i., 2d ed. 1901), translated by R. A. Lehfeld under the title *Lectures on Theoretical and Physical Chemistry* (1898-99); and *Acht Vorträge über physikalische Chemie gehalten auf Einladung der Universität Chicago* (1902). In 1901 he received the Nobel prize for the most important contribution to chemistry.

HÖFFDING, hĕf'dĭng, HARALD (1843—). A Danish philosopher, born and educated in Copenhagen. He was a school-teacher between 1861 and 1871, in the latter year became instructor, and in 1883 professor in the University of Copenhagen. He was early influenced by Kierkegaard and held to a distinction between knowledge and belief; but later became a positivist, though he joins with the views of that school the methods of critical philosophy and the results of psychological study. In ethics he is a utilitarian of a moderate type, not holding that self-interest is the motive of action. His principal works are: *Den engelske Filosofi i vor Tid* (1874); *Etik* (last ed. 1879); *Psychologi i Omrids paa Grundlag of Erfaring* (last ed. 1892); *Formal Logik til Brug ved Forelæsninger* (last ed. 1890); *Psykologiske Undersogelser* (1889); *Kontinuiteten i Kants filosofiske Udviklingsgang* (1893); *Den nyere Filosofis Historie* (1894); *Rousseau und seine Philosophie* (1901); *Det psykologiske Grundlag for logiske Domme* (1899); *Religionsfilosofi* (1901); and *Mindre Arbejder* (1899).

HOFFMAN, CHARLES FENNO (1806-84). An American poet and novelist, born in New York City. In early youth he had his leg crushed and amputated, but was not deterred thereby from athletics and an open-air life. Educated, but

not graduated, at Columbia College, he was admitted to the bar at twenty-one and practiced three years, after which he devoted himself to literature. In 1833 he established the *Knickerbocker Magazine*, but soon gave it up and became editor of the *American Monthly*, which he conducted for several years. Afterwards he edited for short periods the *Mirror* and the *Literary World*. His first book was *A Winter in the West* (1835), which was followed by *Wild Scenes in Forest and Prairie* (1837)—both based upon actual experiences in search of health. He now wrote a few novels, the most important being *Greyslaer* (1840), founded upon the murder of Colonel Sharpe by Beauchamp, a theme which a little later attracted Simms (q.v.). But his fame rested chiefly upon his poems, first collected in *The Vigil of Faith* (1842), and especially his songs, which were once deservedly popular. Among them may be named "Rosalie Clare" and "Monterey." A complete edition of his poems appeared in 1873. In 1849 he became insane, and for the remainder of his life was confined in an asylum.

HOFFMAN, DAVID (1784-1854). An American lawyer and author. He was professor of law in the University of Maryland from 1817 to 1836; traveled much abroad, and received honorary degrees from Oxford and Göttingen. Among his publications are: *A Course of Legal Studies* (1817); *Legal Outlines* (1836); *Miscellaneous Thoughts on Men, Manners, and Things*, by 'Anthony Grumbler' (1837); and *Chronicles Selected from the Originals of Cartaphilus, the Wandering Jew* (1853).

HOFFMAN, EUGENE AUGUSTUS (1829-1902). An American clergyman of the Protestant Episcopal Church. He was born in New York City, and was educated at Rutgers and Harvard Colleges and at the General Theological Seminary. He was rector successively of Christ Church, Elizabeth, N. J.; Saint Mary's Church, Burlington, N. J.; Grace Church, Brooklyn Heights; and Saint Mark's Church, Philadelphia. In 1879 he was appointed dean of the General Theological Seminary, New York, and in connection with his family heavily endowed that institution. Dr. Hoffman built Christ Church and rectory at Elizabeth, and churches at Milburn and Woodbridge, N. J. He wrote *Free Churches* (1858), and *The Eucharistic Week* (1859 and 1893).

HOFFMAN, RICHARD (1831—). An American pianist, composer, and teacher. He was born in Manchester, Lancashire, England, but after his sixteenth year resided in New York City. His earliest instruction was received from his father, and subsequently from Meyer, Pleyel, Moscheles, Rubinstein, Thalberg, Döbler, and Liszt. Within a year of his arrival in America he made a tour of the country, and later accompanied Jenny Lind on her tours. He was an exceedingly popular concert pianist, and played with Gottschalk, and afterwards with Von Bülow (New York, 1875). He settled down to teaching, and has been one of the most important factors in American musical life. His compositions consist of pianoforte music, part songs, ballads, anthems, and Church music generally.

HOFFMAN, WALTER JAMES (1846—). An American ethnologist. He was born at Weidasville, studied medicine at Jefferson College, Philadelphia, and practiced it in Reading, Pa., till 1870, when he went to the Franco-Prussian War as a surgeon with the German Army. On his return he took a similar position with the United States troops, and thus obtained opportunities for natural history researches in Arizona, Nevada, and Dakota. In 1877 Hoffman was attached to the Geological Survey, and two years afterwards became assistant in the Bureau of Ethnology at its formation.

HOFFMAN, OR, THE REVENGE FOR A FATHER. A tragedy by Henry Chettle, performed in 1602; the only play written wholly by this author that has been preserved. It exists in a very corrupt quarto, printed in 1631 without the author's name.

HOFFMANN, hôf'mân, AUGUST HEINRICH, called HOFFMAN VON FALLERSLEBEN, fôn fäl'ĕrslā'ben (1798-1874). A German poet, philologist, and literary historian, born at Fallersleben. He was educated at Göttingen and Bonn, and from 1823 to 1838 was librarian at the University of Breslau, where he was also professor from 1830 till his dismissal (1842) for his *Unpolitische Lieder* (1841-42). He was restored to his rights as a Russian citizen in 1848, having passed the intervening years in Mecklenburg. He married in 1849 and afterwards lived at Bingerbrück, Neuwied, and Weimar, where he was an editor of the *Weimarisches Jahrbuch*. From 1860 till his death he was librarian of the Duke of Ratibor. Popular at first as a liberal political poet, he is cherished still for the ease, simplicity, and grace of songs of common life, for many of which he also composed melodies. Hoffmann was a diligent editor of early German classics (*Reineke Vos, Monumenta Elnonensia, Theophilus*), made valuable contributions to philology now of antiquarian interest only, and to literary history. In 1868-70 Hoffmann published *Mein Leben*, an autobiography in six volumes. Hoffmann's *Works* are still uncollected, but the *Poems* (incomplete) have been often reëdited. His *Briefe au Ferdinand Wolf* were published in 1874. There is a *Life* by Wagner (Vienna and Dresden, 1869). Consult also Kreyenberg, in *Preussische Jahrbücher* (Berlin, 1891).

HOFFMANN, ERNST THEODOR AMADEUS (originally WILHELM) (1776-1822). An eccentric German romantic novelist of cosmopolitan reputation and influence, born at Königsberg. His foremost characteristic is his wayward yet keen fancy, suggesting at once Hawthorne and Poe. He dealt by preference with the grotesque, startling, and marvelous, until toward the close of his life morbidity verged on madness. After a joyless childhood, he prepared for the law, let his wit run away with his prudence in some witty caricatures, and finding his career thus blocked, suffered from penury and dissipation. He eked out a living by scene and portrait painting and musical composition and criticism in Posen, Warsaw, Bamberg, Leipzig, Dresden, and Berlin, where in 1816 he became councilor of the Court of Appeals. For short intervals he was manager and musical director also. His first book was a collection of musical criticisms with illustrations, *Phantasiestücke in Callot's Manier* (1814). In 1816 appeared *Die Elixire des Teufels*, which, with *Lebensansichten des Katers Murr* (1820-22), is the most famous of his works. Other noteworthy volumes are *Die Serapionsbrüder* (1819-21) and

Nachtstücke (1817). All are alike characterized by a lyric swing and an erratic imagination that is mentally disquieting and yet blended with shrewd satire, wit, and even wisdom. He died of disease induced by dissipation, his mind at times clear, and clinging tenaciously to a life that ebbed inch by inch away. Hoffmann's *Works* are in fifteen volumes (1879-83). Of the more popular, there are many editions. The *Elixire des Teufels* has been translated into English (1824), also *Der goldene Topf* (The Golden Pot), one of the *Phantasiestücke*, by Carlyle in his *German Romance* (Edinburgh, 1827), where also is a biographical sketch. Other translations are by Gillies (London, 1826); Bealby (New York, 1885); and Ewing (London, 1886). Consult: Hitzig, *Hoffmann's Leben und Nachlass* (Stuttgart, 1839), and *Erinnerungen*, by Funck (Leipzig, 1836).

HOFFMANN, FRIEDRICH (1660-1742). A German physician, one of the most celebrated of the eighteenth century. He was born at Halle, and received his medical degree in 1681 at Jena. He then studied chemistry at Erfurt, under Kaspar Cramer; practiced at Minden and Halberstadt with great success, and was professor of medicine in the University of Halle from 1693 to 1742. In 1708 he became physician to the King of Prussia at Berlin, and subsequently enjoyed a European reputation second only to that of Boerhaave. His name is perpetuated in the title Hoffmann's anodyne. (See ETHER.) His greatest work was *Medicina Rationalis Systematica* (1718-40); *Opera Omnia Physico-Medica Denuo Revisa, Correcta et Aucta* (1740) and *Medicini Consultatoria* (1721-39) were also celebrated, together with the *Opuscula*, published after his death and reprinted at Venice in seventeen volumes, in 1745, and subsequently at Naples.

HOFFMANN, GUSTAV (known as GRABEN-HOFFMANN) (1820-1900). A German composer, born at Bnin, near Posen. He was the pupil of Stümer in Berlin, and afterwards of Hauptmann at Leipzig in singing, and acquired a reputation in barytone parts in concert and oratorio. He also taught vocal music, and was the composer of nearly a hundred books of songs and choral music, besides publishing several text-books on voice-training. His best-known song is *Fünfmalhunderttausend Teufel.* In 1885 he settled at Potsdam, where he founded a singing-school for women.

HOFFMANN, HANS (1848—). A German novelist, born in Stettin. He studied at the universities of Bonn, Berlin, and Halle, and made a long visit to Italy and Greece. He is one of the most gifted of the modern German novelists, and unites with an uncommon talent for vivid descriptions of landscapes a poetical and delightful humor. Among his works are: *Iwan der Schreckliche und sein Hund* (1889); *Von Frühling zu Frühling* (1889, 3d ed. 1898); *Geschichten aus Hinterpommern* (1891, 2d ed. 1894); and *Irrende Mutterliebe* (1900).

HOFFMANN, or **HOFFMANN-DONNER,** dŏn'ĕr, HEINRICH (1809-94). A German humorous poet, born in Frankfort-on-the-Main. At his marriage he added his wife's name (Donner) to his own. He studied at the universities of Heidelberg, Halle, and Paris; then became a teacher of anatomy in the Senckenberg Institution in Frankfort-on-the-Main, and from 1851 till 1889 was directing physician of the municipal insane asylum. He wrote on medical subjects, but is far better known through his children's books, which he illustrated himself. The most famous of these, *Struwwelpeter* (1845), has gone through several hundred editions, and has been translated into nearly all the languages of Europe. Among his other publications are: *König Nussknacker*, and a volume of poems, entitled *Auf heitern Pfaden* (1873).

HOFFMANN'S ANODYNE. See ETHER.

HOFFORY, hŏf'fō-rē, (JOHN PETER) JULIUS (1855-97). A Danish-German philologist, phonetician, and Germanic scholar, born at Aarhus. He was educated at Copenhagen and Berlin. In 1886 he was made professor of Norse philology and phonetics at the University of Berlin. He wrote: *Eddastudien* (1889); "Phonetische Streitfragen," in the *Zeitschrift für vergleichende Sprachforschung*, vol. xxiii.; and *Professor Sievers und die Principien der Sprachphysiologie* (1884), both attacks on Sievers. He edited and translated into German some of Holberg's comedies under the title of *Dänische Schaubühne* (1885-87) and translated other Danish writings in *Nordische Bibliothek* (1889-91). His personality was a strong one, and he did much toward the introduction of Ibsen in Germany.

HOFHAIMER, hōf'hī'mĕr, or **HOFHAINER,** PAULUS VON (1459-1537). An Austrian composer, born in Salzburg. He was an excellent organist, and filled the position of Court organist and composer in Vienna. He received numerous honors, and was especially distinguished as a teacher. As a composer he ranked among the foremost of his time. His best work was *Harmoniæ Poeticæ* (1839, republished 1868), which consisted of Latin poems set for four voices. In addition, he composed many German songs and considerable later music.

HOFHUF, hō-fōōf'. A town of Arabia, near the Persian Gulf. See EL-HOFUF.

HÖFLER, hĕf'lĕr, KARL ADOLF KONSTANTIN, von (1811-97). A German-Austrian historian. He was born at Memmingen, and studied philosophy and history at the universities of Munich and Göttingen. For two years (1834-36) he was in Rome and Florence, making historical researches. When he returned to Munich he undertook the direction of the *Münchener Zeitung*, the official journal of Bavaria. Three years afterwards he was made a professor at the university there. He became involved in the political troubles of Bavaria, and the publication of his book, *Konkordat und Konstitutionseid der Katholiken in Bayern* (1847), lost him his Munich chair; but after being archivist at Bamberg for a time, he was made professor of history in the University of Prague (1851). In the controversy between the Czechs and the Germans, Höfler sided conspicuously with the Czechs, and in 1872 he was called into the Austrian House of Peers. His numerous publications upon historical subjects include: *Die deutschen Päpste* (1839); *Lehrbuch der allgemeinen Geschichte* (1850-56); *Papst Adrian VI.* (1880); *Monumenta Hispanica* (1881-82); and *Die Aera der Bastarden am Schlusse des Mittelalters* (1891).

HOFMANN, hōf'mān, AUGUST WILHELM VON (1818-92). A distinguished German chemist, born at Giessen. After obtaining the degree of

doctor of philosophy, he became assistant to Liebig in the Giessen laboratory, and in 1845 became professor of chemistry in the University of Bonn. In the same year the Royal College of Chemistry was established in London, and Hofmann was recommended by Liebig as highly qualified for the post of superintendent to the new institution. This college, which subsequently became part of the Royal School of Mines, owes much of its high reputation to Hofmann's activity as teacher and investigator. On the promotion of Thomas Graham from the post of chemist to the mint to the office of master of that institution, Hofmann was appointed his successor. In 1861 he was elected president of the London Chemical Society. In 1863 Hofmann accepted an appointment to the chair of chemistry in the University of Berlin, and in 1868 founded the German Chemical Society. He was ennobled in 1888. He served as judge at several industrial expositions, of which he published admirable accounts, and was a member of many scientific bodies, both at home and abroad. His name justly figures among those of the greatest chemists of the nineteenth century.

The results of his brilliant researches have formed entire departments in organic chemistry, and have had an important influence on the development of chemical theory. He investigated the organic bases obtained from coal-tar, and discovered a new and important class of compounds which are derived from ammonia by the substitution of organic radicals for hydrogen atoms. Among his most important discoveries is that of aniline among the products of destructive distillation of bituminous coal, and the discovery of methods for the artificial preparation of beautiful coloring substances from aniline. He obtained the colorless base known as *rosanilin* and its colored salts, such as *fuchsin, dahlia* (*'Hofmann's violet'*), etc., which are the most important of the colors derived from aniline. These discoveries have contributed greatly to the development of the color industry, and have practically revolutionized the art of dyeing. Among his contributions to physical chemistry may be mentioned his method of determining the vapor densities of chemical substances for the purpose of obtaining their molecular weights, and a method of demonstrating the dissociation of gases, such as carbonic-acid gas and water-vapor, by the action of electric sparks. Hofmann was a brilliant teacher, and his *Introduction to Modern Chemistry* (1865, and several later editions) has brought about important reforms in the methods of teaching chemistry. He also wrote: *A Handbook of Organic Analysis* (1853); *The Life Work of Liebig in Experimental and Philosophic Chemistry* (1876); *Zur Erinnerung an vorangegangene Freunde* (3 vols., 1889), etc. His statue may be seen at the National Gallery of Berlin.

HOFMANN, Franz Adolf (1843—). A German hygienist. He was born in Munich, studied medicine there, and was assistant in the physiological institute of the university until 1872, when he went to Leipzig as head of the university laboratory of pathological chemistry. Six years afterwards Hofmann was appointed to the management of the hygienic institute of the same university. An editor of the *Archiv für Hygiene*, he contributed to that journal, to the *Zeitschrift für Biologie*, and to the *Vierteljahrschrift für öffentliche Gesundheitspflage* on pathological chemistry, on the properties of subterraneous waters, and on disinfection, refrigeration, and various methods of preservation of foods, especially meats.

HOFMANN, Heinrich (1842-1902). A German composer, born in Berlin. As a pupil of Kullak's Akademie he studied under Grell, Dehn, and Wüerst, and became a well-known pianist. In 1869 his opera, *Cartouche*, was produced in Berlin, and thereafter he devoted himself entirely to composition. Hofmann was considered one of the foremost of contemporary composers, and was elected a member of the Berlin Royal Academy of Arts. Among his many compositions are: an *Ungarische Suite* (1873); the symphony *Frithjof* (1874); the operas *Der Matador* (1872), *Armin* (1872), *Wilhelm von Oranien* (1882), *Lully* (1889); the secular oratorio *Prometheus* (1896); numerous choral works, cantatas, and songs; and a series of exquisite pianoforte duets.

HOFMANN, Johann Christian Konrad von (1810-77). A German Lutheran theologian and historian, born in Nuremberg. He studied history and theology at the universities of Erlangen and Berlin, and in 1833 was appointed a teacher in the gymnasium at Erlangen. Two years later he became a tutor in the theological faculty of the university and rose to the position of professor extraordinarius in 1841. The next year he accepted a call as full professor to Rostock, but in 1845 returned to Erlangen. In 1857 he was ennobled. He was the head of the so-called Erlangen school, which developed the theological ideas of Bengel, and in the end conformed in all essential respects with the doctrines of the Lutheran Church. As a member of the Second Chamber of the Bavarian Legislature he labored for the union of Germany, and was, despite his clerical conservatism, a member of the Progressist Party. His writings include: *Lehrbuch der Weltgeschichte* (2d ed. 1843); *Weissagung und Erfüllung* (2d ed., 3 vols., 1857-60); *Die Heilige Schrift Neuen-Testaments, zusammenhängend untersucht* (1862-86, the latter part edited by Vlock); and *Der Schriftbeweis* (2d ed. 1857-60). Consult Grau, *Johann Christian Konrad von Hofmann. Erinnerungen* (Gütersloh, 1879).

HOFMANN, Josef (1877—). A celebrated Polish concert pianist, born in Cracow, Galicia. His father was a leading musician of Warsaw, in which city he held the position of professor of harmony and composition at the conservatory, and also the directorship of the opera. Josef studied with his father until he was fifteen years of age, after which he spent two years with Rubinstein. As a child he was one of the most remarkable musical prodigies ever known; at the age of six years he had made his public début, and by the time he was nine had toured Continental Europe and Great Britain, and in 1887-88 he visited America. On the conclusion of the last-named tour he went into retirement for further study and preparation, and in 1894 made his reappearance as a full-fledged concert virtuoso at Dresden, and subsequently toured every civilized country on the globe. On his reappearance in New York in 1901 he showed a vastly improved technique and great interpretative ability.

He is the composer of several attractive numbers for the piano.

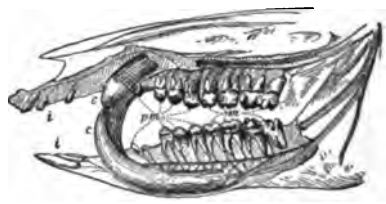
HOFMANN, KONRAD (1819-90). A German philologist, born near Bamberg. After studying medicine at Munich and Erlangen, he turned his attention to philology at Munich, Leipzig, Berlin, and Paris. In 1852 he was put in charge of the materials gathered by Schmeller in the library of Munich. In the following year he succeeded Schmeller as professor of Germanic philology, assuming in 1869 also the chair of Romance philology. Most of his writings were for journals, especially the publications of the Munich Academy, *Romanische Forschungen*, and Pfeiffer's *Germania*. His other works are: Editions of the *Hildebrandlied* (with Vollmar, 1850); *Amis et Amiles, Jourdain de Blaivies* (last ed. 1882); *Primavera y Flor de Romances* (with Wolf, 1856); *Karls des Grossen Pilgerfahrt* (1866); *Joufrois* (1880); Lutwin's *Adam und Eva* (with Meyer, 1881); and *Chanson de Roland* (not published); and the critical works: *Ueber die Gründung der Wissenschaft altdeutscher Sprache und Litteratur* (1857), and *Zur Textkritik der Nibelungen* (1872).

HOFMANNSWALDAU, hôf'måns-väl'dou, CHRISTIAN HOFMANN VON (1617-79). A German poet, born in Breslau; the chief representative of the so-called second Silesian school. He studied at Leyden, and then traveled through the Netherlands, England, France, and Italy. On his return, and before he had reached the required age, he was made a member of the council in his native city. In his poetry he was greatly influenced by the Italians Guarini and Marino, and departed more and more from the somewhat insipid and tasteless style of the previously authoritative Martin Opitz (q.v.). Witty and endowed with considerable literary skill, he was much admired; his love lyrics were often imitated, and many editions of them were published. Consult Ettlinger, *Christian Hofmann von Hofmannswaldau* (Halle, 1891).

HOFMEISTER, hôf'mī-stẽr, WILHELM (1824-77). A German botanist, born at Leipzig. He became professor of botany at Heidelberg in 1863, and at Tübingen in 1872. His researches in botany resulted in contributions of the greatest importance, especially to the department of botany dealing with the reproduction of plants. He published *Die Entstehung des Embryo der Phanerogamen* (1849), and *Vergleichende Untersuchungen höherer Kryptogamen und der Koniferen* (1851).

HOFSTEDE DE GROOT, hôf'stâ-de de grōt, PETRUS (1802-86). A Dutch theologian and reformer, born at Leer in East Friesland. In 1826 he became pastor at Ulrum, and in 1829 professor in and preacher to the university at Groningen. He was the head of the so-called Groningen school, the members of which style themselves the Evangelicals and form a middle Church party between the moderns and the orthodox. The organ of the party was a publication entitled *Waarheid en Liefde*, of which Hofstede was an editor. Among his voluminous writings may be mentioned: *Opvoeding der Menschheid* (2d ed. 1855); *Institutio Theologiæ Naturalis* (4th ed. 1861); *Die Groninger Theologen* (1854); *Over de evangelisch-catholieke godgeleerheid als de godgeleerdheid der toekomst* (1856); *Die moderne Theologie in den Niederlanden* (1870). Consult Heerspink, *Dr. Petrus Hofstedes leven en werken* (Groningen, 1897).

HOG, THE DOMESTIC (probably from *hog, hag*, to cut, Icel. *hoggva*, Swed. *hugga*, AS. *hēawan*, OHG. *houwan*, Ger. *hauen*, to hew; connected with OChurch Slav. *kovati*, Lith. *káuti*, to strike, to forge; referring ordinarily to a castrated boar). All the known breeds of domestic swine (see SWINE, for the general natural history of the race) may be divided into two groups: The European hog (*Sus scrofa*), which is sprung from and resembles the wild boar; and the Asiatic pigs, regarded as descended from the



DENTITION OF THE WILD BOAR.

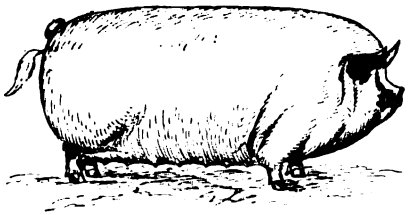
Right upper and lower jaws, with their teeth and their nerves, exposed from the inside: *i, i*, incisors; *c, c*, canines (tusks); *pm*, premolars; *m*, molars.

Indian wild boar (*Sus cristatus*). The common hog (*Sus scrofa*) appears to be a native of most parts of Europe and Asia, and domesticated swine were found by the first navigators in many of the islands of the southern seas. Although the use of its flesh was prohibited to the Jews, and the prohibition has been adopted in the Mohammedan law, the hog has been a domesticated animal from a very early period, and its flesh constitutes a large part of the food of many nations. The fecundity of the hog is great; with proper treatment, it will produce two litters annually, generally of four to eight pigs each, although sometimes there are as many as fourteen in a litter. The period of gestation is usually 16 weeks. Great quantities of the flesh and fat are consumed in various forms as pork, fresh or salted, bacon, ham, lard, and so on. Brawn is an English luxury. The skin of the hog is made into leather, which is particularly esteemed for saddles. The bristles are much used for brush-making.

BREEDS. Numerous breeds of the domestic hog have resulted from selection and crossing and from conditions of environment favorable to improvement. Apparently there were two original or native breeds in Great Britain, the old English hog and a breed found in the Highlands of Scotland. From these our modern improved breeds have been developed by crossing the native breeds with foreign hogs, principally the Chinese and Neapolitans. The modern white breeds, with fine bone, thin skin, short legs, a tendency to fatten at an early age, take these qualities from the Chinese hog, which is said by some writers to be a more refined and highly developed animal; while the black breeds, of which the Essex is a type, get their qualities from the Neapolitan stock.

The *Yorkshire* is the principal of the English white breeds and is divided into three subvarieties, the Large Whites, or Large Yorks, the Middle Whites, represented by the Cheshires, and the Small Whites or Small Yorkshires, which are considered the smallest and finest of the white breeds. They mature early and fatten quickly.

STANDARD BREEDS OF HOGS



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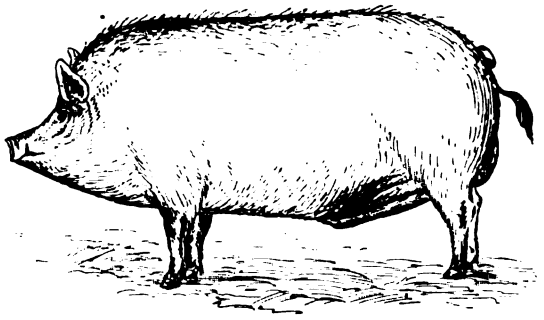

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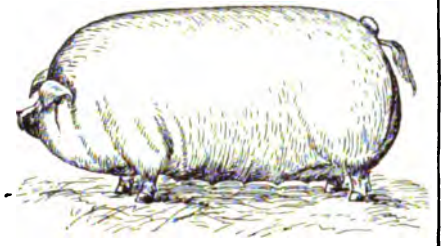

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1. KANSAS BERKSHIRE SOW
2. TAMWORTH BOAR
3. LARGE YORKSHIRE OR "WHITE"
4. CHESTER WHITE BOAR
5. KANSAS ESSEX BOAR
6. KANSAS POLAND-CHINA SOW

The Large Whites are characterized by immense size, although the best are rather fine boned and not coarse. The Yorkshires are very popular in England, and white swine generally are preferred in that country. It is said that from this source came the American breed of Chester Whites, which was originated in Chester County, Pa. Pigs of this breed are among the largest, and individuals have attained a weight of 1300 pounds. They are said to be lacking in hardiness and to have a tendency to degenerate under careless treatment or neglect.

The *Berkshires* are probably the most universally popular and widely disseminated of all the breeds. This breed is of English origin, and takes its name from the county whence it came. It is of large size, black in color with white on the face, and occasional splashes elsewhere, and fattens readily at any age. Great improvement has been made in its size and symmetry in recent years. The quality of the pork is unexcelled.

The *Poland-Chinas* divide honors with the Berkshires in the great pork-producing sections of the United States. This is also a black breed, and is a purely American one, originating in Ohio. It is not generally believed that any Polish cross was ever introduced in its development, in spite of its name. As now bred, the Poland-Chinas are similar to the Berkshires, but show rather more white in their markings. They are among the largest of hogs, but have been much improved in fineness of bone, early maturity, and tendency to fatten at an early age.

The *Jersey Reds* or *Durocs* are a breed of unknown origin, which has long been quite extensively bred in New Jersey. They are also known as Red Berkshires. They are rather coarse, but are considered much hardier than the finer boned breeds. The *Tamworth* is a large, coarse, 'leggy' hog, of a dark chestnut color, more or less spotted with black. This animal has been widely exploited as a bacon hog. The *Victorias* are a white breed of medium size, not widely raised in the United States; and the *Essex* is a black English breed, classed among the smaller breeds. It has not become popular in the United States. Record books or registers are published in the United States for the Berkshire, Poland-China, Yorkshire, Chester White, and Duroc-Jersey breeds.

CARE AND TREATMENT. Although hogs are raised to some extent in every section of the country, the great pork-producing section is in the Mississippi Valley, where corn is abundant and cheap. The northern part of this valley is said to be the greatest hog-raising section in the world. The hogs are commonly pastured during the earlier stages of growth. Frequently a herd of swine are put with steers which are being fed whole corn, and the hogs feed upon the corn voided in the manure. Alfalfa pasturage is used for hogs in some sections. In the South, cowpeas, peanuts, chufas, and a variety of other crops are grown for hog-pasture. Corn is the great hog feed of the middle West; sometimes it is ground, but it is largely fed on the ear. As corn contains only a small percentage of ash, the hogs fed upon it exclusively become weak-boned, and can hardly walk about. This is corrected by giving wood-ashes, which they eat greedily. Skim milk and buttermilk from creameries constitute excellent food for pigs of all ages; and if corn-meal is added, a pork of the finest quality is obtained. The large, over-fattened hog, weighing 400 or 500 pounds, has given way to a quickly maturing hog of from 200 to 300 pounds. This animal is produced more economically and is preferred by the packing houses. The gains in proportion to the food eaten diminish as the animal grows, and experiments have shown that it is most profitable to market the hogs when they have reached 200 or 250 pounds. Packers prefer a hog weighing about 250 pounds. See PORK; SWINE.

BIBLIOGRAPHY. Consult: Long, *The Book of the Pig* (London, 1889); Coburn, *Swine Husbandry* (New York, 1888); Harris, *On the Pig* (New York, latest ed., 1896); Spencer, *Pigs, Breeds and Management* (London, 1897); Wallace, *Farm Live Stock of Great Britain* (Edinburgh, 1889).

HOG (so called as resembling in outline the back of a hog). This nautical term implies the opposite of *sag*. A ship is *hogged* when through weakness her ends droop in such a manner as to cause her keel to curve upward amidships. In lightly built or shallow vessels a tendency to *hog* is prevented by a truss-frame arranged to support the ends and called the hog-frame. Most wood-built and many iron paddle-wheel river steamers have such frames rising well above the hull, and sometimes above the deck-houses. Instead of a framework extending from end to end, it may be located only amidships, and the strain transmitted to it by *hog-chains* extending to the ends.

HOG-APE. The mandrill. See BABOON.

HOG-APPLE. See PODOPHYLLUM.

HOGARTH, hō'gärth, GEORGE (1783-1870). A Scottish journalist and musical critic, born in Edinburgh. He studied law and music there, played the violoncello, wrote criticisms for the *Courant*, and associated with Sir Walter Scott's clique. When about fifty years of age, he went to London to live, and became a member of the editorial staff of the *Morning Chronicle*, then of the *Daily Telegraph* (1846-66), of which his son-in-law, Charles Dickens, was editor. The novelist was indebted to the journalist for the insertion of some of his earlier work in the *Evening Chronicle*. He was musical critic of the *Illustrated London News*, and also secretary of the Philharmonic Society (1850-64), and wrote its history, as well as a general *Musical History, Bibliography and Criticism* (1835); *Memoirs of the Musical Drama* (2 vols., 1838; 2d ed. 1851); and other works on his specialty, besides editing and harmonizing collections of hymns and songs.

HOGARTH, WILLIAM (1697-1764). An English painter and engraver, born in London, November 10, 1697. His father was an unsuccessful schoolmaster, who was also a hack writer and corrector for the press. At the age of seventeen, Hogarth was apprenticed to a silversmith for whom he made designs for plate, which are now much prized by collectors. In 1718 he entered business on his own account, and besides engraving arms and shop bills, he began to design copper plates for the booksellers. During the years 1721-26 he designed a number of engravings, the most important of which were "Masquerades and Operas" (1724), which struck the keynote of his future satire, and his illustrations to Butler's *Hudibras*, which brought him into public notice. At first Hogarth's ambition was

to be a line-engraver, but about 1724 he began to attend the private art school of Sir James Thornhill, in Saint Martin's Lane, with a view to painting. In 1728-29 he painted a series of small conversation pieces, groups of family portraits connected by some common interest or occupation, besides others of a political and social character. Between 1727 and 1732 he engraved a large number of frontispieces for well-known books. In 1729 he ran away with his former master's daughter, Jane Thornhill, who made him an excellent wife.

Soon after his marriage he began the first of the series of paintings, "The Harlot's Progress," reproduced also as engravings, which made him famous. It represented in six plates the story of a country girl who came innocent to town to seek a situation. The original paintings, except one, are lost, but the plates are well known. The shameless piracy of these plates resulted in the Parliamentary act of 1735 vesting in artists the exclusive rights to their designs. In the same year appeared "A Rake's Progress," eight plates, representing the career of a profligate young man of means, who ends in the madhouse, the original paintings for which are in the Soane Museum, London. The third and most famous series, the "Marriage à la Mode," was not completed till 1745. It represents in six plates the story of a fashionable marriage between the son of an impoverished lord and the daughter of a wealthy city alderman. The original paintings are in the National Gallery, and are Hogarth's greatest work. Another prominent series was "Industry and Idleness" (12 sheets, 1747), executed as engravings only. They represent the respective careers of an idle and an industrious apprentice, and were intended for the working class. Besides these he executed briefer series, and many single plates.

Hogarth's art was essentially of a literary character, and he has well been called the Molière of painting. His constant endeavor was to point out the vices and follies of society, with the strict moral purpose of reforming. His great importance in the development of art lies in the fact that he was the first to turn his back on traditional practices, and to go directly to nature for the figures he painted. He is free from all foreign and ancient influence. In his portraits he is a technician of high order. His pictures are strongly and broadly painted, and are equally excellent in drawing and in color. His paintings excel his engravings, which are hastily executed and lack finish, although they are always spirited and intelligible.

He succeeded especially well in his portraits, the best of which is one of himself with his dog Trump (1745), in the National Gallery. This collection also contains portraits of his sister, Mary Hogarth (1746), Polly Peachum, David Garrick as Richard III., the Earl of Feversham, and the inimitable "Shrimp Girl." Among his other paintings of a didactic character, painted for engraving, were: "Southwark Fair" (1733); "Midnight Modern Conversation" (1734); the "Distressed Poet" (1735); the "Enraged Musician" (1741); "March to Finchley," and the "Election;" the two latter in the Soane Museum. He also attempted a few historical pictures on a large scale, but not with equal success.

Hogarth took a prominent part in the art controversies of his day, being the uncompromising foe of the imitation of the old masters—the 'black masters' as he called them, because of their darkened colors. In 1753 he published his *Analysis of Beauty*, setting forth his views on art; it was not a success, and brought ridicule upon him. After the death of his father-in-law in 1734, Hogarth converted his art school into a sort of life class, in which thirty or forty artists drew after the nude. In 1757 he was appointed sergeant-painter of all His Majesty's works, succeeding his brother-in-law, John Thornhill. His last days were marred by the ill success of his "Sigismunda Weeping Over the Heart of Her Husband," the harsh criticism of which was especially painful to Hogarth, as Sigismunda bore the features of his wife. An ill-advised effort in behalf of Lord Bute's Ministry in 1762 brought down upon him the terrible satire of Wilkes and Churchill, until then his intimate friends. Though much grieved, Hogarth retaliated by two prints: a hideous portrait of Wilkes, with a satyr's leer and squint, and "The Bruiser, C. Churchill." He died at London, October 25, 1764.

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HOGARTH CLUB. An artists' club in London, with headquarters at 36 Dover Street.

HOG CHOLERA. A virulent contagious disease of hogs, due to the presence of a pathogenic bacillus in the alimentary tract. The term has been used to cover at least two diseases, true hog cholera and swine plague (q.v.). Some authors have attempted to distinguish four or five diseases of the hog-cholera group, but the present tendency is to recognize only two.

The chief symptoms of hog cholera are a rise in body temperature, loss of appetite, a discharge from the eyes, watery at first but later yellowish and viscid, a purplish coloration of the skin, giving rise to a common name, blue sickness, occurring especially on the ears, chest, and abdomen, the under side of the neck, and on the inside of the thighs. Constipation is an early symptom, but diarrhœa soon sets in and persists until the death of the animal. The excrement is dark-colored, and possesses a fetid odor. The body temperature may rise from one to three degrees above the normal, but the elevation of temperature is frequently absent. The animals are dull and indifferent to surroundings, lie down a great part of the time and hide their heads under straw or litter, often have a dry cough, and sometimes squeal from intestinal pain. As the disease progresses they become gaunt with arching backs. The mortality from hog cholera under ordinary conditions is from 80 to 90 per cent. Acute

WILLIAM HOGARTH

"AFTER THE MARRIAGE" (FROM "MARRIAGE À LA MODE")
FROM THE ORIGINAL IN THE NATIONAL GALLERY, LONDON

cases may last from two to five days; chronic ones, a month. The characteristic pathological changes are enlargement of the spleen and a hemorrhagic condition of the large intestines and lymphatic glands. In chronic cases, ulcers are formed in the large intestines or the whole wall may become effused with blood.

Hog cholera and swine plague have been frequently confounded, but in typical cases they may be distinguished by clinical symptoms and post-mortem lesions. In most outbreaks of contagious hog diseases, hog cholera and swine plague occur in combination in the same animal. In general, however, the seat of infection in hog cholera is in the intestines; that of swine plague is in the lungs and secondarily in the intestines. A reddening of the skin is an indication of hog cholera, while coughing is more pronounced in cases of swine plague. For a reliable differential diagnosis of the two diseases it is necessary to make pure cultures of the micro-organisms which are concerned.

No satisfactory medicinal treatment has been devised for hog cholera. Recognized tonics which assist in keeping hogs in good physical condition may render them less susceptible to disease. A mixture containing sodium salts, sulphur, sulphide of antimony, and charcoal has proved as effective as any remedy. Serum therapy for hog cholera is still in the experimental stage, but has given promising results. The serum treatments devised by Pasteur and Lorenz have proved satisfactory in Europe. Experiments in the United States have demonstrated that serum used alone confers only a partial and temporary immunity to hog cholera. On the other hand, when antitoxic serum was used in combination with a virulent culture of the hog-cholera bacillus in the proportion of ten to one, a complete and lasting immunity was produced in more than 50 per cent. of cases.

It has been found practically impossible to disinfect hog pens and yards after an outbreak of hog cholera. Infected pens should be burned, and the surrounding ground should be cultivated to some crop for at least a year before again using as a hog-yard. Pens should be kept as clean as possible, and treated from time to time with lime or whitewash. By observing these precautions, preventing infection of the water-supply, and quarantining imported hogs before allowing them to run with the herd, the liability to infection from hog cholera will be much reduced. Consult: Nocard and Leclainche, *Les maladies microbiennes des animaux* (Paris, 1898); de Schweinitz, "Hog Cholera," and "Swine Plague," in *United States Department of Agriculture, Bureau of Animal Industry Reports* (Washington, 1889-92).

HOG-DEER. The 'para' or smallest of the East Indian rusine deer (*Cervus porcinus*), which takes its name from its habit of darting through the tall grass like a startled boar. It stands only two feet high at the withers. Its legs are comparatively short, and its antlers, having given off a brow tine, are nearly straight to the small terminal fork, and are mounted upon remarkably high pedicels. The general color is rufous brown, paler in summer and somewhat spotted. This deer ranges through Northern India, and down the coasts of Assam and Burma. It is very numerous, not gregarious, and forms a favorite object of jungle sport, sometimes by spearing.

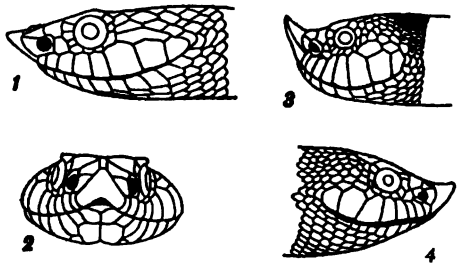
HOGE, hōg, Moses Drury (1819—). An American Presbyterian minister. He was born in Hampden-Sidney, Va., was educated there, and was made assistant in a Richmond church in 1844. When a second Presbyterian church grew out of the first, Dr. Hoge became its pastor (1845-85), and during the Civil War he succeeded in sailing to England from the blockaded port of Charleston to secure from the British and Foreign Bible Society a very large number of volumes for the use of Confederate soldiers. He was joint editor of the *Central Presbyterian* (1862-67).

HOGFISH, or Hogmolly. (1) See Log-Perch. (2) See Stone-Roller.

HOGG, James (1770-1835). A Scottish poet, known as the 'Ettrick Shepherd,' born in the parish of Ettrick, Selkirkshire, in 1770. His father was a poor farmer. The boy's education was slight, for he was taken from school to herd ewes. But from his mother he learned many folk-tales of giants, fairies, and brownies. Beginning to make songs for lasses to sing in chorus, he next wrote them out with great labor. His first poem was published anonymously in 1800. Going to Edinburgh, in 1801, to sell his employer's sheep, he wrote out from memory a little collection of his songs and published them roughly as *Scottish Pastorals, Poems, Songs, etc.* The next year he made the acquaintance of Scott, who was visiting the Ettrick forest in search of material for the *Minstrelsy of the Scottish Border*. Several ballads which Hogg and his mother furnished Scott appeared in the third volume of the *Minstrelsy* (1803). In 1807 Hogg published *The Mountain Bard*, original ballads suggested by Scott. With the proceeds of this volume and a treatise on sheep, amounting to £300, Hogg took a farm, which proved a disastrous venture. In 1810 he went to Edinburgh and began as professional author. Three years later appeared his most imaginative poem, *The Queen's Wake*. By this time he was becoming acquainted, directly or through correspondence, with some of the most eminent men of letters, who admired him greatly. He married in 1820, and retired to the farm of Eltrive Lake, in the valley of the Yarrow. He died November 21, 1835, and was buried in the Ettrick churchyard. In 1860 a monument was erected to his memory, overlooking Saint Mary's Lake. Hogg was immortalized as the Ettrick Shepherd by Wilson in the *Noctes Ambrosianæ*. Among his poems not cited above are *Madoc of the Moor, The Pilgrims of the Sun, The Jacobite Relics of Scotland, Queen Hynde*, and *The Border Garland*. These and other poems place Hogg, after Burns, among the greatest of the peasant poets of Scotland. Well known are such songs as "When the Kye comes Hame" and "Flora Macdonald's Farewell." Hogg also wrote many tales of uneven quality. The most remarkable is entitled *Confessions of a Fanatic*. Interesting, too, is the volume called *Winter Evening Tales*, depicting the manners of the border. Consult: *Works*, edited with memoirs by T. Thomson (London, 1865); "Poems," selected, in *Canterbury Poets* (London, 1886); and *Memorials of J. Hogg*, by his daughter, Mrs. Garden (London, 1885).

HOGNOSE. A harmless American serpent, remarkable for its blunt snout and curious man-

ners. Three species form the colubrine genus Heterodon, all confined to North America, exclusive of the Pacific Coast and Mexico. The best known species (*Heterodon platyrhinus*) is one of our most common and widespread snakes. It is usually about two, but may be three, feet long, and is normally reddish-brown above, heavily blotched or obscurely barred with a darker tint; and underneath is greenish-white. Great variety in color and markings exist, however, and many seem sooty black or dark slate all over. It is



HEADS OF HOGNOSE SNAKES.

1. Heterodon platyrhinus. 2. Face of same. 3. Heterodon nasicus. 4. Heterodon simus.

always to be recognized by its pig-like snout and its extraordinary behavior when disturbed. It is timid and will hide or escape when possible; but if surprised or cornered it will throw itself into vigorous contortions, and perhaps soon tumble over on its back as if dead; or, more probably, it will inflate its long lung until its body swells up like a sausage, and at the same time extend its anterior ribs until its neck is surprisingly broad and flat, and then, opening wide its great mouth, will blow and hiss loudly. This alarming menace is meant to terrify its foes, and has led to the popular names of 'blowing viper,' 'spreading adder,' etc., and to the general belief that it must be very poisonous. Its blotched back, easily mistaken by the unobserving for that of a copperhead, adds to its evil reputation. Nevertheless, this snake is entirely harmless, and when handled is found to be so gentle that it can hardly be forced to bite.

It feeds on mice, frogs, insects, birds' eggs, and so on, all obtained on the ground, for it is unable to climb trees. It lays a number of eggs, about an inch in length, in loose soil, into which it burrows for this purpose. The eggs are covered with a tough parchment-like coat, and probably hatch in a few days. There seems to be no precise time of laying; young have been reported from May until September. The young just issued from the egg will go through their contortions and hissing when molested, as do the adults. Much interesting information as to their breeding and other habits, collected by Abbott, Hay, and others, will be found summarized in Cope, *Crocodilians, Lizards, and Snakes*, published by the Smithsonian Institution (Washington, 1900).

The Southern States have a second species (*Heterodon simus*), and Texas and the Mexican border a third (*Heterodon nasicus*), in which the point of the snout is long r and more upturned than in the Northern forms.

HOG-PLUM, SPANISH PLUM, and BRAZILIAN PLUM. Names given in the West Indies and other tropical countries to the fruit of certain species of Spondias, a genus which belongs to the natural order Anacardiaceæ. The species are trees and shrubs with pinnate leaves, with terminal leaflets, and flowers in racemes or panicles. Some of them produce very pleasant fruits, among which may be mentioned *Spondias purpurea* and *Spondias lutea*, which are generally called hog-plum in the West Indies, because the fruits are a common food of hogs. *Spondias purpurea* has fruit about an inch in length, ovate or oblong, purple or variegated with yellow; yellow pulp with a peculiar but agreeable acid and aromatic taste. The fruit of *Spondias tuberosa*, called imbuzeiro in the north of Brazil, is about twice the size of a large gooseberry, oblong, yellowish, with a leathery skin and sweetish-acid pulp. A much-esteemed Brazilian dish is prepared of milk, curds, sugar, and the pulp of this fruit, from which also a refreshing beverage is made for use in fevers. The tree is remarkable for the numerous round black tubes, about 18 inches in diameter, which it produces on its widely spreading roots, and which are very cellular, and full of water. They are evidently intended for the wants of the tree in the dry season, and are often dug out by travelers for the sake of the water, of which each full-grown tuber yields about a pint. An important species is the ti or tahiti apple (*Spondias dulcis*), a very fine fruit of the South Sea Islands. This tree often attains a height of 50 to 60 feet, and, according to Seeman, is laden with fruits averaging a pound each.

HOG-RAT. See HUTIA.

HOGSHEAD. An old English measure of capacity. For wine, it was equivalent to 63 gallons; for ale and beer, to 54 gallons. In the United States it is still used as a measure for liquids, equivalent to 63 gallons; but when used for tobacco, it varies in different States from about 750 to 1200 pounds. See WEIGHTS AND MEASURES.

HOGUE, ôg, or **HOUGUE**, o͞og, LA. A roadstead near the northeast extremity of the Peninsula of Cotentin, Normandy, a few miles south of Barfleur. It gives its name to the naval battle of May 29 (old style May 19), 1692, when the combined English and Dutch fleets, under Admiral Russell, defeated the French fleet commanded by Tourville. The name of La Hogue is often confounded with La Hague, the name of the cape at the northwest extremity of Cotentin.

HOGUET, ô'gâ', KARL (1821-70). A German painter, born in Berlin. He studied first under Krause, and then went to Paris, where he was a pupil of Ciceri, and afterwards of Isabey. His works are marine and genre, and belong to the French school. Among them are: "Rue Pirouette in Paris," "From Normandy," "Last Windmill on Montmartre," "The Wreck" (1864, Berlin Museum), "Market Scene at Rouen," and "Lighthouse Near Boulogne."

HOHENHEIM, hō'en-hīm, PHILIPPUS, A. P. VON. See PARACELSUS.

HOHENLINDEN, hō'en-lĭn'den (Ger., Tall Lindens). A village in Upper Bavaria, 19 miles east of Munich, celebrated for the victory gained there by the French, under Moreau, over the Austrians under Archduke John, December 3, 1800. Moreau's army was posted on the plateau between the Isar and the Inn, and barred the way to Mu-

nich, which was the Archduke's objective point. In three columns the Austrians advanced to the attack through forest and ravines in a blinding snow-storm. Moreau contented himself with holding them in check until Richepanse, whom he had sent around the enemy's flank, reached the Austrian rear. Then he hurled Ney against their front. Richepanse delivered his attack from the rear, and the Austrian army was destroyed between the two French forces. The Austrians lost 20,000 men and 100 guns, while Moreau's loss amounted to only 5000. The battle hastened the conclusion of peace at Lunéville, February 9, 1801.

HOHENLOHE, hō'en-lō'e. Formerly an earldom, later a principality, in Franconia, Germany. It was mediatized in 1806, the main portion being assigned to Württemberg and a part to Bavaria.

HOHENLOHE. A princely family of Germany, claiming descent from Eberhard, one of the early dukes of Franconia. The family first appears in history in the early part of the twelfth century in possession of the Castle of Holloch, near Uffenheim. The first count we hear of is Heinrich, who lived in the twelfth century. He left two sons, Konrad and Gottfried, who followed the fortunes of the Hohenstaufen, and founded, respectively, the lines of Hohenlohe-Brauneck and Hohenlohe-Holloch. The former became subdivided into the Haltenbergstetten and Brauneck branches, both of which were extinct in 1390; the latter into the Weikersheim and Uffenheim, or Speckfeld, branches, of which the latter became extinct in 1412. In 1551 a new division in the Weikersheim line gave rise to the branches of Hohenlohe-Neuenstein and Hohenlohe-Waldenburg, which still continue. In the Reformation the Neuenstein branch became Protestant, while the Waldenburg counts remained Catholic. Princely rank was conferred upon the latter branch in 1744, and on the former in 1764. Of the Neuenstein branch there were two lines: Oehringen, extinct in 1805, and Langenburg, the latter being further subdivided into the Hohenlohe-Ingelfingen (Oehringen after 1805), and Hohenlohe-Kirchberg, extinct in 1861. The Waldenburg branch formed two lines: Bartenstein, with the cadet branch of Jagstberg, and Schillingsfürst, to which was added the Duchy of Ratibor. Among the prominent members of the Hohenlohe family are:

FRIEDRICH LUDWIG, PRINCE OF HOHENLOHE-INGELFINGEN (1746-1818). He distinguished himself at the storming of Weissenburg (1793), and won the battle of Kaiserslautern (September 20, 1794). After the defeat of Jena, in which he shared, he succeeded the Duke of Brunswick in command and capitulated at Prenzlau with 17,000 men (October 28, 1806). For this he was severely censured and forced to retire from further participation in the campaign.—KRAFT KARL AUGUST EDUARD FRIEDRICH, PRINCE OF HOHENLOHE-INGELFINGEN (1827-92). A Prussian general of artillery. He received a thorough training for the artillery service, and was placed in several positions of responsibility. In 1866 he held an important command at Sadowa, and in 1870 he commanded the artillery of the Guards in all its engagements, including Saint-Privat and Sedan. He was chief of artillery at the siege of Paris. He was made a lieutenant-general in 1873, adjutant-general in 1875, general of infantry in 1883, and general of artillery in 1889. He died in Dresden, January 16, 1892. He was the author of several works on military science: *Militärische Briefe* (1887-90); *Strategische Briefe* (1887); *Die Feldartillerie in ihrer Unterstellung unter die Generalkommandos* (1889); *Ideen über Befestigungen* (1888); also, *Gespräche über Reiterei* (1887).—CHLODWIG KARL VICTOR, PRINCE OF HOHENLOHE-SCHILLINGSFÜRST, of RATIBOR and KORVEI (1819-1901). Chancellor of the German Empire from 1894 to 1900. He was born March 31, 1819, at Rotenburg-an-der-Fulda. His mother was a princess of Hohenlohe-Langenburg. He studied political science and jurisprudence at Heidelberg, Göttingen, and Bonn. Before he came to his title of Duke of Ratibor and of Korvei, in 1845, he held offices in connection with the law courts at Ehrenbreitstein and Potsdam. In the Bavarian Diet he opposed the Ultramontane policy, and in 1866 he strove to bring over Bavaria to the side of Prussia. At the close of the year he became Bavarian Minister of Foreign Affairs and president of the Ministerial Council, holding office till March, 1870. His efforts in behalf of a united Germany long met with fierce opposition, but he saw clearly the triumph of the cause for which he had worked, and entered the First German Reichstag as a member of the *Reichspartei*. In 1874 he was appointed German Ambassador to Paris, and in 1878 he was the third German Plenipotentiary at the Congress of Berlin. In 1885 he became Governor of Alsace-Lorraine, in which position he displayed conspicuous tact. On the resignation of Count Caprivi, in 1894, Prince Hohenlohe was created Imperial Chancellor. This office he resigned in 1900, being succeeded by Count von Bülow. During his long career in German politics Prince Hohenlohe did much to promote German unity. He had to face the hostility of the anti-Unionists in Bavaria, and was one of Bismarck's chief supporters in that statesman's Imperial policy. As Governor of Alsace-Lorraine, Hohenlohe aided greatly in Teutonizing the provinces. As Chancellor he promoted the colonial policy, and favored the creation of a powerful navy. He was a favorite with William II., whose masterful policy he did not oppose, and with whom he was on the best of terms up to the time of his resignation, in October, 1900. It was said that the cause of his resigning the Chancellorship was dissatisfaction with the advanced or 'forward' policy favored by the Emperor, especially in so far as it related to China. He died at Ragatz, Switzerland, July 6, 1901.—GUSTAV ADOLF (1823-96), PRINCE OF HOHENLOHE-SCHILLINGSFÜRST. A brother of the Chancellor. He took holy orders in 1849, and became in 1857 Bishop of Edessa *in partibus*, and almoner to Pius IX. He was made a cardinal in 1866.. He was opposed to Jesuit influence in Rome, and endeavored to prevent the Kulturkampf (q.v.). He was sent to Rome in 1872 as Ambassador to the Holy See, but his appointment was rejected by Pius IX. He returned to Rome in 1876, and subsequently gained the favor of Leo XIII. From 1879 to 1884 he was Bishop of Albano, and became subsequently Archpriest of Santa Maria Maggiore in Rome. He died in Rome, October 30, 1896.—HERMANN, PRINCE OF HOHENLOHE-LANGENBURG (1832—). He entered the Württemberg army, was in the Austrian service from

1854 to 1860, and was a general in the army of Baden from 1862 to 1871. He has been a member of the Upper Chamber of Württemberg since 1860, and was elected its vice-president in 1893. He was a member of the Imperial Reichstag from 1871 to 1880, and acted with the *Reichspartei*. (See POLITICAL PARTIES, paragraph on *Germany*.) In 1894 he became Governor of Alsace-Lorraine. He was the founder and president (1883-94) of the Deutsche Kolonialgesellschaft. He holds the military rank of general of cavalry in the Prussian Army.

HOHENSTAUFEN, hō'en-stou'fen. A princely house of Swabia, in Germany, which held possession of the German Imperial throne from 1138 to 1254. The family traced its descent from Frederick of Büren, who lived about the middle of the eleventh century, and whose son, Frederick of Staufen, built the castle from which the family derived its name, some vestiges of which are still to be seen on the summit of the Hohenstaufen, one of the peaks of the Rauhe Alb, close to the town of Göppingen, Württemberg. The son, Frederick of Staufen, was a faithful partisan of the Emperor Henry IV., and in return received Henry's daughter and the Duchy of Swabia in 1079. Duke Frederick, at his death in 1105, left two sons—Frederick II., the One-Eyed, and Conrad; the former was immediately confirmed in the possession of Swabia by Henry V., and in 1112 the latter received the Duchy of Franconia. Upon the death of Henry V. in 1125 his family estates fell to the House of Hohenstaufen. It seemed, too, as if the Imperial dignity would be conferred upon Frederick on account of his talents and popularity; but Lothair of Saxony, his rival and enemy, was elected as Henry V.'s successor. On Lothair's accession, he demanded the Imperial possessions held by the House of Hohenstaufen, and a war ensued between him and the Hohenstaufen princes, in which Lothair was supported by the House of Welf (Guelph). In the course of this struggle Conrad was crowned King of Italy in 1128; but the two brothers were forced to make peace with Lothair in 1135, and afterwards lent him their support. After Lothair's death, Conrad was elected King of Germany, in 1138, as Conrad III. (q.v.). Under Conrad III. the House of Hohenstaufen waged war against the House of Guelph, which for a brief time was weakened by the loss of Bavaria.

On Conrad's death, in 1152, his nephew, Frederick I. Barbarossa, became Emperor. As he was the offspring of a Hohenstaufen father and a Guelph mother, it was hoped that the struggle between the two houses might be ended by his accession. But the defiant attitude of Henry the Lion, Duke of Saxony and Bavaria, the powerful representative of the Guelph family, caused the conflict to break out afresh in 1180. Henry the Lion was conquered and deprived of most of his possessions. Frederick went on the Third Crusade, but died in 1190, before reaching Jerusalem. His son, Henry VI., succeeded to the throne without opposition. By a marriage with the heiress of Sicily and by conquest he added Southern Italy and Sicily to the Empire. He exercised the most far-reaching power of any of the Hohenstaufen, and dreamed of a world-wide empire. Richard the Lion-Hearted of England was obliged to become his vassal in order to be freed from captivity. Some of the Christian rulers in the East had sought protection from Henry, and he sent an army to the Holy Land, 'the German Crusade' (see CRUSADES) to establish his own supremacy. His plans were frustrated by his early death, in 1197. His son Frederick II. had already been crowned King of Germany, but as he was only a child of three, his rights were passed over. The Guelphs chose Otho of Brunswick, son of Henry the Lion, and the choice of the partisans of the Hohenstaufen fell upon Philip of Swabia, uncle of Frederick II. Civil war followed, the contest terminating with the assassination of Philip in 1208 by Otho of Wittelsbach. For a time Otho of Brunswick (Otho IV.) was recognized as ruler; then his opponents rallied about Frederick II., who in the meanwhile had been ruling his Kingdom of Sicily, which he had inherited from his mother. Frederick was crowned, and by 1215 was recognized by all except a few obstinate partisans of Otho IV. He ruled over Germany, Italy, and Sicily, and also became King of Jerusalem. His reign was spent to a great extent in a struggle with the Papacy. The partisans of the Hohenstaufen in Italy and the opponents of the Imperial power, in general the supporters of the Papacy, were known respectively as Ghibellines and Guelphs. (See GUELPHS AND GHIBELLINES.) After Frederick's death, in 1250, the inveterate animosity of the Guelphs followed his son, Conrad IV., who abandoned Germany for his hereditary Italian possessions, and died in 1254. After Conrad's death his half-brother Manfred fought for the Hohenstaufen interests until he was defeated and killed at the battle of Benevento, in 1266, against Charles of Anjou, who at the invitation of the Pope, had undertaken the conquest of the Two Sicilies. Manfred's sons were kept in prison until his death. His daughter married Peter III. of Aragon, who later avenged the destruction of the Hohenstaufen by expelling their foes from the Kingdom of Sicily. Conrad's young son, Conradin, in an attempt to reconquer the Two Sicilies, was taken captive by Charles of Anjou at the battle of Tagliacozzo, and executed at Naples on October 29, 1268. Enzio, an illegitimate son of Frederick II., who had been made King of Sardinia, died in prison four years later. Thus all of the male descendants of Frederick II. perished. The emperors of this family rank among the ablest rulers of Germany, and hold the first place in popular German tradition today, just as they held the first place in the affections of the people during their lifetime. They appear in general as men possessed of great virtues and of great faults, and impressive by reason of both. Frederick Barbarossa, according to the legend, is not dead, but asleep, and will wake to help his people in time of need. Frederick II. is one of the most remarkable figures of the Middle Ages in his character as ruler, knight, scholar, and free-thinker. Consult Raumer, *Geschichte der Hohenstaufen* (5th ed., Leipzig, 1878). See, also, articles on the individual emperors.

HOHENSTEIN, hō'en-stīn. A manufacturing town in the Kingdom of Saxony, 12 miles northeast of Zwickau (Map: Prussia, E 3). It produces chiefly textiles and knit goods; in the neighborhood are mines of sulphur, arsenic, and gold. Population, in 1890, 7546; in 1900 (with the neighboring town of Ernstthal annexed in 1898), 13,397.

HOHENWART, hō'en-värt, KARL, Count (1824-99). An Austrian statesman, leader of the Federalist party. In 1868 he became Governor of Upper Austria, and three years afterwards succeeded Potocki as president of the Ministry. In his Cabinet he held the portfolio of the Interior. His federalist policy met with such opposition on the part of the Hungarian Ministry and the German Liberals that he was forced to resign after holding office for less than a year. He was elected to the Lower House in 1873, and became a leader of the Right Centre. In 1885 Hohenwart was appointed president of the Supreme Court of Accounts, and in 1891 he formed the Hohenwart Club, consisting of German Conservatives, Slovenes, Croatians, and Rumans, as well as the great landed proprietors of Bohemia. But this party broke in 1895, through the defection of the German members, and in 1897, on the appointment of its leader to the House of Lords, it disintegrated entirely.

HOHENZOLLERN, hō'en-tsōl'lērn. A province of Prussia, consisting of a narrow strip of land entirely surrounded by Württemberg and Baden, and covering, together with its nine exclaves, an area of about 440 square miles (Map: Prussia, C 4). It extends from the Neckar in the northwest to the vicinity of Lake Constance. It is divided by the Rauhe Alb, which rises in places to 3000 feet. The Danube crosses the province, which is well watered. The mountain valleys are productive, and yield grain, fruit, hops, etc. The Alb chain yields some iron, and in other mountains some deposits of rock salt are found. Mineral springs abound. Some manufacturing is done in the way of cotton-spinning, the production of iron of superior quality, etc. Administratively the province is divided into the four districts of Sigmaringen, Gammertingen, Haigerloch, and Hechingen. Since 1873 it has had a Landtag sitting at Sigmaringen. It sends one Deputy to the Reichstag. The population numbered, in 1900, 66,783. The inhabitants are nearly all Roman Catholics, and the province forms a dependency of the Archbishop of Freiburg. On a steep eminence near Hechingen stands the magnificent Castle of Hohenzollern, erected in the second half of the nineteenth century, in the style of the fourteenth century, on the ruins of the mediæval stronghold, the cradle of the reigning Hohenzollern dynasty of Prussia.

HOHENZOLLERN. The family name of the royal house of Prussia, in which has been vested also, since January 18, 1871, the dignity of German Emperor. The name is derived from the ancestral Castle Zollern, or Hohenzollern, in Swabia (see preceding article). The origin of the house is involved in obscurity, and the story of its descent from Count Thassilo, a Swabian noble of the time of Charles the Great, is a fiction of the sixteenth century. The family name occurs as early as the eleventh century in the persons of Burchard and Wezel of Zolre, who were killed in 1061, but whether there is any relationship between these and the succeeding Hohenzollern family is a matter of doubt. The House of Hohenzollern occupied a prominent position among the petty princely families of Swabia as early as the first half of the twelfth century, and at the close of that century we find Count Frederick of Zolre invested with the Burggraviate of Nuremberg, an Imperial office, which descended to his posterity. His sons, Frederick and Conrad, divided the possessions of the house in 1227, founding the Swabian and Franconian lines. From the close of the sixteenth century the elder or Swabian branch of the House of Hohenzollern existed in the two lines of Hohenzollern-Hechingen and Hohenzollern-Sigmaringen. In 1695 a pact of inheritance was made between these branches and that of Brandenburg (see below). In 1821 a new covenant was drawn up and confirmed by the King of Prussia, as head of the Hohenzollern family, by which it was provided that in case of failure of male issue in either line possession should pass to the other, and on the extinction of both lines should vest in the royal family of Prussia. But before the prospect of extinction presented itself the princes of Hohenzollern-Hechingen and Hohenzollern-Sigmaringen, after the commotions of the revolutionary year 1848, decided to abdicate in favor of the King of Prussia. The act of renunciation took place at the close of 1849, and in accordance with the covenant of 1821 the King of Prussia took possession of the two principalities in the following year, the two princes being given annual pensions. Leopold of Hohenzollern, the prince who was offered the crown of Spain in 1870, was the eldest son of the last ruler of Hohenzollern-Sigmaringen. The second son, Charles, became Prince and King of Rumania.

The great destiny of the family was reserved for the cadet branch, the Franconian line. They attached themselves to the Hohenstaufen until that great house became extinct, when they gave their support to Rudolph of Hapsburg. During the civil war which followed the double election of 1314 they sided with Louis of Bavaria against the House of Austria, but subsequently they became once more faithful supporters of the Hapsburgs. Acquisitiveness and a capacity to hold what was once obtained and to administer it with thrift seem to have characterized to a greater or less degree all the Franconian Hohenzollern princes. From the founder of the line, Conrad III. (died 1261), there was a steady gain in territory and influence under Frederick III. (1261-97), Frederick IV. (1297-1332), John II. (1332-57), and Frederick V. (1357-98). The possessions of the house, in which was vested the Burggraviate of Nuremberg, were constituted into the two margraviates of Bayreuth (originally Culmbach) and Anspach. The sons of Frederick V., John III. and Frederick VI., possessed respectively Bayreuth and Anspach, the latter inheriting his brother's possessions in 1420. Frederick VI. in 1411 received the Margraviate of Brandenburg as a pledge for a loan to the Emperor Sigismund, and in 1415 it was granted to him as an hereditary possession, together with the dignity of Elector. This was the foundation of the real greatness of the House of Hohenzollern.

The Elector Albert Achilles of Brandenburg by the so-called *Dispositio Achillea* of 1473 decreed that the Franconian margraviates (Anspach and Bayreuth) should be separated from Brandenburg and ruled as secundogenitures. The last Margrave of Bayreuth died in 1769, when the State was united with Anspach. In 1791 the Margrave of Anspach and Bayreuth sold his principalities to Prussia, which, however, retained them only a few years.

The succession of electors of Brandenburg was as follows:

Frederick I. (the Frederick VI. mentioned above).	(1415-1440)
Frederick II.	(1440-1470)
Albert Achilles.	(1470-1486)
John Cicero.	(1486-1499)
Joachim I. Nestor.	(1499-1535)
Joachim II. Hector.	(1535-1571)
John George.	(1571-1598)
Joachim Frederick.	(1598-1608)
John Sigismund.	(1608-1619)
George William.	(1619-1640)
Frederick William, the Great Elector.	(1640-1688)
Frederick III.	(1688-1713) after 1701, King Frederick I. of Prussia.

The Hohenzollern kings of Prussia since Frederick I. have been as follows:

Frederick William I.	(1713-1740)
Frederick II. the Great.	(1740-1786)
Frederick William II.	(1786-1797)
Frederick William III.	(1797-1840)
Frederick William IV.	(1840-1861)
William I.	(1861-1888), after 1871, German Emperor
Frederick III.	(1888)
William II.	(1888—)

The history of the Hohenzollern family from the fifteenth century is that of BRANDENBURG, PRUSSIA, and GERMANY. Consult: Stillfried-Alcantara and Kugler, *Die Hohenzollern und das deutsche Vaterland* (Munich, 1881), a well-ordered account in luxurious folio volumes, dedicated to Emperor William I., and presumably having a semi-official standing; Waddington, *L'acquisition de la couronne royale de Prusse par les Hohenzollern* (Paris, 1888), a valuable study of Hohenzollern history in the seventeenth and eighteenth centuries, with many documents; Berner, *Die Abstammung und älteste Genealogie der Hohenzollern* (Berlin, 1893); Seidel, *Hohenzollern-Jahrbuch, Forschungen zur Geschichte der Hohenzollern in Brandenburg-Preussen* (Leipzig, 1897, et seq.); Tuttle, *History of Prussia* (Boston, 1884-96), one of the best products of American historical scholarship, cut short at 1757 by the death of the author.

HÖHNEL, hē'nel, LUDWIG VON (1857—). An Austrian explorer, born at Pressburg and educated at the Naval Academy of Fiume. In 1887 he accompanied Count Teleki in the journey from Zanzibar, on which Lakes Rudolph and Stephanie were discovered, and a large area, before unknown, carefully plotted on Höhnel's maps. The expeditions proved the connection between the Abyssinian plateau and the Rand. Lieutenant Höhnel described the results of his journey in his book, *Zum Rudolfsee und Stefaniesee* (1892). In 1892-93 he made a journey of exploration with an American traveler, William Astor Chanler (q.v.), in the country between the rivers Tana and Juba. Consult Chanler, *Through Jungle and Desert* (New York, 1896).

HÖHSCHEID, hē'shīt. A town of the Prussian Rhine Province, situated on the Wupper, 17 miles east-southeast of Düsseldorf (Map: Prussia, B 3). It has extensive manufactures of steel products and machinery. Population, in 1890, 12,593; in 1900, 14,172.

HOI-HAU, hoi'hou'. The seaport of Kiungchow (q.v.).

HOJEDA, ō-HĀ'DÅ, ALONZO DE. A Spanish pioneer in America. See OJEDA.

HŌJŌ, hō'jō. The name of five towns in Japan, from one of which, in Idzu (q.v.), arose the celebrated family of regents known as the Hōjō, which, during the era of the puppet Shoguns at Kamakura (A.D. 1219-1333), ruled the Empire. Of the twelve, several were of marked ability. During their régime Buddhism developed rapidly, and the Mongol invaders under Kublai Khan were driven off and their armada destroyed. The Hōjō were overthrown by one Nitta Yoshisada in 1333. Consult: Griffis, *The Mikado's Empire* (New York, 1900); Adams, *History of Japan*, vol. i. (London, 1884); Brinkley, *Japan, Its History, Arts, and Literature* (Boston, 1901-02).

HOK-CHIN, hôk'chēn'. See FU-KIEN.

HOKITIKA, hō'kē-tē'kå. The capital of Westland County, on the northwest coast of South Island, New Zealand (Map: New Zealand, C 5). It lies 24 miles southwest of Greymouth, with which and with Nelson it is connected by rail. It has thriving agricultural industries, while gold-mining, which was formerly of great importance, is still carried on. Population, in 1901, 1951.

HOKKAIDO, hôk'kī'dō. See YEZO.

HO-KOW, hō'kou'. The name of a number of towns in China, the most important of which are the following: (1) A town situated in the Province of Kiang-si, on the right bank of the Poyang-hu Lake, opposite Kiu-kiang (Map: China, E 6). It has an extensive trade in black tea, and an estimated population of 300,000. (2) A treaty port, situated in the northern part of the Province of Yun-nan, on the left bank of the Red River, nearly opposite the town of Laokai in Tonking, with which it is connected by a suspension bridge, completed in 1900. It is only a short distance from the treaty port of Meng-tsze. It is a small village of about 4000 inhabitants, and the seat of a French vice-consulate. It was opened for foreign trade in accordance with a supplementary convention between China and France of June 20, 1895. The trade of the port is as yet insignificant. (3) A small town in the northern part of the Province of Shan-si, at the confluence of the Hei-shui River with the Hoang-ho. It has important soda-works, and lies near the starting-point of the highway to Peking.

HOKUSAI, hôk'ōō-sī (1760-1849). A noted Japanese artist. He was born at Honjō, in Yedo (now Tokio), son of an artisan named Nakashima Ise, a maker of metal mirrors in the employ of the Shogun of the time. Little is known of his life beyond what he himself tells in the prefaces to his numerous works. At thirteen he left home and apprenticed himself to an engraver. Five years afterwards he gave up engraving to study with Shunsho, the most noted designer of the time, but was expelled in 1786 for persistently indulging in a style that was displeasing to his master. He tried to make a living by illustrating comic books, but not meeting with success, he became a peddler, continuing to draw and paint as he had opportunity. In order to attract attention and raise money, he in 1804 exhibited his dexterity by painting in public a colored figure of a Buddhist saint on a sheet of paper 18 yards long and 11 yards wide, using brooms for brushes and buckets to hold his liquid India ink. Three years later he became associated with Bakin, the novelist, and collaborated with him in illustrating a work translated from the Chinese by Bakin, and containing 108 portraits of Chinese heroes. This

appeared in 1828. His connection with Bakin lasted only four years, and he was again adrift. His public career really did not begin until 1810, when he became an industrial artist and a teacher of drawing. Pupils flocked to him in numbers so great that he could not supply them with original drawings of his own as models, so he began wood-engraving in order to furnish the needed number. In this way his *Mangwa*, or album of "Ten Thousand Sketches," took form, and his fame spread as volume after volume and edition after edition appeared. The later volumes of this series appeared in 1836, a year after the issue of his *Fugakū Hiyakūkei*, or *Hiakke* ("A Hundred Views of Fujisan"). His industry was great, and his works numerous. Thirty thousand drawings of his have been counted up, yet he was always in poverty. He died April 13 (some say May 10), 1849, at Asakusa, a district of Yedo, the ninety-third place in which he had lived. Money for his funeral was provided by his pupils and admirers. He was twice married, and had five children.

Hokusai was a man of the people to the end. He never rose above his class, and never made any attempt to do so. His talent lay in producing *Ukio-ye* ('pictures of this passing world'), free from the conventionalities of his predecessors and his contemporaries. His influence on modern art has been very great. His whole life was spent in perfecting himself; yet when he came to die his last words were, "If Heaven would only grant me ten more years!" and a moment later, "If Heaven had only granted me five years more, I could have been a thorough artist." His signatures were numerous. In 1798 he appears under the name of 'Sori;' in the following year he changed this to 'Sori, who has changed his name to Hokūsai.' In 1800 he called himself simply 'Hokusai' ('North Studio'). A favorite signature was 'Hokusai Gwa-Kio Rōjin' ('Hokusai, the old man crazy about drawing'). His latest name was 'Manji' (the Swastika), and the inscription over his grave is the one he loved most to use—'Manji Gwa-Kio Rōjin.' A full list of his works (with a bibliography) is given in Anderson's *Descriptive and Historical Catalogue of Chinese and Japanese Art* (London, 1886).

Bibliography. *Hokūsai*, a paper read by John La Farge before the Century Club (New York, 1897); Holmes, *Hokusai* (London, 1899); Fenollosa, *Hokusai and His School* (Boston, 1893); Anderson, *History of Japanese Art* (London, 1886); and *Fuji Hiakke* ('A Hundred Views of Fujisan') (London, 1880). Consult also Brinkley, *Japan: Its History, Arts, and Literature* (Boston, 1901-02).

HOLABIRD, Samuel Beckley (1826—). An American soldier, born in Canaan, Conn. He graduated at West Point in 1849, served with the Army of the Potomac (1861-62), and continued to rise in his profession till he became brigadier and quartermaster general (1883), as well as translator for the army. His chief work in that connection was General Jomini's *Treatise on the Grand Military Operations of Frederick the Great* (1865).

HOLARCTIC REGION (from Gk. ὅλος, *holos*, entire + ἀρκτικός, *arktikos*, northern, from ἄρκτος, *arktos*, bear). A division in zoögeography, defined in two senses: (1) *Arctogæa.*—In the larger sense the term is used, unhappily, as a synonym for 'Arctogæa.' (See Distribution of Animals and Notogæa.) This 'region' embraces all of the Northern Hemisphere except the hot coast regions of Central America, all of Africa and Madagascar, and an indefinite extent of the Malayan and Polynesian islands, where its boundaries vary in different classes of animals; in other words, it is a combination of the Nearctic, Palæarctic, Palæotropical, and Oriental regions of Sclater and Wallace, as opposed to the combined Neotropical and Australasian regions (Notogæa). The fundamental difference between Arctogæa and Notogæa reaches back to an early geological period, while many of the present distinctions between their subdivisions disappear when traced back to the Tertiary, when the distribution of animal life was very different from now. It is this broad historical view, rather than the modern aspect, which has led naturalists to the generalizations of Arctogæa and Notogæa. Limiting the comparison to vertebrate animals, the characteristics of Arctogæa are in outline as follows: Among fishes, the perches, carps, salmons, and sturgeons are present as whole tribes, together with many lesser groups, especially of fresh-water or coast fishes, while the lungfishes are conspicuous absentees. In the class Amphibia, the line is drawn at the frog family Cystignathidæ, which is entirely Arctogæan. Gadow also points out the predominance of Arcifera, which constitute nine-tenths of the anurous population, and are hardly represented in Notogæa. Of turtles, the presence of Trionychoidea and the absence of Chelydidæ are distinctive. Of lizards, exclusively Arctogæal groups are the Lacertidæ, Zomoridæ, Gerrhosauridæ, and Aniellidæ. Among the snakes, the viper family is entirely Arctogæal, and the crotaline tribe mainly so. Lesser exclusive groups are the Uropeltidæ, Xenopeltidæ, and many genera. Ornithological distinctions may be most easily sketched by saying that Arctogæa possesses no emus or cassowaries; no mound-birds, birds of paradise, lyre-birds, cockatoos, tinamous, curassows, hoactzins, toucans, cotingas, or many others, although it is rich in game birds, finches, woodpeckers, wood-warblers, and the like. But perhaps the most striking difference is the presence of the large Arctic tribe of auks, and the like, and the absence of penguins. Among mammals, also, the most notable feature is the entire absence of edentates, of monotremes, of marsupials (except one opossum), of cebine monkeys, and of marmosets. The northern region, on the other hand, has all the lemurs, all the insectivores with the exception of the West Indian Solenodon, all the elephants, rhinoceroses, hyraces, horses, deer, giraffes, bovines, hyenas, hares, and a variety of other important families; it is, in fact, as Beddard points out, the headquarters of all the Eutheria except edentates and marsupials.

(2) *Holarctic, or Periarctic, Province.*—In a more restricted and perhaps more usual sense, the term 'holarctic' in zoögeography denotes a circumpolar district formed by the union of the Palæarctic and Nearctic provinces of Sclater and Wallace, elsewhere described. It was long ago felt that the faunal characteristics of North America and the northern part of the Old World were not sufficiently distinct to justify their separation into two provinces. Their union under one name was first made by A. Heilprin,

who proposed 'Triarctic' as the new designation. For this A. Newton suggested the substitution of 'Holarctic,' which Heilprin at once adopted. More recently Gadow has used 'Periarctic' as a synonym, on the ground that it is more precise. Its faunal characteristics are those sketched in the first paragraph, with the omission of such forms as are exclusively Ethiopian (Africa, south of the Sahara) or Oriental (the Asiatic coast and islands south of the Himalayan watershed). The faunal agreement between North America and the northern part of the Old World is greater than any differences. There are few families not represented in both, and the distinctive animals are mainly local genera or species, while a great many apparently identical forms occur on both continents, having a circumpolar distribution due either to their powers of travel or to ancient land connections. Consult: Heilprin, *Geographical and Geological Distribution of Animals* (New York, 1887); Newton, *Dictionary of Birds* (New York, 1896); and the authorities referred to under DISTRIBUTION OF ANIMALS. See also NEARCTIC REGION; PALÆARCTIC REGION.

HOLBACH, hôl'bäg, PAUL HENRI THYRY D', Baron (1723-89). A French philosopher of the eighteenth century, and one of the Encyclopædists. (See ENCYCLOPÉDIE.) He was born of wealthy parents, at Heidesheim, in the Palatinate, in 1723. At an early age he went to Paris, where he continued to reside during the remainder of his life. As Holbach was remarkable for his agreeable social qualities, and kept a good table, the most eminent thinkers and writers of the day, such as Condorcet, Diderot, Duclos, Helvétius, Raynal, Rousseau, Buffon, etc., were in the habit of assembling at his house. The witty Abbé Galiani called Holbach the *maître d'hôtel* of philosophy. Here speculation, it is said, was carried to such daring lengths that Buffon, D'Alembert, and Rousseau were compelled to withdraw from the circle. Holbach was the zealous champion of naturalism, and contended not only against Christianity, but against all positive religion. His principal work, the *Système de la nature* (published anonymously in 1770), has been called the "Bible of Naturalism." In this work the author endeavors to expound the principles of morality upon a sensualistic, materialistic, deterministic, egoistic, and atheistic basis. For him God is only an ideal being, created by kings and priests. The work is in no sense original, but gives voice to the materialism of the French *philosophes* of the eighteenth century, which is nowhere more openly advocated than in the writings of Holbach. He was a man of good heart, and, in spite of his theory, of most unselfish benevolence. When the Jesuits fell into disgrace during the reign of Louis XV., Holbach, though he hated their system and had written against them in the days of their prosperity, made his house an asylum for his old foes when the clouds gathered around them. Many anonymous works besides the *Système* have been attributed to Holbach. Consult: Avezac-Lavigne, *Diderot et la société du baron d'Holbach* (Paris, 1878); Morley, "Three Works of the Eighteenth Century, I. Holbach's System of Nature," in *Fortnightly Review* (London, 1877); id., *Diderot and the Encyclopædists* (London, 1878; 2d ed. 1886).

HOLBEIN, hôl'bīn, HANS, the Elder (c. 1460-1524). A noted German painter, whose reputation was for a long time overshadowed by that of his celebrated son, Hans the Younger, to whom most of the elder master's finest productions were formerly attributed. But little is known of his life. He was born at Augsburg, the son of the tanner Michael Holbein, and resided there at intervals for many years, alternately prosperous and in want, first mentioned in the rate-books of the city in 1494. He became a citizen of Ulm in 1499, and two years later visited Frankfort. After 1516 he lived at a short distance from Augsburg, and in 1517 wandered off to paint an altarpiece at Isenheim, in Alsace, where he died. The name of his master is not known; that he worked for some time in the studio of Martin Schongauer at Colmar is a mere surmise suggested by a certain resemblance of style, especially in the types of his heads. Undoubtedly Holbein formed his style on the models of the early Flemish school, and subsequently modified it by yielding to local tradition and Italian influences. In his early pictures slender figures, mild and regular features, staidness of attitude, and a clear transparency of tone unrelieved by depth of shadow, are the prevailing characteristics. To this class belong the "Virgin and Child, with Two Angels," in Sankt Moritz Chapel, Nuremberg, and a "Virgin and Child Enthroned, with Angels," in the Landauer Brüderhaus in that city. Of a similar stamp are four altar panels (1493), representing "Joachim's Sacrifice," "Birth and Presentation of Mary," and "Presentation of Christ," in the Cathedral of Augsburg. Somewhat less marked is the Flemish origin of the master's manner in a series of "Scenes from the Passion" (1499), and the altarpiece (1499) with the "Basilica of Santa Maria Maggiore" in the centre, "Coronation of the Virgin" above it, the "Nativity" and "Martyrdom of Saint Dorothea" in the wings, both in the gallery at Augsburg. To the year 1499 belongs also the "Death of the Virgin" in the Basel Museum. In Frankfort he painted for the Dominicans a composite altarpiece (1501), comprising the "Last Supper," "Entry of Christ Into Jerusalem," "Expulsion of the Jews from the Temple," etc., and "Seven Scenes from the Passion," now all in the Städel Institute at Frankfort. Of the same period are the "Crucifixion," "Descent from the Cross," and "Entombment," also "Sixteen Scenes from the Life of Mary," all parts of a large altarpiece (1502) in the Old Pinakothek at Munich; a "Transfiguration" (1502) and "Christ Crowned with Thorns," both in the Augsburg Gallery. A marked progress in the master's manner is to be noticed in the "Life of Saint Paul" (1504), in its more ideal conception, correct drawing, and delicate execution, and of traditional interest as containing the portraits of the artist and his two sons, Ambrosius and Hans. The influence of the Italian Renaissance is still more apparent in the greater expressiveness and beauty of coloring displayed in the "Saint Catharine Altar" (1512), this and the preceding also in the Augsburg Gallery; but his maturest work is the "Martyrdom of Saint Sebastian" (1515-16), in the Pinakothek at Munich, a composition full of dramatic power, far transcending any of his previous efforts. His last important work was probably the "Fountain of Life" (1519), in the royal palace at Lisbon.

Holbein the Elder also excelled as a portrait painter, and his rare gift for characterization is apparent especially in the numerous head studies, mostly in silver point, distributed in various collections, among which those in Berlin, Copenhagen, and Basel are the richest. The museum at Basel also possesses a number of sketches for his religious paintings.

His brother SIGISMUND (?-1540) first appears on the rate-books of Augsburg in 1504, and in 1519 removed to Bern, where he died, making his nephew, Hans the Younger, his heir. There is very little doubt that he assisted the elder master in several of his most important works, although no single picture can be traced to him directly.—AMBROSIUS (c.1494-c.1519), son and pupil of Hans the Elder, was born in Augsburg, and, with his brother, Hans the Younger, was sent to Basel about 1515, when both were engaged chiefly in designing title-pages, initials, and other illustrations for books. In 1517 he was admitted into the guild 'Zum Himmel,' and acquired the freedom of the city in the year following, but all trace of him is lost after 1519. The museum at Basel preserves three authenticated paintings by him: "Christ Crowned with Thorns" and two "Bust Portraits of Boys," besides which the portrait of the goldsmith Georg Schweiger, of Augsburg, may also be attributed to him with tolerable certainty. A portrait of a young man (1518) is in the Hermitage at Saint Petersburg. Consult: The biography of Holbein the Elder, by Stödtner (Berlin, 1896 et seq.); also Woltmann, *Holbein und seine Zeit* (Leipzig, 1873-76).

HOLBEIN, HANS, the Younger (1497-1543). A German painter and designer, one of the chief masters of the German Renaissance. He was a son of Hans Holbein the Elder, and was born at Augsburg, where he studied with his father and with Hans Burgkmair. Two of the works which he probably painted in his father's workshop survive: a "Madonna" (1514), in the Museum of Basel, and "Christ Dragged to the Crucifixion," in the Gallery at Karlsruhe. Both resemble the work of his father, to whom the latter picture has also been ascribed.

About 1515 we find Holbein at Basel, where he and his elder brother Ambrosius had probably come to make illustrations for books; Basel was then an important centre of the book trade. Here Hans was introduced into the classic world, especially through his association with Beatus Rhenanus, corrector for the printer Froben. This influence is revealed in the table-plate in the Museum of Zurich, which he painted for the family Baer, with scenes of hunting, fishing, and knightly tourneys, and in his eighty-three pen drawings for Erasmus's *Praise of Folly*, which are in the Museum of Basel. These drawings are a curious mixture of the coarse style of the fifteenth century and the finer finish of the sixteenth. They show a great master at the beginning of his powers. The Museum of Basel also contains other characteristic works of 1516: a sign for a school-master, on which are painted two school scenes; the portraits of Burgomaster Jakob Meyer, of his wife, and of Hans Herbst, the painter in whose workshop Holbein worked before he became a member of the painters' guild.

In 1517 he went to Lucerne to decorate the façade and interior of the house of Jakob Hertenstein. These paintings have perished, but the original pen design in the Museum of Basel shows that the façade was decorated with classical subjects, completely in the style of the sixteenth century, and that he was influenced by the study of Mantegna's prints. In 1518 he probably traveled in Lombardy, visiting Milan. The influence of the Lombard school may be seen in Holbein's treatment of form after 1518, and in his "Last Supper" (Basel Museum), which closely resembles Leonardo's masterpiece at Milan.

In 1519 Holbein entered the painters' guild of Basel, and in the following year he became a citizen. During the next few years he decorated the façades of a number of houses at Basel, chief among which was the "Hans zum Tanz," of which the original pen design is in the Museum, with architectural decorations, and a representation of peasants dancing. He also began his extensive decorations of the council chamber, with antique historical subjects representing civic virtue and justice, and with allegorical figures. On the organ doors of the Minster of Basel he painted, in brown monochrome, grandiose figures of saints and angels singing. Among his panel pictures is an altarpiece of "Passion Scenes" of great dramatic power and fine effects of light and shade, and the "Dead Body of Christ" (1521), of striking, almost repulsive realism—all in the Museum of Basel. Among other works of this period is the "Madonna with Saints Ursus and Martin" (1522), in the Museum of Solothurn.

Holbein's best-known work is the "Madonna of Burgomaster Meyer," painted in 1525 or 1526, which holds the same rank in German painting as the "Sistine Madonna" in Italian. The original is in the Gallery of Darmstadt, the Dresden example having been proved to be an excellent copy by a Netherlander of the seventeenth century. Especially fine, in this picture, are the portraits of the kneeling Burgomaster and his family, and the nude figure of his youngest son —a cherub worthy of Correggio.

His portraits of this period include the refined face of Bonifazius Amerbach (1519), the first great German art collector, and three likenesses of Erasmus, who was then a resident of Basel—two in profile, at Basel and in the Louvre, and a larger three-quarter view in Longford Castle. Holbein's mastery of female portraiture is shown in his two allegorical representations of Dorothea Offenburg in the Basel Museum—"The Lais Corinthiaca" (1526), and another portrait in which she is represented with Cupid.

At the same time Holbein was occupied with other forms of design. Among his drawings of the period are two admirable youths, one a pencil, supposed to represent Holbein himself, the other a chalk drawing in the Museum of Basel. One of his favorite subjects was the contemporary German "Lanzknechte" (soldiers), in various actions and attitudes. To the same period belong his drawings of Basler female costumes, which may have been designs for actual use. His designs for glass-painting in the Basel Museum include ten wash drawings of "Passion Scenes," the equals of the painted series mentioned above, Madonnas and other biblical subjects, and coats of arms—all in beautiful Renaissance framing. As a designer for wood-cuts Holbein is second only to Dürer. He left over three hundred blocks, the best of which were cut by Hans Lützelburger. His illustrated Luther's Bible, and his "Histori-

arum Veteris Instrumenti Icones" ("Pictures from the Old Testament"), ninety-one plates, were first published together at Lyons in 1538. Best known of all is his "Dance of Death," fifty-eight plates in all, replete with humor and satire upon the ecclesiastical and social conditions of the day. It was published in book form at Lyons in 1538, and has been often republished; a good modern edition is that of Lippmann (Berlin, 1878).

The advent of the Reformation and the consequent disturbances in Basel were the chief cause of Holbein's journey to England in 1526. Equipped with recommendations from his friend Erasmus, he found a ready welcome in the house of Sir Thomas More at Southwark. His activity during his stay there, which lasted two years, may best be studied in the fine series of chalk drawings at Windsor Castle (published in London, 1884). In 1527 he painted Sir Thomas More, now in possession of Henry Huth, London; Sir Henry Guildford, in Windsor Castle; and Archbishop Warham, of Canterbury, in Lambeth Palace (replica in the Louvre), the best of all—a wonderful piece of realism and strength. Among his portraits of 1528 are those of Nicholas Kratzer, the King's astrologer, in the Louvre, and of Thomas Godsalve and his son John, at Dresden. His famous picture of More and his family is lost, but the studies for the heads are at Windsor, and the pen sketch which he took for Erasmus is still at Basel.

He returned to Basel in 1529 and purchased a house. But during his stay the storm of iconoclasm broke over the city, and the demand for religious pictures ceased. Holbein, indeed, finished his frescoes in the Council Chamber, adding two large subjects from the Old Testament, "Samuel Reproving Saul" and "Rehoboam's Pride." Both paintings are lost, but the sketches in the Museum of Basel, masterly in composition and dramatic action, show Holbein as a great historical painter. In 1529 he painted a highly realistic portrait of his wife and two children on paper (Basel Museum), two portraits of Erasmus (Parma and Basel), and one of Melanchthon (Hanover). In 1532, notwithstanding the efforts of the Burgomaster and Council of Basel to retain him, he returned to England.

On his arrival at London he resided with the German merchants of the Steelyard, with whom he found occupation. In 1532 and in the following years he painted a number of portraits of these merchants, of which examples survive at Vienna, Windsor, Munich, Brunswick, and Petworth. The best is that of George Gysse (1532), in the Museum of Berlin, remarkable for strong character and the detailed finish of the accessories. On the occasion of Anne Boleyn's coronation he designed for the German merchants an allegorical pageant of Parnassus; he decorated their guild-hall with two large paintings, of which there are sketches in the Louvre, "Triumph of Riches" and "Triumph of Poverty." It is not known when he first entered Henry VIII.'s service, but in 1536 we find him mentioned as the King's painter. In 1537 he was sent to Brussels to portray Christina of Denmark, Duchess of Milan, whom the King thought of marrying, and in 1539 to portray Anne of Cleves, whose portrait, now in the Louvre, had much to do with the King's marrying her. His chief work for Henry VIII. was a group painted on the wall of the Privy Chamber at Whitehall, in 1537, representing the King with his father and mother and Jane Seymour. This painting was destroyed in the fire of 1698, but the cartoon of the King is at Hardwick Hall, and there are several copies of the portrait, the best known of which is at Windsor Castle. Holbein painted another excellent portrait of Jane Seymour, now in the Gallery of Vienna, and of Edward, Prince of Wales, at Hanover. The King also commissioned him to design various decorations, especially in the goldsmith's art, in which he acquitted himself with great taste and ability, as is evident from the original designs in the British Museum and elsewhere. In 1538 he visited Basel, where he was banqueted by the council, and he promised to return after two years, which promise, however, he did not keep.

His principal portraits, executed during his last stay in England, besides those mentioned above, are "The Ambassadors" (1533), in the National Gallery; Robert Cheeseman (1533), the King's falconer, at The Hague; Thomas Cromwell, at Tittenhanger; Hubert Morett, at Dresden; Thomas Howard, Duke of Norfolk, at Windsor; two "Unknown Men" at Berlin and Vienna, and an "Unknown Woman" at Vienna; Melchior Maag (1543), in the Huybrecht collection, Antwerp; Dr. John Chambers, the King's physician, at Windsor. He also painted a number of miniatures, among which is that of Queen Catharine Howard in the library at Windsor, and executed a number of important designs for wood-engravings, including the title-page of Coverdale's Bible, illustrations of Cranmer's catechism, and "King Henry in Council," the title-page of Hall's *Chronicle*.

Holbein died of the pestilence in London in the autumn of 1543. He is chiefly known as a portrait painter, but his religious pictures, and especially his mural decorations, show that, had the opportunity presented itself, he might have been one of the greatest historical painters of all times. His portraits are absolutely true to nature, yet show a wonderful interpretation of character. The excellence of his drawing is attested by his large number of chalk and other drawings, especially in the Museum of Basel and in Windsor Castle. His method in portraiture seems to have been to make a careful chalk drawing of the sitter, which he afterwards transferred to the canvas. Holbein is by far the greatest colorist of the German school, and although the details of his portraits are highly finished, they in no wise interfere with the general effect. As a designer for wood-engraving he showed a thorough understanding of the art, combined with a fantasy and humor which have seldom been surpassed.

Consult: Woltmann, *Hans Holbein und seine Zeit* (Leipzig, 1874-76); Wornum, *Life and Works of Holbein* (London, 1866); A. Schmid, *Holbein des Jüngeren Entwickelung 1515-26* (Basel, 1892). See also the biographies of Cundall (London, 1879); Knackfuss (Bielefeld, 1897); and of Wessely, in Dohme's *Kunst und Künstler Deutschlands* (Leipzig, 1877). For reproductions of Holbein's works, compare Mantz, *Hans Holbein* (Paris, 1879); Hiis, *Dessins d'ornements de Hans Holbein* (ib., 1886).

HOLBERG, hōl'bĕrk, Ludvig, Baron (1684-1754). A Danish poet, novelist, and historian, born at Bergen, Norway. He is called the 'father

HOLBEIN

"THE MADONNA OF THE BURGOMASTER MEYER," FROM THE PAINTING IN THE DARMSTADT GALLERY.

of Danish comedy.' Left an orphan in childhood, he proved an eager student in spite of poverty and discouragements, and supported himself precariously as tutor for some years, in the course of which he visited Holland, Germany, and England, and studied for two years at Oxford. He lectured in the University at Copenhagen, where his scholarship was recognized, though not remunerated. Some historical studies in manuscript attracted the attention of King Frederick IV., and Holberg received a traveling scholarship that took him through a great part of Europe, largely on foot. He returned to Denmark in 1716, and in 1718 published *An Introduction to Natural and Popular Law*, which brought him a professorship in the University of Copenhagen and a modest competence. Thus eased, his genius welled up in the serio-comic epic *Peder Paars* (1719), a brilliant satire on contemporary manners, followed by five others, hardly less successful. In 1721 he was made director of the first Danish theatre in Copenhagen, for which he wrote during 1722 five classic comedies and in 1723 ten others. His best comedy, *Henrik and Pernille*, belongs to 1724. The theatre failed, and Holberg closed his dramatic career by publishing his collected comedies in 1731. Adapting himself to a change in the national spirit, he turned to history, philosophy and satire, writing much that is now forgotten, and also the famous satire, *Subterranean Journey of Niels Klim* (*Nicolai Klimii Iter Subterraneum*, 1741), which was thrice translated from Latin into Danish, ten times into German, three times into Swedish, English, and Dutch, twice into French and Russian, and once into Hungarian. He published also five volumes of *Letters* (1748-54). He shares with Voltaire the preëminence in European literature in his generation. He made Danish a literary language, and wrung for it aristocratic recognition. His influence has endured for two centuries. Editions of his works are countless; the best edition of the *Comedies* is by Lichtenberg (Copenhagen, 1884 et seq.). The Holberg Society, founded at Copenhagen in 1842, oversaw (1848-54) a critical edition of Holberg's comedies in eight volumes. There are biographies by Prutz (Stuttgart, 1857); Smith (Copenhagen, 1858); and Horn (ib., 1884). Consult also: Legrelle, *Holberg considéré comme imitateur de Molière* (Paris, 1864); Brandes, *Holberg und seine Zeitgenossen* (Berlin, 1885).

HOLBORN, hō'bŭrn. A district and street in London. The name is derived from Old or Hole Bourne, the former name for a part of the Fleet, which ran through a valley. The depression is now crossed by the famous Holborn Viaduct, an iron structure 27 yards wide and 657 long, built in 1869 to facilitate communication by avoiding the ascent of Holborn Hill. Criminals formerly passed through Holborn on their way to execution, and according to an old custom received a nosegay at Saint Sepulchre's Church, near Newgate Prison, from which the thoroughfare leads west to New Oxford street. On Holborn are Barnard's, Furnivall's, and Staple Inn, and near it are Ely Chapel, Gray's Inn, and Lincoln's Inn. Milton at one time lived on the western portion of the street, called High Holborn. A number of picturesque old houses stand on this street, which survived the Great Fire.

HOL'BROOK, John Edwards (1794-1871). An American naturalist, born in Beaufort, S. C. He graduated at Brown in 1815, and in medicine at the Pennsylvania University three years later, studied afterwards in Europe, and began practice in Charleston in 1822. In 1824 he was made professor of anatomy in the South Carolina College. This position he retained for more than thirty years. The outbreak of the Civil War put an end to the publication of his *Ichthyology of South Carolina*, begun in 1854. His previous work upon *American Herpetology* (5 vols., 1842) was highly commended by Agassiz and others.

HOL'BROOKIA (named in honor of the American naturalist J. E. Holbrook). A genus of iguanid lizards of the Southwestern United States and Northern Mexico, especially characteristic of the Rio Grande Valley. The four species

HOLBROOKIA MACULATA.
a, top of head; *b*, profile.

are of moderate size, with short legs, squat depressed bodies, covered with minute scales, and long tails. The general color is gray, and all are blotched, spotted, and barred (on the tail) with darker tints, but the colors are highly variable; hence they are popularly known as 'spotted lizards.' They prefer rocky ground, and run swiftly with their tails curved over their backs. They subsist mainly on insects, worms, and the like, but also take vegetable food. They make interesting pets. When placed in a fly-trap they pick out the very large, black, and bright-colored flies before eating the house-flies. See Iguana.

HOLCROFT, hōl'krŏft, Thomas (1745-1809). An English dramatist and novelist, born in London. The son of a shoemaker, he learned his father's trade; later he was a stable boy, a schoolmaster, an actor, and lastly a playwright. He wrote thirty plays, the best and most successful of which is *The Road to Ruin* (1792), still occasionally acted. During the French Revolution he became a member of the Society for Constitutional Information, and was indicted for high treason, imprisoned, and finally discharged without trial. He was a man of great industry. He learned French, German, and Italian, and translated many works, including Goethe's *Hermann and Dorothea*, Lavater's *Physiognomische Fragmente*, and some of the works of Frederick the Great. He was also the author of four novels and numerous poems. His *Memoirs*, written by himself or compiled from his diary and other papers, by William Hazlitt, were published after his death (3 vols., 1816).

HOLCUS. See Soft Grass.

HOLD (older form *hole*, from Dutch *hol*, hole, hold; connected with AS., OHG. *helan*, Ger. *hehlen*, Lat. *celare*, Gk. καλύπτειν, *kalyptein*, to hide, OIr. *celim*, I hide; confused in popular etymology with *hold*, to contain). That portion of the interior of the ship which is below the upper deck. This part of a ship may be divided into

several parts, as the *fore-peak*, the *fore-hold*, the *main-hold*, the *after-hold*, the *engine* and *boiler rooms*, *coal-bunkers*, *store-rooms*, etc. To *stow* a hold is to put things in it and arrange them properly; to *break out* a hold is to remove the contents of it.

HOLD. In music, a sign placed above (⌢) or below (⌣) a note or rest to indicate that its time-value is increased. The length of a hold is governed by the rhythm of the music, and is left to the performer's discretion. See GENERAL PAUSE.

HOLDEFLEISS, hôl'de-flīs, FRIEDRICH WILHELM (1846—). A German agricultural chemist. He was born at Bennstedt, and studied at Halle, where for several years he acted as assistant in the Agricultural Experiment Station and in the Agricultural Institute of the university. In 1878 he was appointed director of the agricultural station of the Central Silesian Agricultural Society at Breslau. In 1881 he became professor extraordinary and in 1882 ordinary professor of agricultural chemistry in the Agricultural Institute of the University of Breslau. After filling this position with distinction for ten years he was appointed director of the Institute. During his incumbency he was actively engaged in the preparation of numerous works dealing with his specialty. Among these may be mentioned: *Untersuchungen über den Stallmist* (Breslau, 1889); *Das Knochenmehl* (Berlin, 1890); *Die Rinderzucht Schlesiens* (Breslau, 1896); *Schatzkästlein des praktischen Landwirts* (Berlin, 1896).

HOLDEN, ALBERT J. (1841—). An American organist and composer of Church music. He was born in Boston, studied music in New York, where he made his home in 1855, and became organist in the Universalist Church of the Divine Paternity and the Church of the Puritans (Congregationalist). His musical compositions include ballads and secular as well as sacred part-songs and choruses, but he is best known as the composer of more than three hundred hymn tunes, anthems, and the like. He also edited collections of music.

HOLDEN, EDWARD SINGLETON (1846—). An American educator. He was born in Saint Louis, Mo., and received his education at Washington University, Saint Louis, and at West Point, where he graduated in 1870. He occupied successively the positions of professor of mathematics, United States Navy; astronomer at the United States Naval Observatory, Washington, D. C.; director of the Washburn Observatory, Madison, Wis.; president of the University of California; and director of the Lick Observatory. His most important work was that done at the Lick Observatory, Cal., with which he was connected for twenty-eight years, and most of the buildings and instruments of which were designed and built under his direction. He founded the Astronomical Society of the Pacific, and wrote several works on astronomy, history, and education. In recognition of his services, numerous honors were bestowed upon him, both in this country and by the governments of several European States.

HOLDEN, Sir ISAAC (1807-97). A British inventor, who produced lucifer matches and improved wool-carding machinery. He was born in Hurlet, Renfrewshire, of English parents, and from being a draw-boy to hand-weavers, he went into a Paisley cotton-mill, educating himself meanwhile till he was able to teach school. In the course of experimenting for a chemistry class, he discovered the efficiency of lucifer for matches (1829), but, as he took out no patent, others reaped the benefit of his invention. He was next bookkeeper, then manager, then owner of a wool-combing mill, and made such important improvements in its machinery that he became a wealthy manufacturer. He was also a member of Parliament, but in neither position did he forget the interests of the working men from whose ranks he had sprung.

HOLDER, CHARLES FREDERICK (1851—). An American naturalist. Born in Lynn, Mass., of Quaker parents, he was sent to the Friends' School in Providence, R. I., afterwards to a seminary near Boston, thence to the United States Naval Academy, at Annapolis, but followed his natural bent toward science, and became assistant curator of zoölogy in the American Museum of Natural History, New York City (1871-75). He spent some time collecting specimens in different parts of the country for the Aquarium at New York City, and was lecturer in the city schools as well as a writer upon scientific subjects for young people. After his removal to California, he took a prominent part in educational affairs, was made president of the Pasadena (Cal.) board of education, and trustee of, and professor of zoölogy in, Throop University. His publications include: *Marvels of Animal Life* (1880); *Elements of Zoölogy* (1885); *Living Lights* (1887); *The Ivory King* (1888); *A Frozen Dragon* (1888); *A Strange Company* (1889); *Around Pasadena* (1889); *The Pasadena Highlands* (1889); *Santa Catalina Island, Its Sports* (1889); *Louis Agassiz, His Life* (1892); *Charles Darwin's Life and Work* (1893); *The Treasure Divers* (1889); *Stories of Animal Life* (1900); *Big Game at Sea* (1901); and *Half Hours with Nature* (5 vols., 1901).

HÖLDER, hēl'dēr, EDUARD OTTO (1847—). A German jurist, especially versed in Roman law. Born at Stuttgart, he studied at Tübingen, and became professor at Zürich (1872), Greifswald (1874), Erlangen (1880), and Leipzig (1893). His works include: *Institutionen des römischen Rechtes* (3d ed. 1893); *Zum allgemeinen Teil des Entwurfs eines deutschen bürgerlichen Gesetzbuchs* (1888); *Pandekten* (1886-91); *Ueber objektives und subjektives Recht* (1893); *Die Stellung des römischen Erben* (1895); with Schollmeyer and others, he undertook the preparation of the *Kommentar zum deutschen bürgerlichen Gesetzbuch* (1899 et seq.).

HÖLDERLIN, hēl'dēr-lēn, JOHANN CHRISTIAN FRIEDRICH (1770-1843). A German poet, born at Lauffen, and educated at Tübingen, where he knew Hegel and Schelling. He was private tutor in the house of Schiller's friend, Charlotte von Kalb (1793-94), and then at Frankfort, where the mother of his young charges, Frau Gontard, inspired him with a platonic passion, which led him to celebrate her under the name of Diotima in his *Hyperion*. But from this time on his mind began to fail, and, save for intervals of sanity, he never recovered. His style was classic; his thought, in his best work, deep and full. He wrote: *Hyperion, oder der Eremit in Griechenland*, a romance in epistolary form (1797-99);

an incomplete drama, *Empedokles;* translations from Sophocles's *Œdipus* and *Antigone* (1804); and the *Lyrische Gedichte,* mostly elegiac in tone, edited by Uhland and Schwab (4th ed. 1878; in 1899, by Linke). A complete edition of his works, with his letters and biography by Schwab, appeared at Stuttgart (1846). Consult: Milbrandt, *Friedrich Hölderlin* (Berlin, 1896); Müller-Rastatt, *Hölderlin, sein Leben und sein Dichten* (Bremen, 1894); and Klein-Hattingen, *Das Liebesleben Hölderlins, Lenaus, Heines* (Berlin, 1900).

HOLDING (Lat. *tenementum,* a tenement, something held, from *tenere,* to hold). In Scotch law, an estate held of a superior, under the feudal system of land tenure. It corresponds to the terms 'tenement' and 'tenure' in English and American law. See also ESTATE; FEE; FREEHOLD.

HOLE, WILLIAM (1846—). An English painter and engraver. He was born at Salisbury, and was educated for an engineer at the Edinburgh Academy and University, but an Italian journey having inspired him with a desire to be an artist, he studied at the Edinburgh school, and became associate (1878), and full member (1889) of the Royal Scottish Academy. Aside from portraits, Hole's best paintings are: "The End of the Forty-Five" (1879); "The Eve of Culloden" (1880); "If Thou Hadst Known" (1884); "News of Flodden" (1886); but he is more famous as an etcher, having made excellent reproductions of the masterpieces of Millet, Constable, Velazquez, Millais, Thomson of Duddingston, and others. In his later years he turned to fresco painting, and his work is to be seen in Saint James Church, and in the National Portrait Gallery, Edinburgh.

HOLGUIN, ôl-gēn'. A city of Cuba, in the Province of Santiago de Cuba, and capital of the department of the same name, about 25 miles by rail from Gibara, its port (Map: Cuba, J 6). It is regularly built with several open squares and streets crossing at right angles, and it has a number of fine buildings. It exports tobacco, timber, corn, and cattle. It was founded in 1720, and received the title of city in 1751. Population, in 1899, 34,056.

HOLIBUT. See HALIBUT.

HOLIDAY (AS. *hālig dæg,* holy day). A day set apart as a religious anniversary, or for the purpose of commemorating some extraordinary event, or of honoring the memory of a distinguished person. As a rule, holidays are occasions for rejoicing. People are expected to observe them "with the voice of joy and praise." (Ps. xlii. 4.) At times, however, they are accompanied by fasts rather than feasts. Of this character are days of humiliation and prayer, such as Fast Day, formerly observed in Massachusetts and other New England States, and days specially appointed from time to time by proclamation of Government authorities or of ecclesiastical dignitaries.

During the Middle Ages holidays became so numerous, in many parts of Europe, as to interfere seriously with industrial pursuits. One of the most important results of the religious reformation of the sixteenth century was the abolition of excessive holidays with its consequent increase in the volume of secular labor. The present tendency in this country appears to be toward the multiplication of legal holidays.

Many occasions are observed by Church or social or political organizations as holidays which are not declared holidays by law. A legal holiday is one set apart, either by common or by statute law, as a day of rest, or of cessation in whole or in part from ordinary business activities. Sunday is the only common-law holiday in this country, although Good Friday has been recognized as such in England for centuries. Legal holidays are of two kinds, general or public, and special or limited. On a public holiday, such as Sunday or the Fourth of July, public offices are closed, and persons under contract to render services are not bound to work for their employers. If they do labor at the request of their employers, they are entitled to extra pay. In England, and in many of our States, persons are prohibited from carrying on secular business or making contracts during Sunday. (See SUNDAY LAWS.) On special or limited holidays, such as some of the bank holidays (q.v.), exemption from labor and from the performance of contracts generally is confined to a particular class of employees or to a designated section of the community, or to specified contracts.

As a nation, we have no legal holiday, although Congress has appointed special holidays from time to time, and in the District of Columbia has made Labor Day a public holiday. It is customary for the President to appoint annually the last Thursday of November as a day of thanksgiving, but its observance as a legal holiday is dependent upon State and Territorial legislation. At present there are about thirty different legal holidays recognized by our various States. Some of them, like the anniversary of the battle of New Orleans (Louisiana), Bennington battle day (Vermont), Patriots' Day (Massachusetts), and Lincoln's Birthday (New York), are confined to a single commonwealth; while others, like Christmas Day and the Fourth of July, are observed throughout the Union. Consult: *Brooklyn Daily Eagle Almanac* (1902, p. 52); *Thoughts for the Occasion* (New York, E. B. Treat, 1894); "Origin of Holidays," 34, *Popular Science Monthly,* 516 (1889); "American Holidays," 62, *Saturday Review,* 19 (1886); Manners, *A Plea for National Holy Days* (London, 1843); "The Holidays," 32, *Harper's Magazine,* 164, 358 (1866); "Bank Holidays," 22, *Journal of the Institute of Bankers* (London, 1901); "What Should Our National Holidays Commemorate?" 15, *Massachusetts Historical Society,* second series, 506 (1902).

HOLINSHED, or **HOLLINGSHEAD,** hŏl'ĭnz-hĕd, RAPHAEL (?-1580). An English chronicler. Little is known of his life save that he was of a Cheshire family, probably the son of Ralph Holinshed of Cophurst, in the township of Sutton Downes. He is celebrated as the author of a history of England, Scotland, and Ireland, which the Elizabethan dramatists drew upon for material in the construction of their historical plays. The work had been started originally by Wolfe, who, however, died in 1573 before its completion. Thereupon Holinshed undertook the work, and in 1578 appeared *Raphael Hollingeshed's Cronycle,* in two folio volumes. Holinshed had been assisted by William Harrison, who wrote the historical descriptions of England

and Scotland, and by Richard Stanihurst, who contributed a part of the history of Ireland. All copies of the work were printed by Henry Bynneman. The publishers were George Bishop, John Harrison, and Luke Harrison. A second edition appeared in 1587, after Holinshed's death. This edition was chiefly revised by Hooker, and contained some passages disagreeable to Elizabeth, who immediately ordered them cut out. A modern edition in six volumes was published in London (1807-08), with the 'disagreeable passages' restored. But after all Holingshed's *Chronicle*, though popular in its day, would be seldom recalled to-day were it not for Shakespeare's indebtedness to it. From it the data for most of the great historical plays were probably derived; and in *Macbeth*, *Lear*, and *Cymbeline* most of the borrowed action and dialogue can be illustrated by excerpts from Holinshed. Consult: Cooper, *Athenæ Cantabrigienses* (Cambridge, Eng., 1858); Boswell-Stone, *Shakespere's Holinshed* (New York, 1896).

HOLI-SHIN, hō'lē'shēn'. See FUSAN.

HOLKAR, hōl'kär. The name of a powerful Mahratta family, later adopted as a title by the rulers of Indore, one of the native States of Central India. The founder of the family was Mulhar Rao Holkar, who was born in the Deccan in 1693, and having gained by his valor the favor of the Peishwa (q.v.), obtained from him the western half of Malwa, with Indore for his capital. In 1761 he joined the great league of the princes of Hindustan, formed to bar the progress of Ahmed Shah Durrani, and was present at the battle of Panipat, January 6, 1761; but as he fled shortly after the battle began, he was suspected of treason. Holkar was the only Mahratta chief of note who escaped the slaughter. He died in 1768, and was succeeded by his grandson Malli Rao, who died soon after. The government then passed to Aylah Bade, the mother of Malli Rao, who resigned the military power to Toghaki Holkar. On his death in 1797 his natural son, Jeswunt Rao Holkar, a man able, brave, and unscrupulous, seized Indore, but was driven out by Scindia (q.v.). Such, however, was Holkar's reputation for energy and ability that part of the victorious army deserted to him, with whose aid he obtained a signal victory over Scindia and the Peishwa (October, 1802). After fighting a long time against the British with varying success, he was compelled to conclude peace. He died insane October 20, 1811. His son, Mulhar Rao Holkar II., a minor, succeeded, and in 1817 declared war against the British, but his army was totally routed at Mahedpore, December 21st; whereupon he sent offers of peace, which were accepted, and an English residency was established at Indore in January, 1818. He died in 1833. Martund Rao Holkar, Hurri Rao Holkar, and Kumdi Rao Holkar successively ruled after him. The last of these died without heirs in 1843, and the East India Company assumed the right of nominating Tukagi Rao Holkar, who did not belong to the Holkar family. He was educated under the auspices of the British Government, and displayed great ability, and always remained on the most friendly terms with the British. In 1886 he was succeeded by his eldest son, Shiraji Rao Holkar.

HOLL, FRANK (1845-88). An English painter. He was born in London, July 4, 1845, a son of a well-known engraver. He was admitted as a student at the Royal Academy, 1860. He received a prize for the best drawing from the antique, 1862, and another for the best historical painting, "Abraham's Sacrifice" (1863). He exhibited at the Royal Academy: "Turned Out of Church" (1864); "A Fern Gatherer" (1865); "The Ordeal" (1866); "Convalescent" (1867). His picture "The Lord Gave and the Lord Hath Taken Away" gained him the two years' traveling studentship for painting, 1869. Among his other works exhibited are: "No Tidings from the Sea" (1871), which was painted for Queen Victoria; "I am the Resurrection and the Life" (1872); "Deserted" (1874); "Her First-Born" (1876); "Committed for Trial" (1878); "The Gifts of the Fairies" (1879); "Ordered to the Front" (1880); "Home Again" (1881); and "Millicent" (1883). In 1879 he took up portrait painting, in which he achieved high success, being excelled only by Sir John Millais (q.v.) among his contemporaries. He united strong characterization with brilliancy of color. Among his sitters were the Prince of Wales, Lord Wolesley, the Duke of Cambridge, John Bright, the Marquis of Dufferin, Joseph Chamberlain, Sir John Millais, William Ewart Gladstone. Holl was elected academician in 1883, and received medals at Philadelphia in 1876, and at Melbourne. He died in London, July 14, 1888.

HOLLAND. A mediæval county, whose territories now form the provinces of North and South Holland (qq.v.), in the Kingdom of the Netherlands. The hereditary counts of Holland, whose dominions were included within the limits of the Holy Roman Empire, appear in history as early as the tenth century. Count William II. was elected Roman Emperor in 1247 in opposition to Frederick II. He contested the Imperial crown with Conrad IV., Frederick's successor, and on the death of Conrad in 1254 was recognized by the German princes. He was slain in a war with the Frisians in 1256. In 1299 Holland passed to the counts of Hainault. Soon after Zeeland was permanently united with Holland. In 1433 Countess Jacqueline made over Hainault, Holland, and Zeeland to Philip the Good of Burgundy. Holland shared the fortunes of the united Netherlands and was one of the provinces which achieved their liberation from Spain and constituted themselves into the Dutch Republic. See BURGUNDY; NETHERLANDS.

HOLLAND. A city in Ottawa County, Mich., 25 miles southwest of Grand Rapids; at the head of Black Lake, which affords a good harbor, having regular steamboat lines to Milwaukee and Chicago, and also on the Père Marquette Railroad (Map: Michigan, G 6). It is the seat of Hope College, opened in 1865, and of the Western Theological Seminary, both under the control of the Reformed Church in America, and has a public library. There are several summer resorts on the shore of Black Lake that enjoy considerable popularity. Holland carries on an extensive grain trade, and is a manufacturing centre of importance, its industries including flour and planing mills, tanneries, furniture, veneer, tub, and basket factories, a beet-sugar factory, a large pickling plant, and establishments for the manufacture of wood-working machinery, and electric and steam launches. The water-works and elec-

tric-light plant are owned by the municipality. Founded in 1847 by Dutch settlers, Holland was chartered as a city in 1867. Its inhabitants are still largely of Dutch descent. Population, in 1890, 3945; in 1900, 7790.

HOLLAND. A variety of unbleached linen cloth used largely for window-shades and in upholstery for covering furniture. The name is derived from the fact that it was first manufactured in Holland. See LINEN.

HOLLAND, EDMUND MILTON (1848—). An American comedian, born in New York City, the son of George Holland, who was also a well-known actor. He appeared upon the stage in childhood, but his regular professional career began in 1866 at Barnum's Museum. The next year, under the name of Mr. E. Milton, he became a member of Wallack's company, with which he played successfully in *The Road to Ruin*, *Caste*, and other pieces till 1880. After an interval, during which he made a tour in England, he was engaged in 1882 at the Madison Square Theatre. Among his characters in the years that followed were Pittacus Green in *Hazel Kirke*, Old Rogers in *Esmeralda*, Captain Redwood in *Jim the Penman*, and Colonel Carter in *Colonel Carter of Cartersville*, the last-named at Palmer's Theatre. Beginning in 1895 he and his brother Joseph starred for about two years in *A Social Highwayman*, and other plays. Two of his more recent rôles were those of Leopold Kolditz in *Hearts are Trumps* (1900), and *Eben Holden* (1901). Consult: McKay and Wingate, *Famous American Actors of To-Day* (New York, 1896); Strang, *Famous Actors of the Day in America* (Boston, 1900).

HOLLAND, Sir HENRY (1788-1873). An English physician, natural philosopher, and author, born at Knutsford, England. He was educated at London and Edinburgh, receiving his medical degree at the University of Edinburgh in 1811. He traveled extensively during his life; practiced medicine from 1815 till his death; was elected fellow of the Royal College of Physicians in 1828; physician-in-ordinary to the Prince Consort in 1840, and in 1852 to Queen Victoria; was made a baronet in 1853; and was very prominent medically, socially, and in literary circles. He was the author of *Medical Notes and Reflections* (1840); *Chapters on Mental Physiology* (1852); *Essays on Scientific Subjects* (1862); and *Recollections of a Past Life* (1871).

HOLLAND, HENRY FOX, Baron (1705-74). An English politician. He was the younger son of Sir Stephen Fox. He was elected to Parliament as a Whig in 1735, and two years later was appointed surveyor-general of works by Walpole. After his chief's fall he was Lord of the Treasury (1743), and Secretary of War (1746). In 1755 he was bribed by a seat in the Cabinet to back George II.'s measures, and quickly became leader of the House. But in 1756 he resigned, and a year later he entered upon the lucrative office of Paymaster-General. Grenville's resignation in 1762 made him again leader of the House of Commons. The task of getting the Peace of Paris approved he accomplished by wholesale corruption and browbeating (1763); but made himself so unpopular that he gladly resigned. He kept the Paymaster-Generalship until 1765. The Court of Exchequer brought proceedings against him, and the Mayor of London (1769) spoke of him in a petition to George III. as "the public defaulter of millions," but he had served the King so well that all attacks were unsuccessful even when he was out of favor at Court.

HOLLAND, HENRY RICHARD VASSAL FOX, Lord (1773-1840). An English politician, son of Stephen, second Lord Holland, and nephew of Charles James Fox. He entered the House of Lords in 1798, and won especial fame by his protests, later collected by Moylan: *The Opinions of Lord Holland, 1797-1840* (1841). He was soon recognized as a power in the Whig Party, and fought against suspension of the Habeas Corpus Act, against the union with Ireland, and for the repeal of the Test and Corporation Acts. He was a commissioner (1806) to negotiate a treaty with America. When his uncle died he was a member of the privy council, and was a member of the Cabinet of 1806 as Lord Privy Seal. When his party was restored to power in 1830 he became chancellor of the Duchy of Lancaster. He is best known, perhaps, as the host of Holland House, and the centre with Lady Holland of the brilliant company that gathered there. Besides his important *History of the Whig Party During My Time*, edited by his son (1852), he wrote: *Some Account of the Life and Writings of Lope Felix de Vega Carpio* (1806). His *Foreign Reminiscences* (1850) gives vivid, but not entirely trustworthy, pictures of his times.

HOLLAND, HENRY SCOTT (1847—). An English preacher and theologian, born at Ledbury in Herefordshire. He was educated at Eton and Oxford, was made canon (1844), and precentor (1886) of Saint Paul's Cathedral, London. His publications include several volumes of sermons, such as *Logic and Life* (1882).

HOLLAND, JOSIAH GILBERT (1819-81). An American journalist and author, born at Belchertown, Mass., July 24, 1819. He graduated at Berkshire Medical College, Pittsfield, Mass., in 1844, practiced medicine three years, was made school superintendent at Vicksburg, Miss., became assistant editor of the Springfield *Republican* (1849-66), and made that journal attain great influence in New England. Here he published his *History of Western Massachusetts* (1855), and during these years gained distinction as a popular lecturer. On his return from two years in Europe (1868-70), he founded *Scribner's Monthly*, which absorbed successively *Hours at Home*, *Putnam's Magazine*, and *Old and New*, and, under changed ownership, is the present *Century Magazine*. Of this he remained editor till his death in New York, October 12, 1881. Of his many volumes of fiction and verse, the earlier were published under the assumed name of Timothy Titcomb. The more noteworthy of the novels are: *The Bay Path* (1857); *Miss Gilbert's Career* (1860); *Arthur Bonnicastle* (1873); *The Story of Seven Oaks* (1875); and *Nicholas Minturn* (1876). Of the poems the most popular are: *Bitter-sweet* (1858); *Kathrina* (1867); and *Garnered Sheaves* (1873). Noteworthy also are *Letters to Young People* (1858); *Letters to the Joneses* (1863); *Plain Talk on Familiar Subjects* (1865); *Life of Lincoln* (1865); and *The Mistress of the Manse* (1874). His prose and verse are alike clean in diction and thought,

pure and sweet in feeling, earnest in moral tone, and appeal to a wide circle of readers. For his *Life*, consult Plunkett (New York, 1894).

HOLLAND, PHILEMON (1552-1637). A native of Chelmsford, England, called by his contemporaries 'the translator-general of his age.' He was educated at Trinity College, of which he became a fellow. On being appointed to the rectorship of the free grammar-school of Coventry, he began a long series of translations from the classics. He also found time to carry on practice as a physician. By distribution of his time he reconciled his three professions of schoolmaster, doctor, and translator, fulfilling the functions of all three till his eightieth year. His chief translations are those of Livy, Pliny's *Natural History*, Plutarch's *Morals*, Suetonius, Ammianus Marcellinus, and the *Cyropædia* of Xenophon. He also did good service to literature by his edition of Camden's *Britannica*, to which he made some valuable additions.

HOLLAND, THOMAS ERSKINE (1835—). An English jurist of prominence. He was born at Brighton, studied there and at Balliol and Magdalen Colleges, Oxford, where he won high honors, and entered practice in 1863. In 1874 Holland became Vinerian reader of English law at Oxford, and immediately afterwards was appointed Chicele professor of international law and diplomacy. The wide recognition of his merits in this field may be seen from the fact that Holland was given the degrees of D.C.L. from Oxford and LL.D from Bologna, Glasgow, and Dublin, and from his membership in the University of Saint Petersburg and an honorary professorship at Perugia. His best known work, *Elements of Jurisprudence* (1880, 9th ed. 1900), is a standard in England and America. He also wrote: *The Institutes of Justinian* (1873-81); *The European Concert in the Eastern Question* (1885); and *Studies in International Law* (1898).

HOLLANDER, JACOB HARRY (1871—). An American economist, born in Baltimore, and educated at Johns Hopkins University. He was appointed secretary to the Bimetallic Commission of 1897; in 1900 the Secretary of War made him special commissioner on the revision of law in Porto Rico, and a few months afterwards he was named treasurer of the island by President McKinley. He served as associate professor of finance in Johns Hopkins, and recording secretary of the American Jewish Historical Society. His publications include: *The Cincinnati Southern Railway, a Study in Municipal Activity* (1894); *The Financial History of Baltimore* (1899); and *Studies in State Taxation* (1900); and he edited the *Letters of David Ricardo to J. R. McCulloch* (1895), and to *Hutches Trower* (1899).

HOLLAND HOUSE. A London mansion of Tudor architecture, on a hill near Kensington Gardens, built in 1607 for Sir Walter Cope. Its name is derived from an early owner, Henry Rich, Earl of Holland. The house is famous for its associations with the names of those who have occupied it. After Lord Holland's execution it passed into the hands of the Parliamentary generals Fairfax and Lambert, but was later restored to Lady Holland. Addison lived in it from 1716 to his death in 1719. Henry Fox, father of Charles James Fox, purchased it in 1762, and it is still in the possession of his line. Among its other inmates have been Cromwell, Ireton, William Penn, William III. and Mary, Moore, and Macaulay.

HOLLAND PURCHASE. See NEW YORK.

HOLLAND SOCIETY. A patriotic society, founded in New York City on April 6, 1885. Its objects are to collect information respecting the early history and settlement of the city and State of New York by the Dutch, and to discover and preserve all existing documents, mementos, etc., relating to their genealogy and history, as well as to publish material for a memorial history of the Dutch in America, in which shall be particularly set forth the part belonging to that element in the growth and development of American character, institutions, and progress. The society admits to membership descendants, in the male line only, of a Dutchman who was a native or resident of New York, or of the American Colonies, prior to the year 1675. The insignia is an oval medallion with the head of William the Silent in relief. The society has marked various historical localities in New York City by inscribed brass plates; and publishes volumes containing historical information. Its membership is upwards of 1000.

HOLLAR, hŏl'lär, WENCESLAS (in Bohemian, VACLAV HOLAR) (1607-77). A celebrated etcher and engraver. He was born at Prague, June 13, 1607, the son of a lawyer, and received a good education. He studied engraving under Matthew Marian, a pupil of Rubens and Van Dyck. He was only eighteen when he published his first works, consisting of the "Virgin," the "Ecco Homo," and some other subjects. Leaving Prague, he began a wandering life through Germany, taking views of the chief towns and of the most striking scenery of the Danube, Rhine, and other streams. He lived two years at Frankfort, and afterwards in Cologne and Antwerp. At Cologne in 1635 he fell in with the Earl of Arundel, the English Ambassador to the German Emperor, who attached him to his service. Soon after reaching England with his patron he was appointed to instruct the Prince of Wales in drawing; and in 1640 published his *Ornatus Muliebris Anglicanus*, a description of the customs of the contemporary Englishwomen, followed in 1643 by *Theatrum Mulierum*, a similar production for the women of the remaining parts of Europe. During the Civil War he enlisted as a Royalist, and in 1645 he joined Lord Arundel at Antwerp. After Arundel's death he became very poor. He worked by time, fixing his tariff at fourpence an hour, which he marked by a sand-glass. During this period, however, he produced his best work. He returned to England in 1652, and worked with the same unflagging industry, and with no more profitable result. His plates in Dugdale's *Monasticon* and *History of Saint Paul's* and in other works attest his diligence. After the Restoration he was made designer to the King, and in 1669 he was commissioned by Charles II. to take plans and perspective drawings of Tangier and its fortifications, in payment for which work he received a very paltry sum. In 1673 he traveled through Northern England, etching the principal cities there. He died in great poverty in London, January 19, 1677.

He left over 2700 plates on a great variety of subjects. They include views of cities, such as Strassburg, Frankfort, Cologne, Oxford, Lin-

coln, and York, Albury, Windsor, Tangier, etc.; architectural drawings, like Antwerp Cathedral, Saint George's Chapel, Windsor; tomb of Edward IV., Windsor; and other subjects, like "Trial of Archbishop Laud," "Coronation of Charles II.," "Engagement with the Algerian Pirates," the "Four Seasons." His portraits were largely after Holbein, and especially Van Dyck. Among the best-known are those of Charles I. and his Queen after the latter, and his original engravings of the Duke of York (afterwards James II.), Oliver Cromwell, Hobbes, and Lady Venetia Digby. While most of his work was original, he executed with equal facility engravings after the old masters. Some of the best known are an "Ecce Homo," after Titian; "Esther Before Ahasuerus," after Veronese; "Cupid Riding a Lion," after Giulio Romano; and especially a beautiful goblet after Mantegna's pen drawing. There are almost complete collections of his works in the British Museum and in the library of Windsor Castle.

Hollar's work unites, in a remarkable fashion, accuracy and the pictorial quality. He endeavored to render detail rather than character; but his technical excellence was unsurpassed in his day. His process was peculiar, being mostly done with the etching needle.

Consult: The catalogue of Hollar's plates by Vertue (London, 1759), and by Parthey (Berlin, 1853, supplement 1858). The former contains valuable biographical notices; the latter is an excellent and exhaustive treatise.

HOLLAZ, hō'läts, DAVID (1648-1713). A German dogmatic theologian, born in Pomerania. He studied at Erfurt and Wittenberg; became preacher at Pützerlin in 1670, assistant rector at Stargard in 1680, and afterwards was situated at Kolberg and at Jakobshagen. His great work, *Examen Theologicum Acroamaticum Universam Theologiam Theticopolemicam Complectens* (1707), passed through many editions, and surpassed preceding works in clearness and simplicity rather than scientific knowledge. It may be considered the best expression of Lutheran orthodoxy of the period. He is not to be confused with David Hollaz, his son, who preached at Günthersberg, and was the author of *Beschreibung der Wiedergeburt* (1737); *Anweisung zum Gebet* (1747); *Evangelische Gnadenordnung* (1751), and *Pilgerstrasse nach Zion* (1771).

HOLLEBEN, hōl'läben, THEODOR VON (1838—). A German diplomat. He was born in Stettin, and in 1872 left the Hussars for the diplomatic service. He was Minister to Argentina (1875-85), Envoy to Japan (1885-91), to Washington (1891-93), to Stuttgart (1893-97); and then again to Washington, where he received the rank of Ambassador. After the failure of the German effort to induce President Roosevelt to act as arbitrator in the Venezuelan dispute, von Holleben resigned because of failing health.

HOLLES, hōlz, DENZIL, Lord (1599-1680). An English statesman, born at Haughton, Nottinghamshire. He was a member of Parliament for Saint Michael, Cornwall, in 1624, and five years afterwards was one of two members who forced the Speaker to keep his seat when he strove to obey Charles I. by adjourning the House before it could pass certain acts upon taxation and religion obnoxious to the King. Holles was fined and imprisoned in the Tower for nearly a year, but made his escape abroad, and returned to represent Dorchester in the Long Parliament (1640). Two years afterwards he was one of the famous five members whom King Charles tried unsuccessfully to arrest, and while the Civil War was in progress held Bristol for the Parliament, and raised a regiment of foot that made its mark at Edgehill and Brentford. He was most anxious to effect a reconciliation with the King, because, being a leader of the Presbyterian, as opposed to the Independent Party, he feared military even more than royal supremacy. When he proposed the disbandment of the army in 1647, its leaders accused him of high treason, and he was once again obliged to seek an asylum on the Continent, and remained in France until the close of the Protectorate. Though he worked for the restoration of the Stuarts after his return, he was ever watchful that Charles II. did not encroach upon the public liberties, dearer to him than the King who had made him a peer (1661), and in whose Privy Council he sat (1679), and he exercised his great influence toward the disbanding of the army lest the restored monarch should attempt to use it for his own purposes. Lord Holles was one of the commissioners of the Treaty of Breda (1667), and wrote a number of political pamphlets of little present interest.

HOLLEY, ALEXANDER LYMAN (1832-82). An American metallurgist, born at Lakeville, Conn., where his father, Alexander H. Holley, later Governor of the State, had a cutlery factory, in which the boy became an adept as a machinist. He took a scientific course at Brown University (1850-53); entered the Corliss and Nightingale shops at Providence, R. I.; worked in the Jersey City locomotive-works; and in 1854 became editor and partner with Zerah Colburn of the *Railroad Advocate*. Four years later he and Colburn wrote *The Permanent Way and Coal-Burning Locomotive Boilers of European Railways*, which did much to reform American railroad management. He was an editor of the New York *Times* and of Webster's *Dictionary;* traveled in Europe in 1862, and wrote a *Treatise on Ordnance and Armor* (1864). In 1863 he went to England, purchased the Bessemer patents, and two years later started the Bessemer plant at Troy. He was closely connected with the building of steelworks at Harrisburg, North Chicago, Joliet, Pittsburg, Saint Louis, Cambria, Bethlehem, and Scranton, and made many improvements on the old Bessemer plant. He was a trustee of the Rensselaer Polytechnic Institute (1865-82), and in 1875 he became president of the Institute of Mining Engineers and a member of the Government board for testing structural materials.

HOLLEY, MYRON (1779-1841). An American reformer and editor, born in Salisbury, Conn. A graduate of Williams College, he began the practice of law in 1802, but left it for a bookselling business in Canandaigua, N. Y., and was a leading promoter of the Erie Canal. Afterwards he was prominent in the anti-Masonic and the anti-slavery movements. He was editor first of the *Countryman* (1831-34), then of the Hartford *Free Elector*, and of the Rochester *Freeman*.

HOLLIDAYSBURG. A borough and the county-seat of Blair County, Pa., six miles south of Altoona; on the Juniata River and on branches of the Pennsylvania Railroad (Map: Pennsyl-

vania, C 3). It is the seat of the Hollidaysburg Female Seminary. Coal, iron ore, and limestone are found in the vicinity; and the borough has nail-factories, foundries, and machine-shops, rolling-mills, boiler-works, etc. Population, in 1890, 2975; in 1900, 2998.

HOLLINS, ALFRED (1865—). An English musician, born at Hull. He was blind from his birth, and at nine years of age entered the Wilberforce Institution for the Blind at York, where he remained three years, studying music under William Barnby. In 1878 he entered the Royal Normal College for the Blind, at Upper Norwood, making the piano his chief study, his teacher being Fritz Hartvigson. Through the kindness of the principal of the institution he secured organ lessons from E. J. Hopkins, who took a special interest in him, and who helped him considerably in the mastery of orchestration, which was later a conspicuous feature of his compositions. At the age of sixteen he had given recitals before the Courts of England and Germany, and was a special favorite with Queen Victoria and the Empress Frederick of Germany. In furtherance of his equipment as a pianist he studied piano with Von Bülow in Berlin, and in 1887 became a pupil at the Raff Conservatory, studying in addition under Max Schwartz. He visited America twice, in 1886 as a member of Dr. Campbell's party, and in 1888 as a concert organist. His most important engagement was as organist of United Free Saint George's Church, Edinburgh. His organ compositions are universally known, and are very popular in the United States. The following are among his better-known works: Two concert overtures (in C major and C minor); andante in D; grand *chœur* in G minor; two preludes; intermezzo in D flat; and a nocturne in B flat.

HOLLINS, GEORGE NICHOLS (1799-1878). An American naval officer. A native of Baltimore, Md., he was midshipman at the age of fifteen, and being aboard a frigate taken by the English, he was held a prisoner by them till the end of the War of 1812. Ten years later he had exchanged the naval for the merchant service, and by 1844 was captain of an armed vessel which he subsequently employed to enforce the rights of Americans living in Nicaragua, thereby causing international complications with Great Britain. This was in 1855. At the outbreak of the Civil War he sided with the Confederates and became a commodore in their navy, rendering important service, but at the peace he turned landsman and was court crier in Baltimore.

HOLLISTER. A town and the county-seat of San Benito County, Cal., 94 miles southeast of San Francisco; on a branch of the Southern Pacific Railroad (Map: California, C 3). It is the centre of farming, fruit-growing, dairying, and stock-raising interests. The town has a public library. Population, in 1890, 1234; in 1900, 1315.

HOLLISTER, GIDEON HIRAM (1817-81). An American author, born in Washington, Conn. After graduating at Yale (1840), he studied and practiced law in Litchfield, with digressions to other towns in Connecticut, and a year in Haiti as United States consul (1868-69). In 1880 he was sent to Congress. His literary work consists of an historical novel, *Mount Hope* (1851); *History of Connecticut* (2 vols., 1854); *Thomas à Becket: A Tragedy, and Other Poems* (1866), and *Kinley Hollow* (1882), published posthumously.

HOLLMANN, hôl'mân, FRIEDRICH (1842—). A German admiral, born in Berlin. He entered the Russian Navy in 1857, served in the Asiatic expedition of 1859-62, commanded a gunboat in 1864, and, after service on schoolship and at the Kiel Naval Academy, fought at the battle of Grille in the Franco-Prussian War. His advance was rapid; in 1889 he arranged the trip of the German Emperor and Empress to Greece and Turkey; and in the following year he was made Secretary of State for the Navy, a post which he held until June, 1897, when he resigned because of his inability to pass the naval budget. He had been promoted to admiral in 1896.

HOLLOWAY, LAURA CARTER (afterwards Mrs. LANGFORD) (1848—). An American author, twice married, whose maiden name was Carter. She was born in Nashville, Tenn., and was educated at the Female Academy there. She was president of the Seidl Musical Society in Brooklyn and a collaborator with Anton Seidl himself in the musical work for the *Standard Dictionary*. She published *Ladies of the White House* (1870); *An Hour with Charlotte Brontë* (1883); *The Mothers of Great Men and Women* (1884); *Chinese Gordon* (1885); and *The Buddhist Diet Book* (1887).

HOLLOWAY COLLEGE. An institution founded in 1883, in Mount Lee, Egham, Surrey, England, by Thomas Holloway, for the purpose of supplying higher education to women, particularly of the middle class. The building is very handsome in the French Renaissance style, and was opened by Queen Victoria in 1886. Twelve trustees look after the management.

HOLLOW-WARE. There are two classes of iron goods so called, viz. cast-iron hollow-ware and wrought-iron hollow-ware. Both kinds include cooking and other vessels for domestic use, and comprise also some other articles, such as coffee-mills, which are molded and finished in a similar way. Wrought-iron hollow-ware is largely made by the process of stamping. (See DIES AND DIE-SINKING.) Hollow-ware is finished in three ways; some of it is enameled, some tinned, and some of it is left black, or untinned. See ENAMEL.

HOLLS, GEORGE FREDERICK WILLIAM (1857—). An American lawyer. He was born at Zelienople, Pa., graduated at Columbia (1878) and at Columbia Law School (1880), and gained a large German-American practice in New York City. He was a Republican delegate-at-large to the State Constitutional Convention in 1894, and was commissioner on government of cities of the third class (1895). In 1898 he did much in Germany to better feeling toward the United States, and in the following year was appointed secretary and counsel of the American delegation to the Peace Conference at The Hague. In the treaty there concluded, Holls wrote the article *Special Mediation*. He wrote: *Franz Lieber* (1884, in German); *Sancta Sophia and Troitza*, a sketch of travel in Russia and the East (1888); *Compulsory Voting* (1891); and *The Peace Conference at The Hague and Its Bearings on International Law and Polity* (1900).

HOLLY (older *hollen*, from AS. *holen;* connected with Ir. *cuilenn*, Gael. *cuilioun*, Welsh

celyn, holly, and also with OHG. *hulis*, *huls*, Ger. *Hülse*, holly, Skt. *śala*, staff), *Ilex*. A genus of trees and shrubs of the natural order Ilicineæ, chiefly natives of temperate climates; with evergreen, leathery, shining, and generally spinous leaves. The common holly (*Ilex Aquifolium*), the only European species, and a native also of some parts of Asia, is a well-known ornament of parks and shrubberies in Great Britain, where it sometimes attains a height of fifty feet upon suitably light soils. Numerous varieties of holly have been produced, or at least perpetuated, by cultivation, which exhibit great diversity in the leaves. The flowers of the holly are whitish, axillary, nearly umbellate; the fruit small, scarlet, rarely yellow or white. Medicinal properties are attributed to the leaves, berries, and roots. Bird-lime is made from the inner bark. The wood is almost as white as ivory, very hard and fine-grained, and is used by cabinet-makers, turners, musical-instrument makers, etc., and sometimes for wood-engraving. The holly is often planted for hedges, since it bears clipping well. The name holly is said to be derived from the use of the branches and berries to decorate churches at Christmas, from which the tree was called holy-tree. Numerous species of holly are found in North America, most of them in swampy situations; in South America, Nepal, Japan, and other parts of the

HOLLY (*Ilex Aquifolium*).

world. Some of these have been introduced as ornamental trees and shrubs. Maté (q.v.), or Paraguay tea, is the leaf of a South American species of holly (*Ilex Paraguensis*). In the United States there are a dozen species of Ilex, the finest of which, American holly (*Ilex quercifolia*), is a small tree 20 to 40 feet tall, extensively used as a Christmas decoration, though the leaves are less glossy and the berries not so bright a red as the European species. *Ilex cassine* is a shrub which occurs from Virginia southward. Its leaves are used for tea, and it furnished the 'black drink' of the North Carolina Indians.

HOLLYHOCK (ME. *holihoc*, holy hock,, from *holi*, AS. *hālig*, holy + *hoc*, AS. *hoc*, leaf), *Althæa rosea*. A plant of the natural order Malvaceæ, native of India and south of Europe, etc., and common in gardens through the world. It has a tall, straight, hairy, unbranched stem, 8 to 15 feet tall, heart-shaped crenate, wrinkled, five to seven angled leaves, which diminish upward into bracts; and large axillary flowers, almost without stalks, which on the upper part of the stem form a spike; the petals are hairy at their bases. Its flowers vary much in color, and

HOLLYHOCK (*Althæa rosea*).

double and semi-double varieties are common. It is an ornamental autumnal flower, which continues till frost. It is propagated either by seed or cuttings.

The plant is frequently attacked by a fungus, a rust, *Puccinia malvacearum*, which has greatly reduced its culture in many parts of the United States and Europe. Its presence may be first noticed in May or June by small yellow spots on the leaves and stems. Soon the leaves become dry and dead, as though scorched by fire. Any standard fungicide applied frequently from early spring until flowering time will keep the disease in check. Washing the leaves with a solution of two tablespoonfuls of potassium permanganate in a quart of water is a common remedy employed in Europe. The hollyhock is sometimes attacked by blight (*Colletotrichum malvarum*), and a leaf-spot disease (*Cercospora althæina*), both of which may be prevented by the use of some good fungicide (q.v.).

HOLLY SPRINGS. A city and the county-seat of Marshall County, Miss., 45 miles southeast of Memphis, Tenn., at the junction of the Illinois Central and the Kansas City, Memphis and Birmingham railroads (Map: Mississippi, G 1). It has a public library, Rust University for negroes (Methodist Episcopal), opened in 1868, a colored State Normal School, founded in 1870, the North Mississippi Presbyterian College for young ladies, the Holly Springs Normal Institute, and other educational institutions. The city is principally engaged in the cotton trade, and has a cotton compress and gin, a cottonseed-oil mill, stone-jug factories, etc. Holly Springs is governed under a charter of 1896, which provides for a mayor, elected biennially, and a city council. The water-works and electric-light plant are owned and operated by the municipality. In December, 1862, during the Civil War, General Grant established here a depot of supplies, protected by a small garrison under Col. R. C. Murphy, preparatory to moving forward against Vicksburg. On December 20th the Confederate General Van Dorn by a rapid movement captured

the post, taking about 1500 prisoners, and destroyed supplies valued by Grant at $400,000. This, together with a raid by Forrest into Tennessee, forced Grant to abandon for a time his forward movement. Population, in 1890, 2246; in 1900, 2815.

HOLM, SAXE. The nom-de-plume signed to a series of short stories, first published in *Scribner's Monthly Magazine*, and then in a volume (New York, 1873; second series, 1878). They have been attributed to Mrs. H. M. F. Jackson (at the time of publication, Mrs. Helen Hunt).

HOL'MAN, JOSEPH GEORGE (1764-1817). An English actor and dramatist. Educated in London and at Oxford, he made his début, when twenty years of age, as Romeo at Covent Garden, and continued to present Shakespearean and other rôles there till the end of the eighteenth century. In 1806 he played in Dublin, then at the Haymarket, London. He went in 1812 to America, where he had the support of his daughter in performances at New York City and Philadelphia. He made two attempts at theatrical management in the United States, but was more successful as a writer of comedies and comic operas, such as: *Abroad and at Home* (1796); *Red Cross Knights* (1799); *Votary of Wealth* (1799); and *What a Blunder* (1800).

HOLMAN, SILAS WHITCOMB (1856-1900). An American physicist, born at Harvard, Mass. He graduated at the Massachusetts Institute of Technology in 1876, was appointed an instructor in that institution in 1881, assistant professor in 1882, associate professor in 1885, and professor in 1893. In 1897 ill health and failing eyesight compelled him to retire with the title of professor emeritus. He was particularly interested in the methods of laboratory instruction, and published investigations on *The Effect of Temperature on the Viscosity of Air* (1876), and on *The Viscosity of Gases;* and other works, including *Physical Laboratory Notes* (1885-95); *Computation Rules and Logarithms* (1896); and *Matter, Energy, Force, and Work* (1898).

HOLMAN, WILLIAM STEELE (1822-97). An American jurist and politician. He was born in Dearborn County, Ind., and was educated at Franklin College, became a lawyer, and held several judicial positions; was a member of the Indiana Constitutional Convention in 1850, and of the Indiana Legislature in 1851. With the exception of eight years he was a Democratic Representative in Congress from 1859 till his death, in 1897; and from his opposition to extravagant appropriations was known as 'the great objector' and 'the watch-dog of the Treasury.'

HOLMBOE, hôlm'bĕ, KRISTOFFER ANDREAS (1796-1882). A Norwegian Orientalist and numismatist, brother of Bernt Michael Holmboe (1795-1850), the mathematician. He was born at Vang; studied at Christiania, and made a specialty of Oriental languages, especially Persian, under De Sacy, in Paris (1821-22). In 1822 he became lektor in Oriental languages at Christiania, and in 1825 professor. Besides being a pioneer in philology he took an active interest in education. He founded (1834) the *Norske Universitets og Skole-Annaler*. His more important works are: *De Re Prisca Monetaria Norvegia* (1841); *Sanskrit og Oldnorsk* (1846); *Det Oldnorske Verbum* (1848); *Det Oldnorske Sprogs väsentligste Ordforraad, sammenlignet med Sanskrit* (1852); *Norsk og Keltisk* (1854); and the very valuable *Bibelsk Real-Ordbok* (1868).

HOLM'BY HOUSE. A mansion near Northampton, England, erected by Sir Christopher Hatton during the reign of Elizabeth, and later purchased by James I. It was here that Charles I. was imprisoned by the Parliamentary commissioners from the time he was surrendered by the Scots until removed to Newmarket by Cornet Joyce (February-June, 1647). Five years thereafter the house was dismantled. See Gardiner, *History of the Great Civil War*, vol. iii. (new ed., London, 1893).

HOLMES, hōmz, ABIEL (1763-1837). An American Unitarian clergyman and historian, born at Woodstock, Conn. He graduated at Yale in 1783, and for a time was a tutor and a student of theology there. His first pastorate was at Midway, Ga., in a district settled largely by New Englanders. There he remained from 1785 till 1791, when he accepted a call to the First Congregational Church of Cambridge, Mass., where he continued during the next forty years. His first wife was a daughter of President Stiles, of Yale College; his second was the daughter of Oliver Wendell, and became the mother of Oliver Wendell Holmes (q.v.). His publications include: *A Life of President Stiles* (1798); *Annals of America* (2d ed. 1829), his best-known work, characterized by the minutest accuracy and still standard for the period covered; *Historical Sketch of the English Translation of the Bible* (1815); and a number of sermons, addresses, and memoirs.

HOLMÈS, ô'mĕs', AUGUSTA MARY ANNE (1847-1903). A French song composer, born in Paris of English-Irish parents. Her father was Captain Dalkeith Holmes, of the British Army, and her mother was a member of an old Hampshire (England) family. She studied under Lambert, Klosé, and César Franck, and although a brilliant pianist (in her childhood regarded as a prodigy), she attained distinction entirely through her compositions. In 1879 she won the third prize with her *Lutèce* in an open competition instituted by the city of Paris. Her other important compositions are a psalm, *In exitu* (1873); the symphony *Héro et Léandre* (1874); an *Andante pastoral* (1877); the symphonies *Les Argonautes* (1880) and *Irlande* (1885); and over a hundred songs, besides other orchestral works.

HOLMES, hōmz, GEORGE FREDERICK (1820-97). An American educator. He was born in British Guiana; was educated at Durham University, England; came to America in 1838, and taught in Virginia, South Carolina, and Georgia. He was for a time one of the editors of the *Southern Quarterly Review*, and in 1846 was president of the University of Mississippi. From 1847 to 1857 he was professor of history, political economy, and international law in William and Mary College. From that time until his death he was professor of history and literature in the University of Virginia. He prepared a series of text-books for the use of schools in the Southern States, in which the sentiments and selections were made with reference to the justification of slavery.

HOLMES, MARY JANE (c.1839—). An American novelist. Her maiden name was Hawes, and

she was born in Brookfield, Mass., but moved at her marriage to Versailles, Ky., and afterwards Brockport, N. Y. She was at first a district school-teacher, and the didactic tendency is perceptible throughout her works, which were favorites of the young person of a past generation. Her first novel, *Tempest and Sunshine* (1854), was followed by a book almost every year, and the circulation of her books has exceeded two millions.

HOLMES, NATHANIEL (1815—). An American jurist and author, born in Peterborough, N. H. He graduated at Harvard, began legal practice in 1839 at Saint Louis, and was judge of the Missouri Supreme Court from 1865 to 1868. From that time until 1872 he was law professor at Harvard, but he retired altogether from public life in 1883. In *The Authorship of Shakespeare* (1866) he credits Francis Bacon with the dramas, and he published also *Realistic Idealism in Philosophy Itself* (2 vols., 1888), and an *Historical Address* (1890).

HOLMES, OLIVER WENDELL (1809-94). An American man of letters, born at Cambridge, Mass., August 29, 1809, son of the Rev. Abiel Holmes (q.v.). Holmes was brought up in the orthodox faith, was sent to Phillips Academy, Andover, Mass., for his preliminary education, and graduated from Harvard College in 1829. He at once entered the Law School of that institution, but, finding the law uncongenial, he gave it up for medicine. While a law student he wrote and published in the *Boston Advertiser*, in 1830, his well-known and stirring verses, "Old Ironsides," which were an effective and popular protest against the proposed breaking up of the famous frigate *Constitution*. After three years in the Harvard Medical School, Holmes, in 1833, sailed for Europe, where he studied two years, chiefly in Paris, and on his return began the practice of medicine in Boston in 1836. The same year witnessed the publication of his first volume of poems. In 1838 he was appointed to the professorship of anatomy at Dartmouth College, a post which he held for two years. Thenceforth he passed his life almost wholly in Boston, with which city his name became very intimately associated. On June 15, 1840, he married Miss Amelia Lee Jackson of Boston. His only important contribution to medical science was made in 1843, when he published his essay on the *Contagiousness of Puerperal Fever*, though he wrote numerous other scientific papers. From 1847 to 1882 he was Parkman professor of anatomy and physiology in the Harvard Medical School. He was, however, not really eminent in his profession. His literary gift was marked, and he was less renowned in Boston as a practitioner than as a writer of very facile, witty verse, collections of which appeared in 1836, 1846, 1849, 1850, and later.

Until 1857, however, his reputation was almost wholly local. The establishment in that year of the *Atlantic Monthly*, under the editorship of Lowell, brought him a national and almost world-wide vogue through the serial publication in that magazine of the *Autocrat of the Breakfast Table*, which appeared in book form in 1858. These delightfully egotistical talks, full of brilliant wit and buoyant seriousness, essentially of New England and Boston, had had their origin in two forgotten essays by Holmes in the *New England Magazine* in 1833. The success of *The Autocrat* was remarkable, and Holmes has been likened to almost every famous essayist from Montaigne to Lamb. Among orthodox Calvinists the sketches met with disfavor, since the ideas and the manner were those of an essential rationalist. They were followed in the next year by a series scarcely less delightful, *The Professor at the Breakfast Table* (pub. 1860 in book form), and after a lapse of more than a decade, in 1871-72, by the third and last volume of the series, *The Poet at the Breakfast Table*. *The Autocrat*, however, is the best, most original, and most popular of the works of Holmes, who is often called 'The Autocrat.'

In 1861 Holmes published his first novel, *Elsie Venner*. Though rather formless and uneven in quality, and inartistic in method, it is interesting, and full of power. More commonplace in idea than *Elsie Venner*, but equally interesting in its delineation, often rather contemptuous, of New England character, was *The Guardian Angel* (1867). In the interval between these two novels appeared *Songs in Many Keys* (1861) and *Humorous Poems* (1865), and a volume of prose, *Soundings from the Atlantic* (1863). His remaining literary work contained nothing very new or striking. The chief titles are: *Mechanism in Thought and Morals* (1871); *Songs of Many Seasons* (1874); *John Lothrop Motley* (1878), a memoir; *The School-Boy* (1878); *The Iron Gate, and Other Poems* (1880); *Pages from an Old Volume of Life* (1883); *Medical Essays* (1883); *Ralph Waldo Emerson* (1884), a life; *A Mortal Antipathy* (1885), his last novel, inferior to the two former; *The New Portfolio* (1885-86) in the *Atlantic; Our Hundred Days in Europe* (1887), an account of a voyage taken with his wife and daughter; *Before the Curfew, and Other Poems* (1888); and *Over the Tea-Cups* (1890), in the vein of *The Autocrat*. His death occurred in his eighty-sixth year, in Boston, October 7, 1894.

Dr. Holmes was slight in stature and fastidious as to his personal appearance. In temper he was humane and kindly, particularly gracious to his numerous correspondents when confident of their sincerity, and genial in all his writing. His social accomplishments were unusual; he is said to have been the best talker in Boston. His style, at its best, is the style of spoken discourse—light, intimate, and winning, but not flippant. His verse, which is almost wholly of an occasional character, such as poems read at reunions of his college class or scattered throughout the pages of *The Autocrat*, is, like that prose work, sparkling with wit, or a graceful compound of gravity and humor. He is a prince among writers of *vers de société*. Among the best known of his poems are "Old Ironsides," "The Chambered Nautilus," "The Last Leaf," "Dorothy Q.," "The Voiceless," "The Deacon's Masterpiece; or, the Wonderful One-Hoss Shay," a satire against the doctrines of Jonathan Edwards.

BIBLIOGRAPHY. Consult Morse, *Life and Letters of Holmes*, vols. xiv. and xv. of the *Collected Works*. Sketches are to be found in Higginson, *Old Cambridge* (New York, 1900), and Howells, *Literary Friends and Acquaintance* (New York, 1899). The literary historians, as Stedman, Richardson, and Wendell, discuss at some length his general position in the history of American

letters. The standard edition of his works is the Riverside, in fifteen volumes (Boston, 1892).

HOLMES, OLIVER WENDELL, JR. (1841—). An American jurist, son of Dr. O. W. Holmes. He was born in Boston; was educated at Harvard; served in the Civil War, and was three times wounded—at Ball's Bluff, at Antietam, and at Fredericksburg. He practiced law in Boston; edited the *American Law Review* (1870-73); became professor of law at Harvard in 1882; and in the same year entered the Massachusetts Supreme Court, of which he became Chief Justice in 1899. In 1902 he was named to succeed Justice Gray in the United States Supreme Court. Holmes edited the twelfth edition of Kent's *Commentaries* and published his own Lowell Institute lectures, *The Common Law* (1881).

HOLMES, THEOPHILUS HUNTER (1804-80). An American soldier, prominent on the Confederate side in the Civil War. He was born in Sampson County, N. C., graduated at West Point in 1829, served in the Florida War and the War with Mexico, and at the outbreak of the Civil War was acting as superintendent of the general recuiting service, with the rank of major. In April, 1861, he resigned his commission in the United States Army, and for a time was engaged in organizing the State troops of North Carolina. He became a brigadier-general in the Confederate service soon after the secession of his State, commanded the Confederates in the engagement at Aquia Creek, was promoted to be major-general, and from September, 1862, to March, 1863, was in command of the Trans-Mississippi Department, attaining the rank of lieutenant-general. On July 3, 1863, he made an unsuccessful attack on Helena, Ark.

HOLMES, WILLIAM HENRY (1846—). An American geologist. He was born near Cadiz, Ohio, and after graduating at the McNeely Normal College (1870), was assistant on the United States Geological Survey (1872-80). During that period he accompanied Dr. F. V. Hayden's explorations in the Rocky Mountain region, and superintended the survey of the San Juan territory until the reorganization of the survey (1880) when he was appointed geologist in charge of the department of illustrations; had charge of the archæological explorations of the Bureau of Ethnology in 1889-93; in 1894-98 was professor of archæologic geology at the University of Chicago; and in 1898 was made curator of the United States National Museum. He edited geological publications, including Hayden's *Atlas of Colorado* and the eleventh and twelfth reports of the Geological Survey, and published reports on the cliff ruins of the San Juan country, and on aboriginal American art and archæology. He is a fellow of the American Association for the Advancement of Science.

HOLMGREN, hôlm'grĕn, ALARIK FRITHIOF (1831-97). A Swedish physiologist, born in Vestra Ny (East Gotland), and educated at the University of Upsala, at the University of Berlin under DuBois-Reymond and Helmholtz, and under Brücke and Ludwig in Vienna. In 1864 he became professor of physiology at Upsala, the first chair in that subject in Sweden, and soon afterwards founded a physiological laboratory. His medical studies were mostly in the field of ophthalmology, and he was an authority on color-blindness; his work on this subject, *Om färgblindheten i dess förhållande till järnvägstrafiken och sjöväsenet* (1877) has been translated into many languages. Holmgren was a firm believer in the hygienic value of Swedish gymnastics. He edited the *Skandinavisches Archiv für Physiologie* (1889 sqq.).—His wife, ANN MARGRETA TERSMEDEN (1850—), under the pseudonym Märta Bolle, wrote the novels *Fru Ströle* (1894) and *När Kiadar Alf sockar* (1896).—His brother, AUGUST EMIL HOLMGREN (1829—), is a naturalist of much ability. He wrote: *Ichneumonologia Suecica* (1864); *Handbok i Zoologi* (1865-71); *Om Smafoglarne* (1869); and *Om skadeinseketer iniomhus* (1879), besides other works on entomology and ornithology.

HOL'OCEPH'ALI (Neo-Lat. nom. pl., from Gk. *ὅλος, holos*, entire + *κεφαλή, kephalē*, head). A subclass of cartilaginous fishes (q.v.), including the single living family Chimæridæ. The number of living species is small, but in the remote past they were a dominant group, numerous in species. See CHIMÆRA.

HOLOFERNES, hŏl'ō-fẽr'nēz, or **HOLOPHERNES.** (1) The stock pedant in Italian comedy. (2) The tutor of Gargantua, in Rabelais's *Gargantua and Pantagruel*, who teaches his pupils to say the alphabet backward. (3) A pedantic schoolmaster in Shakespeare's *Love's Labour's Lost*, said to have been meant for John Florio, author of a dictionary.

HOL'OGRAPH (Lat. *holographus*, from Gk. *ὁλόγραφος*, written entirely by the author's hand, from *ὅλος, holos*, entire + *γράφειν, graphein*, to write). A deed or writing wholly by the hand of the maker or author. In those countries which derive their legal systems mainly from the civil, or Roman, law, a holographic writing is deemed to prove itself; that is, proof of the handwriting of the person whose instrument it purports to be is in itself sufficient to authenticate the document, without formal attestation by subscribing witnesses, notarial seals, and the like. This is true of Scotland, Quebec, and Louisiana, as well as of most Continental States. In the common-law system, however, of England and America, no distinction of superior validity attaches to holographic writings, and they require the same formal attestation and the same proof of validity as other writings. See EVIDENCE; HANDWRITING, and the authorities there cited.

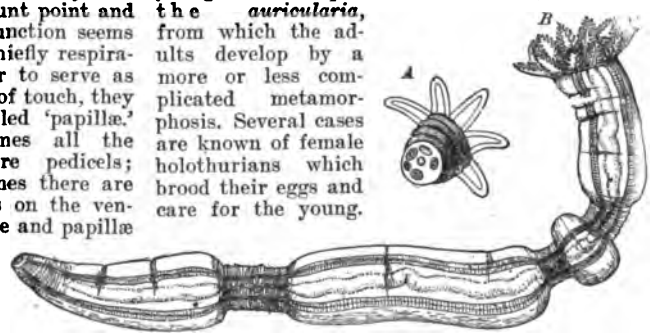
HOLOPTYCHIUS, hŏl'ŏp-tĭk'ĭ-ŭs (Neo-Lat., from Gk. *ὅλος, holos*, entire + *πτυχή, ptychē, πτύξ, ptyx*, fold). A genus of fossil ganoid fish of the order Crossopterygii, remains of which are found commonly in the Catskill sandstones of North America and in the Old Red Sandstone of the British Devonian system. Some of the species were thirty inches long, with rounded tapering bodies, and heterocercal tails. There are two dorsal fins, a pair of long, stout, pointed pectoral fins, and short pelvic and anal fins. The body was covered with large, rounded (cycloid) scales, the surfaces of which are marked by prominent ridges of ganoine, a structureless enamel. These scales, of gray or bluish-white color and one to three inches in diameter, are very abundant in some parts of the Catskill formation in New York and Pennsylvania. See CATSKILL GROUP; DEVONIAN SYSTEM; GANOIDEI; FOSSIL.

HOLOSTEI, hŏl-ŏs'tê-I (Neo-Lat. nom. pl., from Gk. *ὅλος, holos,* entire + *ὀστέον, osteon,* bone). A group of bony ganoids, embracing the garpikes and bowfins (q.v.).

HOL'OTHU'RIAN (from Lat. *holothurium,* Gk. *ὁλοθούριον,* water-polyp; probably from *ὅλος, holos,* entire + *θούριος, thourios, θοῦρος, thouros,* impetuous). An echinoderm of the class Holothuroidea, easily recognized by the soft body, generally worm-like form, and circle of tentacles about the mouth. The madreporic plate is internal. 'Sea-cucumber,' 'sea-squirt,' and 'sea-slug' are some of the popular names of these animals, whose dried bodies form the Oriental 'trepang' (q.v.). The class have not the covering of calcareous plates characteristic of the more typical Echinodermata, but a tough leathery muscular integument, in some genera strengthened by minute or rather large calcareous plates or hooks, very irritable, and capable of great distention and contraction. Some of them are almost globose, some truly worm-like; but the same individual is often capable of extending itself to several times the length which it has in a state of repose. In locomotion the body is extended and contracted in the annelids, and in the apodous forms this is the only means of locomotion, except such aid as is given by the tentacles. In the pedate forms the principal organs of locomotion, as in starfishes and sea-urchins, are the ambulacral feet, of which there are sometimes five double rows, while sometimes they are distributed over the whole surface of the body; but some of the species have the feet developed only on the ventral side, and the body then presents an upper and an under surface. When the feet are furnished with suckers and are very extensible they are called 'pedicels,' but when they end in a blunt point and their function seems to be chiefly respiratory, or to serve as organs of touch, they are called 'papillæ.' Sometimes all the feet are pedicels; sometimes there are pedicels on the ventral side and papillæ on the dorsal; rarely all the feet are papillæ. In two families the feet are completely wanting.

THE COMMON NORTH ATLANTIC HOLOTHURIAN. (*Pentacta frondosa.*)

The radiate structure is apparent at the mouth, which is surrounded with tentacles, in number frequently a multiple of five, exhibiting considerable variety of form, and capable of being more or less retracted. These tentacles vary in number from 8 to 30, but 10, 12, 15, and 20 are the usual numbers. They are very rarely short, simple, and unbranched; generally they are provided with branches which may be arranged along the sides, clustered at the top, or irregularly scattered. The tentacles are very sensitive and are the most important sense-organs of the animal; upon them are occasionally found special sense-cups, supposed to be olfactory, or there may be at the base pigment eyes or positional organs. The nervous system is perfectly radiate in structure and very simple in organization. The mouth opens into an alimentary canal, usually much longer than the body, and therefore more or less looped or coiled. An œsophagus, stomach, intestine, and cloaca can usually be distinguished. Arising from the cloaca, there are often two irregularly branched organs, known as the 'respiratory trees.' These are hollow, very thin-walled, and capable of containing a great deal of water, which they receive through the anus. They are excretory, and perhaps respiratory in function. In many species there arise from the wall of the cloaca, and extend into the body-cavity of the animal, numerous glandular tubules, known as Cuvier's organs. These can be ejected from the anus as long, sticky threads, and thus seem to be protective. The blood system is well developed in most holothurians, especially along the intestine. In those forms which have a respiratory tree one branch of it is often closely bound up with a network of blood-vessels, arising from the principal vessel on the intestine. The sexes are generally separate, hermaphrodite forms being quite unusual; but there is no external difference between male and female, save in a very few forms. The eggs are generally thrown out into the water, where they are fertilized, but several viviparous forms are known, in which the eggs fall into the body-cavity of the mother and the young develop there. In such cases the development is direct, but in species whose eggs develop in the water the young assume a peculiar larval form, known as the *auricularia,* from which the adults develop by a more or less complicated metamorphosis. Several cases are known of female holothurians which brood their eggs and care for the young.



SYNAPTA.
a, free-swimming young; *b,* adult synapta.

The holothurians are capable of the most extraordinary regeneration of parts, even of the most important organs. In direct relation with this is their curious and noteworthy habit of evisceration. Many species when alarmed or irritated expel from the anal opening (or less commonly the mouth) the viscera, either wholly or in part. They thus lose their entire digestive, reproductive, respiratory, and excretory systems and a large part of the blood system; but if not disturbed further, they will, in the course of a few weeks, replace all they lost with an entirely new set.

Holothurians are found in all seas, but particularly abound in the West Indies and between Asia and Australia. The largest American species is *Holothuria Floridana*, which abounds just below low-water mark on the Florida reefs. Another large one, *Cucumaria frondosa*, inhabiting the North Atlantic, and probably circumpolar, is about a foot in length, and is yellowish-brown. Many of the tropical species exhibit attractive colors, and are among the creatures which make the bottom of the sea, particularly among coral reefs and islands, extraordinarily interesting.

The holothurians (Holothuroidea) are classified in two orders according to the point of origin of the tentacles. In the *Actinopoda* they arise from the radial vessels of the water-vascular system, while in the *Paractinopoda* they arise from the circumoval ring. The Actinopoda include more than five-sixths of the species, and are grouped in five very distinct families. Of these, the Elasipoda are the most remarkable. They are all deep-sea forms and occur in all parts of the world. Many of them assume the most grotesque shapes, and some reach a large size. The Paractinopoda are all footless forms, of a single family. The best-known genus is Synapta, containing more than fifty species found in all parts of the world. About six hundred species of holothurians are known, varying in size from those half an inch long up to certain tropical species two or even three feet in length. The colors vary from white, or almost transparent, to jet-black, but as a rule the colors are more or less in correspondence with the bottom on which the animal lives. They chiefly feed on Foraminifera. Their movements are generally very sluggish, and they seem to have few enemies. All are harmless, but the only ones of any use to man are the larger forms, from which bêche-de-mer, or trepang, a great delicacy with the Chinese, is prepared.

Consult: Ludwig, "Die Seewalzen," in Bronn, *Klassen und Ordnungen des Tierreichs: Echinodermen*, vol. i. (Berlin, 1889-92), the standard work on holothurians; Lampert, *Die Seewalzen* (Wiesbaden, 1885); the best work in English is Theél, "Report on the Holothuroidea," in *Challenger Reports: Zoölogy*, vol iv., part 13, and vol. xiv., part 39 (London, 1882 and 1886).

HOL'OTHUROI'DEA. A class of echinoderms. See ECHINODERMATA and HOLOTHURIAN.

HOLST, hôlst, HANS PETER (1811-93). A Danish poet and novelist, born at Copenhagen. From 1875 until his death he was dramaturgist for the Royal Theatre, Copenhagen. His first work to attract attention was a memorial poem on Frederick VI. (1839). This was followed by *Ude og Hjemme*, prose and verse (1843), and *Den lille Hornblæser* (1849) a collection of patriotic poems. He also wrote a number of plays, vaudevilles and novels, and translated *Much Ado About Nothing* (1880).

HOLST, HERMANN EDUARD VON (1841—). A German-American historian and educator, born at Fellin, in Livonia, of German parentage. He studied at Dorpat from 1860 to 1863, and at Heidelberg from 1863 to 1865, and became a tutor at Saint Petersburg in 1866; but was excluded from the Russian dominions in the following year for publishing a pamphlet of which the Russian Government disapproved, and emigrated to America. Settling in New York, he taught modern languages for a time in a small private school, made a number of political speeches in the Presidential campaign of 1868, and was an assistant editor of Schem's *Deutsch-Amerikanisches Konversations-Lexikon*. He then returned to Germany, was professor of history in the University of Strassburg from 1872 to 1874, and in the University of Freiburg from 1874 to 1892, visited America in 1878-79 and in 1884, served for a number of years in the Baden Diet, for the last two sessions as vice-president, and in 1892 became head of the department of history in the newly founded University of Chicago. In 1900 ill health compelled his retirement, and he returned to his home in Freiburg. Von Holst's works are almost altogether on American topics. His *Verfassung und Demokratie der Vereinigten Staaten von Amerika* (5 vols., 1873-91), English translation by Lalor and Mason, *The Constitutional and Political History of the United States* (8 vols., 1876-92), is his best-known work, and contains a remarkably able presentation of the Federalist and anti-slavery view of American political history. Among his other publications are: *Das Staatsrecht der Vereinigten Staaten von Amerika* (1885), English translation, *The Constitutional Law of the United States of America* (1887); *John C. Calhoun*, in the "American Statesmen Series" (1882); *John Brown* (1888); and *The French Revolution Tested by Mirabeau's Career* (1894). Consult Hart, "Hermann von Holst," in the *Political Science Quarterly*, vol. v. (New York, 1890).

HOLSTEIN, hôl'stin. Formerly a duchy belonging to Denmark, and at the same time a member of the Holy Roman Empire and of the Germanic Confederation (Map: Prussia, C 1). It was annexed in 1866 to Prussia, and now forms the southern part of the Province of Schleswig-Holstein (q.v.).

HOLSTEIN, or HOLSTEIN-FRIESIAN. A breed of dairy cattle. See CATTLE.

HOLSTEIN, FRANZ VON (1826-78). A German composer, born at Brunswick. He entered a military school, and became an officer in the German Army, but at the same time studied music with Richter. In 1853 he resigned from the army and became one of Hauptmann's pupils at the Leipzig Conservatory. After traveling extensively he settled in Leipzig as a composer. His operas, of which he wrote both words and music, include: *Der Haideschacht* (1868); *Der Erbe von Morley* (1872); and *Die Hochländer* (1876). He also composed considerable vocal and instrumental music.

HOLSTEIN-GOTTORP, göt'tôrp. See OLDENBURG, HOUSE OF.

HOL'STON RIVER. One of the two rivers, the Clinch being the other, which unite at Kingston, Roane Co., Tenn., to form the Tennessee River (Map: Tennessee, H 4). The Holston itself is formed by two forks rising in the Alleghanies in southwestern Virginia and uniting at Kingsport in Sullivan County, Tenn. With the north fork it is over 300 miles long, and is navigable to Knoxville at all seasons, and in winter to Kingston.

HOLT, Sir JOHN (1642-1710). An English jurist. After receiving his education at Oxford, he was called to the bar, 1663, from Gray's Inn, to which he had been admitted when only ten years of age. He soon displayed a decided talent for law, and became an able advocate, well

versed in the constitutional law of England. In 1685-86 he was Recorder of London, and about this time was appointed Sergeant-at-Law and King's Sergeant. Afterwards he fell into disfavor with King James II., but the ability which he displayed in the Convention Parliament raised him so high in the estimation of the Prince of Orange, that, upon the accession of the latter to the English throne, Holt was made Lord Chief Justice of the King's Bench. As a judge he was noted for the fairness and even kindness with which he treated accused persons, and for his opposition to prosecutions for witchcraft. He was also opposed to standing armies and to the use of military power for the preservation of domestic peace. Consult: *Report of All the Cases Determined by Sir John Holt, Kt. from 1688 to 1710*, etc. (in the Savoy, 1738); *Report of Cases Argued*, etc., *in B[anco] R[eginæ] in the Time of Queen Anne* (ib., 1737); Foss, *Judges of England: with Sketches of Their Lives*, etc. (London, 1848-64); Burnet, *History of His Own Time* (6 vols., London, 1838).

HOLT, Joseph (1807-94). An American jurist, born in Breckinridge County, Ky., and educated at Saint Joseph's College and Centre College in the same State. He studied law; practiced in Elizabethtown, then in Louisville; lived for a time after 1835 in Mississippi, where he contested several suits with Sergeant S. Prentiss, among them the case as to the ownership of some public land, claimed by the heirs of Newit Vick, for whom Prentiss was counsel. In the same year (1835) he attracted attention as politician and orator by his defense of R. M. Johnson in the Democratic National Convention. He was a strong supporter of Buchanan in 1856, and was appointed by him Commissioner of Patents in the following year. In 1859 he became Postmaster-General, and in 1860 succeeded Floyd as Secretary of War. A Douglas Democrat before the war, he heartily supported the Union, and in 1862 became Judge-Advocate, and two years later Judge Advocate-General. As head of the department of military justice he conducted the trial of Fitz John Porter and that of Lincoln's assassins. He was brevetted major-general in 1865 and retired ten years later.

HOLTEI, hōl'tī, Karl von (1798-1880). A German poet, dramatist, and novelist, born in Breslau, where at the age of twenty-one he went on the stage. In 1821 he married an actress, Luise Rogée, and after acting as secretary and dramaturgist to the Breslau Theatre for two years went to Berlin with his wife, who had been engaged at the Court Theatre there, and wrote the very successful plays, *Die Wiener in Berlin* and *Die Berliner in Wien*. His wife died in 1825, and he soon married Julie Holzbecher (1809-39), a clever comedienne. In 1833 he returned to the stage and toured with his wife, writing for this purpose *Loorbeerbaum und Bettelstab* and *Shakespeare in der Heimat* (1840). He died at Breslau, in the cloister of the Brothers of Charity. The best of his productions is his *Schlesische Gedichte* (20th ed. 1893), lyrics in the Silesian dialect. Holtei's collected plays are contained in the *Theater* (1867). Besides his plays and lyrics, Holtei wrote many novels, among which mention should be made of *Die Vagabunden* (8th ed. 1894); *Christian Lammfell* (4th ed. 1878); *Noblesse oblige* (2d ed. 1862), and others collected in *Erzählende Schriften* (1861-66); and sketches and criticisms. Consult Storch, *Karl von Holtei* (Waldenburg, 1898).

HOLTON. A city and the county-seat of Jackson County, Kan., 80 miles northwest of Kansas City, Mo., on the Chicago, Rock Island and Pacific, the Union Pacific, and the Missouri Pacific railroads (Map: Kansas, G 2). It is the commercial centre for a stock-raising and farming section, the chief crops of which are corn, wheat, and hay. Campbell University (Baptist) was established here in 1882. Settled in 1859, Holton was incorporated in 1870. The government is administered by a mayor, elected every two years, and a common council. Population, in 1890, 2727; in 1900, 3082.

HOLTON, Luther Hamilton (1817-80). A Canadian statesman, born in South Leeds, Ontario. He was a prominent merchant and city councilor of Montreal before becoming its representative in Parliament (1854-57). He was member for Chateaugay (1863-80), and held different positions in the Government. He was leader of the opposition in the Quebec local House, president of the Montreal Reform Association, a governor of McGill University, and for five years director of the Grand Trunk Railway.

HÖLTY, hēl'tē, Ludwig Heinrich Christoph (1748-76). A popular German poet, born at Mariensee, the son of a country parson. He studied theology at Göttingen (1769), fell in there with Bürger, Voss, and the Stolbergs, and assisted in founding the patriotic poetic league of the Hainbund. He was naturally sentimental, and dwelt, though not morbidly, on death, nature, and solitude, showing the influence of Rousseau, and especially of the *Night Thoughts* of Young. Occasionally there is also a joyous or even a playful strain, but it is with harmonious melancholy that he is associated in the popular mind. A few of his poems are known wherever German is sung. Hölty's *Works* were collected in 1789. There is a life by Ruete (Guben, 1883), and biographies in the critical editions by Voss (Hamburg, 1835), Voigt (Hanover, 1858), and Halm (Leipzig, 1870).

HOLTZ, hôlts, Wilhelm (1836—). A German physicist. He was born October 15, 1836, at Saatel, near Barth, in Pomerania, and studied physics and other sciences at Berlin, Dijon, and Edinburgh. He invented the electrical machine which bears his name (see Electrical Machine) in 1865, and engaged in many researches, particularly in electricity, but his health forced him to give up scientific investigations for a number of years. In 1877 he became assistant in the physical laboratory of Greifswald, where in 1881 he was made privat-docent, and three years later professor. He is the author of many papers on electricity published in the scientific journals, and of two volumes on lightning protection, *Ueber Theorie, Anlage und Prüfung der Blitzableiter* (1878), and *Ueber die Zunahme der Blitzgefahr und ihre vermuthlichen Ursachen* (1880).

HOLTZENDORFF, hôlts'en-dôrf, Franz von (1829-89). A German jurist. He was born in Vietmannsdorf, Prussia; studied law at Berlin, Heidelberg, and Bonn; became professor of jurisprudence at Berlin in 1860, and held the same professorship at Munich from 1873 until his death. He strove especially to correct the crim-

inal law, to abolish the death penalty, and to improve the condition of penal institutions. He was interested and active in the Protestant Union, in the Berlin People's Kitchens, and in the reform of female labor. Among his works are: *Französische Rechtszustände* (1859); *Die Reform der Staatsanwaltschaft in Deutschland* (1864); *Die Prinzipien der Politik* (2d ed. 1879); *Wesen und Wert der öffentlichen Meinung* (2d ed. 1880); and *Das Verbrechen des Mordes und die Todesstrafe* (1874). He edited: *Allgemeine deutsche Strafrechtszeitung* (1861-74); the *Encyklopädie der Rechtswissenschaft* (1880-90); a series of manuals on German law (1871-89); and with Virchow, the *Sammlung gemeinverständlicher wissenschaftlicher Vorträge* (1866 et seq.). Consult Stoerk, *Franz von Holtzendorff* (Hamburg, 1889).

HOLTZ (hôlts) **MACHINE.** See ELECTRICAL MACHINES.

HOLTZMANN, hôlts'mân, ADOLF (1810-70). A German philologist, born at Karlsruhe. He studied theology at Berlin and was for a short time vicar at Kandern. In 1832 he renewed his studies at Munich and later at Paris, and made a specialty of old Germanic dialects and Sanskrit. In 1852 he was made professor of German and Sanskrit at Heidelberg, where he died. His works are: In Indian philology: *Ueber den griechischen Ursprung des indischen Tierkreises* (1841), and the translations *Ramajana* (last edition, 1843), *Indische Sagen* (1845-47); in Germanics: *Kelten und Germanen* (1855), an attempt to identify the two peoples; *Untersuchungen über das Nibelungenlied* (1854), and *Das Nibelungenlied* (1857), both attacking Lachmann's theory of the composite authorship of the poem and renewing the question; the much more important grammatical works, the edition of Isidorus (1836), *Ueber den Umlaut* (1843); *Ueber den Ablaut* (1844); *Altdeutsche Grammatik* (uncompleted, 1870-75); and the posthumous works, *Germanische Altertümer mit Text, Uebersetzung und Erklärung von Tacitus Germania* (1873), and *Deutsche Mythologie* (1874).

HOLUB, hô'lup, EMIL (1847-1902). An African explorer, born at Holitz in Bohemia. He studied medicine and natural science at the University of Prague, and then, in 1872, went to South Africa. He lived for a time in the diamond-fields, but early in 1873 made a journey through the southern Bantu countries, and in the fall a second to the Transvaal and the lands to the north. In 1875 he succeeded in reaching the Zambezi and the Victoria Falls, and brought back with him a rich natural science and ethnological collection, which he divided among various European institutions. In 1883, accompanied by his wife, he started from Cape Town with the intention of traversing the entire length of the African continent to Egypt. He had accomplished scarcely one-third of the journey, however, when he was attacked by hostile tribesmen on the Kafue, a northern tributary of the Zambezi, and only after a desperate struggle was he able to win his way back to civilization. Fortunately, he was able to save the large collection which he had gathered, and this, after it had been exhibited in Vienna and Prague, he divided among a number of museums. His publications include: *The Victoria Falls* (1879); *Sieben Jahre in Südafrika* (1880-81), translated by Ellen E. Frewer as *Seven Years in South Africa* (2d ed. 1881); and *Von Kapstadt ins Land der Maschukulumbe* (1888-90).

HOLY ALLIANCE. A league formed after the fall of Napoleon, at the instance of Alexander I. of Russia, by the sovereigns of Russia, Austria, and Prussia, nominally to regulate the relations of the States of Christendom by the principles of Christian charity. As it formed itself in the mind of Alexander it was the scheme of a pietistic idealist, but it was utilized by Metternich as an instrument of his reactionary policy. The document was drawn up by Alexander, and was signed by the three rulers at Paris in September, 1815. The Russian Emperor at that period was greatly under the influence of the mystical philosophy then current, and especially of its exponent, Madame Krüdener (q.v.), to whom was perhaps due his dream of a community of Christian States under their legitimate sovereigns, which was the underlying thought of the Alliance. In addition to the original signatories Naples, Sardinia, France, and Spain acceded to the treaty, and it received the commendation, though not the signature, of the Prince Regent of Great Britain. It was formally made public in the *Frankfort Journal*, February 2, 1816. Metternich, who privately sneered at the treaty, used it as the basis for the conferences of Troppau and Laybach, and the congresses of Karlsbad and Verona, which were intended to unite the powers in support of absolutism everywhere. It was in the name of the Holy Alliance that Austria, in 1821, crushed the revolutions in Naples and Piedmont, and that France, in 1823, restored absolutism in Spain. Apart from this use of it, as one writer has said, "no one of the princes who adhered to the Holy Alliance, with the single exception of Alexander himself, ever took it seriously." Meaningless in itself, it soon ceased to have any importance.

The text of the covenant is as follows:

In the name of the Most Holy and Indivisible Trinity: Holy Alliance of Sovereigns of Austria, Prussia, and Russia. Their Majesties the Emperor of Austria, the King of Prussia, and the Emperor of Russia, having . . . acquired the intimate conviction of the necessity of setting the steps to be observed by the Powers, in their reciprocal relations, upon the sublime truths which the Holy Religion of Our Saviour teaches: They solemnly declare that the present Act has no other object than to publish, in the face of the whole world, their fixed resolution, both in the administration of their respective States, and in their political relations with every other government, to take for their sole guide the precepts of that Holy Religion, namely the precepts of Justice, Christian Charity, and Peace. . . . *Art. I.* . . . The three contracting Monarchs will remain united by the bonds of a true and indissoluble fraternity, and, considering each other as fellow countrymen, they will, on all occasions and in all places, lend each other aid and assistance; and, regarding themselves toward their subjects and armies as fathers of families, they will lead them, in the same spirit of fraternity with which they are animated, to protect Religion, Peace, and Justice. *Art. II.* In consequence, the sole principle of action, whether between the said Governments or between their Subjects, shall be that of doing each other reciprocal service, and . . . to consider themselves all as members of one and the same

MOUNTAIN OF THE HOLY CROSS

Christian nation; the three allied Princes looking on themselves as merely delegated by Providence to govern three branches of the One family, namely, Austria, Prussia, and Russia, thus confessing that the Christian world, of which they and their people form a part, has in reality no other Sovereign than Him to whom alone power really belongs. . . . *Art. III.* All the Powers who shall choose solemnly to avow the sacred principles which have dictated the present Act . . . will be received with equal ardor and affection into this Holy Alliance. Done in triplicate and signed at Paris, the year of grace 1815, 14/26th September.

Perhaps the most noteworthy development from the Holy Alliance came from the attempt to extend its operation to the New World by the coercion of Spain's revolted colonies. George Canning (q.v.), on behalf of England, opposed this at the Congress of Verona (q.v.), and the threatened invasion of American autonomy, together with the proposed colonization of the Pacific coast of North America by Russia, the leader in the Alliance, brought from the Government of the United States the famous declaration of American policy known as the Monroe Doctrine (q.v.). For accounts of the Holy Alliance and its bearing upon contemporaneous history, consult the histories of the time and the biographies of leading persons connected with it.

HOLY CITY. The common designation among different peoples and religious sects for the city regarded as the chief place of their religion. The term is most often understood as applying to Rome, but has been used also of Jerusalem, Allahabad, Benares, Mecca, Medina, Moscow, Kiev, and Cuzco.

HOLY COAT. A relic preserved with the greatest reverence in the Cathedral of Treves (q.v.). It is alleged to be the seamless robe or upper garment of Jesus Christ (John xix. 23), and to have been discovered in the fourth century by the Empress Helena, in her memorable visit to Palestine (see HELENA, SAINT) and by her deposited at Treves. The earliest definite documentary evidence, supported, however, by still earlier incidental testimony, dates from the eleventh century. The holy coat of Treves was solemnly exhibited to the public gaze in 1196, and again in 1512, when Luther wrote against it and Leo X. appointed it to be exhibited every seven years. The Reformation and wars prevented the regular observance of this religious festival; but it was celebrated in 1810, and was attended by a concourse of no fewer than 227,000 persons, and in 1844 and 1891 by still greater crowds, while miraculous cures were confidently asserted to be performed by the precious relic. The exhibition of the holy coat in 1844 led to the secession of the German Catholics (q.v.) from the Church of Rome. The seamless coat of Jesus is also said to be preserved in the church at Argenteuil, near Versailles, but this claim is not considered well founded. The legend here is that it was given by Charlemagne to the monastery located there, his daughter Theodrada being abbess. Consult: Beissel, *Geschichte des Heiligen Rockes* (Treves, 1889); Clarke, *Pilgrimage to the Holy Coat of Treves* (London, 1892); Plater, *The Holy Coat of Treves* (ib., 1891).

HOLY COMMUNION. See LORD'S SUPPER.

HOLY CROSS, COLLEGE OF THE. A Roman Catholic educational institution founded in 1843 and situated at Worcester, Mass. It is under the control of the Fathers of the Society of Jesus. It maintains collegiate and preparatory departments, and had in 1903 385 students, of whom 175 were in the preparatory school. At the same time its library contained 24,000 volumes, the buildings and grounds were valued at $490,000, and the annual income was $20,000.

HOLY CROSS MOUNTAIN. A celebrated peak of the Rocky Mountains in Colorado, situated in Eagle County, in the central part of the State, 15 miles northwest of Leadville. Its height is 14,006 feet. It derives its name from two snow-filled ravines, which cross each other at right angles, and present from a distance the appearance of a white cross.

HOLY DYING, RULE AND EXERCISES OF. A devotional manual, by Jeremy Taylor, published in 1651. It reached a twenty-first edition in 1710; has been frequently republished during the nineteenth century; and may be said, with its equally popular companion tractate, *Rule and Exercises of Holy Living* (1650), to offer a summary of the duties and devotions necessary to a Christian life.

HOLY FAMILY. The name given in art to representations of the Virgin and the Infant Saviour and their attendants. The earliest such composition is that in the Catacomb of Saint Calixtus in Rome, with the Prophet Isaiah. The Virgin is represented sitting on a seat, which soon became a throne, the traditional attitude up to the Renaissance. The Byzantine School, as early as the sixth century, invented the type in which the Child is seated directly in the centre of the Virgin's lap, and is blessing, both figures gazing straight forward. Some of these early pictures were regarded as painted by Saint Luke and endowed with miraculous powers. Such are a number in the churches of Rome (e.g. at San Sisto, Santa Maria Maggiore, etc.), and Venice (e.g. that of Saint Mark, brought from Saint Sophia in 1204). Later, this school added attendant angels, who sometimes, as in the school of Candia, bore the emblems of the Passion, the sight of which affrights the Child. The arrangement in which the angels are throne-bearing and adoring figures, in rhythmic arrangement on either side of an immense throne, was developed very beautifully by Cimabue and Duccio in their famous pictures at Florence and Siena. It was quite late in the Middle Ages when other figures were brought into the composition. These were, especially, Saint Anna, the mother of the Virgin (sometimes holding the Virgin in her lap), Saint Joseph, and as playmates to the Infant Christ, the infant John the Baptist (usually in goat-skin and bearing a cross), or Saint Catherine (with whom Christ is being sometimes mystically married). Even the early legendary history of the infancy of Christ has been drawn upon for such scenes as the Twelve Apostles playing with the Infant Christ as boys—a scene peculiar to German art. Of all subjects of Christian art that of the Madonna and Child, comparatively unknown before the thirteenth century, came into overwhelming prominence, becoming the favorite theme of the Italian painters of the Renaissance. Giovanni Bellini, Perugino, Filippo Lippi, Leonardo, Raphael, and Andrea del Sarto may be mentioned among the many who frequently treated it. One of its variants at

that time was the adoring Virgin on her knees before the Infant (Filippo Lippi). The scene of the Holy Family must be distinguished from the more elaborate scenes in which the Virgin and Child, similarly portrayed, are accompanied by several large figures, saints and fathers of the Church, which are not mere accessories of the sacred group; this is usually termed a *Sacra* (or *Santa*) *Conversazione*, and was a popular scene, especially with the Umbrian, Venetian, and northern schools of the fifteenth and sixteenth centuries.

HOLY GHOST, or HOLY SPIRIT. In orthodox theology, the third person of the Trinity (q.v.), "proceeding from the Father and the Son," yet of one substance, majesty, and glory with the Father and the Son, very and eternal God. That the Holy Spirit is God is attested by passages of Scripture ascribing to Him the same names and attributes as to God (II. Cor. iii. 16, 17; II. Tim. iii. 16; II. Peter i. 21). He is distinct from the Father and the Son (Matt. xxviii. 19; II. Cor. xiii. 14; I. Peter i. 1-4), and this distinction is of a personal nature, similar to that between the Father and the Son, proved by many passages, such as John xv. 26: "But when the Comforter is come, whom I will send unto you from the Father, even the Spirit of truth, which proceedeth from the Father, He shall testify of Me." The "procession" (q.v.) of the Spirit is the subject of one of the chief differences between the Eastern and the Western churches. The Holy Spirit is essentially a spirit of holiness, and His grand function is to apply to the hearts of men the benefits of Christ's death, to regenerate them, and then to sanctify them by the truth.

HOLY GHOST, ORDER OF THE (Fr., *l'Ordre du Saint-Esprit*). The name of an order of knighthood founded in 1578 by Henry III., King of France, because on Pentecost, 1573, he had been elected King of Poland, and on Pentecost, 1574, had succeeded to the French throne. The grand master of the order was always to be the King of France. The insignia were a green cross with eight points, on the obverse of which was a dove turned downward, on the reverse the representation of the archangel Michael; the chain, after Henry IV., bore the lilies of France and the monogram 'H.' There were one hundred knights, without counting foreigners. The order was definitely dissolved on February 10, 1831, by Louis Philippe.

HOLY GHOST FLOWER, or DOVE FLOWER. See HOLY SPIRIT PLANT.

HOLY GRAIL. See GRAIL, HOLY.

HOLY GRASS (*Hierochloë borealis*). A grass about a foot high, with a brownish glossy lax panicle. It is found in the North of Europe, and throughout North America. It has a sweet smell, like that of sweet vernal grass; and in Iceland, where it is plentiful, it is used for scenting apartments and clothes. In some countries it is strewn on the floors of the places of worship on festival days, whence its name. Its stems are used by North American Indians to weave into their baskets, mats, etc. It is of little value for forage, as stock seem to dislike it. This grass is known by many other names, as vanilla grass, seneca grass, sweet-scented grass, etc.

HOLY GROTTO. The traditional scene of the Annunciation, at Nazareth. Over the grotto stands a monastery, occupying the site of the Santa Casa, the house in which Mary was born, and which was carried by a miracle to Loreto. The grotto is marble-lined and is lighted by nine silver lamps. It is 20 feet square and 10 feet deep.

HOLYHEAD, hŏl'ĭ-hĕd. A seaport of Anglesey, North Wales, situated on the little island of Holyhead, 24½ miles west-northwest of Bangor (Map: England, B 3). It is the terminus of the London and Northwestern Railway, and the port for the mail steamers to Dublin, 60 miles distant. It has a celebrated breakwater, 7860 feet long, which forms a harbor of refuge of 400 acres. It has three lighthouses. Coasting trade, ship-building, and rope-making are carried on. The town possesses assembly rooms and baths and a picturesque old embattled church. Interesting Roman and early English remains exist in the neighborhood. The United States is represented by a consular agent. Population, in 1891, 8745; in 1901, 10,072.

HOLYHEAD ISLAND. A small island of North Wales, west of the island of Anglesey, forming part of the county of that name (Map: Wales, B 3). Its area is about 6000 acres. Population, in 1891, 10,000; in 1901, 11,414.

HOLY ISLAND, or LINDISFARNE. A small island belonging to Northumberland, England, in latitude 55° 40′ N., longitude 1° 47′ W., 10 miles southeast of Berwick-on-Tweed and 3 miles north of the Farne Islands (Map: England, E 1). It is about 4 miles long and 2 miles broad, and is connected with the mainland at low water by sands 3 miles in extent. On the south coast is the village of Holy Island, much resorted to by summer visitors. On the island are several ruins, the chief of which are the extensive and sombre-looking remains of the famous Abbey of Lindisfarne, originally a Saxon edifice, founded in 635 by Aidan, the disciple of Saint Columba. There is also an ancient castle, now fortified. Holy Island flourished under Saint Cuthbert, who died here in 687. In 793 the abbey was destroyed by the Danes. Consult Wilson, *Lindisfarne Churches* (1870). Population 700.

HOLY LANCE. The lance with which the Saviour's side was pierced, and according to one account, found at Jerusalem by Saint Helena, carried to Constantinople, and sent from there in 1492 to the Pope; now preserved in Saint Peter's. According to another account, it was lost until discovered by the Crusaders at Antioch, June 14, 1098. This discovery encouraged them so that they won a great victory. In 1104 this lance was presented to the Byzantine Emperor. The holy lance plays a prominent part in the legends of the Holy Grail (q.v.).

HOLY LAND. See PALESTINE.

HOLY LEAGUE. The name given to a number of political alliances in Europe. Of these the principal were the leagues formed (1) in 1511, by the Pope, Spain, and Venice against France; (2) in 1527, by the Pope, Francis I., and Henry VIII. against the Emperor Charles V.; (3) in 1538, by Charles V. and the Catholic princes of Germany against the Schmalkaldic League; (4) in 1571, by the Pope, Spain, and Venice against the Turks; (5) most important of all, the one formed in 1576 by the Guises, the Pope, Spain, and the Parlement of Paris against the Huguenots. In 1609 a Holy League (known as the Catholic League) was organised

by the Catholic States of Germany, with Bavaria at its head, in opposition to the Protestant Union.

HOLY MAID OF KENT. See BARTON, ELIZABETH.

HOLY MOTHER OF THE RUSSIANS. An epithet originally given to Moscow, the former capital of Russia, by the masses of that nation, and still preserved among the peasantry.

HOL'YOAKE, hōl'yōk, GEORGE JACOB (1817—). An English writer, lecturer, and reformer, particularly identified with the 'coöperative movement.' He was born in Birmingham, England; was educated at the Mechanics' Institution there, taught mathematics for a time, and while still young became widely known as a radical in politics and religion, attracting attention in particular by his advocacy of the theories of Robert Owen (q.v.). He early became especially interested in the theory and practice of coöperation, was active in the movement for the organization of the so-called 'Rochdale Pioneers' in 1843, and subsequently was largely engaged as a lecturer and writer in the interests of coöperation. In 1842 he was imprisoned for six months for blasphemy, his being the last conviction on that charge in England. Soon afterwards he devised a moral system, known as 'secularism' (q.v.), which he advocated in public speeches and in the press. For a time he was president of the London Secular Society, the central organization of Secularism. He was instrumental in securing the repeal of the so-called 'tax upon knowledge' in 1854. He edited at various times the *New Moral World*, the *Reasoner* (from 1846 to 1866), and the *Cause of the People*, in which he contended vigorously for his views; and published numerous books, including: *History of the Rochdale Pioneers* (1857); *The History of Coöperation in England* (1875); *Life of Joseph Rayner Stephens, Preacher and Political Orator* (1881); *Self Helps One Hundred Years Ago* (1890); *The Coöperative Movement of To-Day* (1891); *Sixty Years of an Agitator's Life* (1892), an interesting though somewhat rambling autobiography; *Nature and Origin of Secularism, Showing that Where Free Thought Commonly Ends Secularism Begins* (1896); and *Jubilee History of the Leeds Cooperative Society* (1897).

HOLYOKE, hōl'yōk. A city in Hampden County, Mass., 8 miles north of Springfield; on the Connecticut River, and on the Boston and Maine and the New York, New Haven and Hartford railroads (Map: Massachusetts, B 3). It was originally a part of West Springfield, and was incorporated as the Third Parish in 1786, though it was commonly called Ireland Parish, from the fact that several Irish families were the first settlers. In 1850 Holyoke was set off from West Springfield and incorporated as a separate town; and in 1873 it was chartered as a city. Its importance as a manufacturing centre dates from 1847, when the Hadley Falls Company began to develop the great natural water-power. The river here falls 60 feet and is crossed by a dam 1000 feet long, affording the most valuable power in New England. For many years it was noted for its paper-mills, but it now has also extensive manufactures of cottons, woolens, thread, silk, alpaca, bicycles, automobiles, belting, bricks, screws, wires, machinery, envelopes, and school supplies. It is an important centre for hydraulic engineering, for testing water-wheels, etc. There are a public library, a college of music, city hospital, and House of Providence Hospital. The Holyoke Scientific Society has done valuable work in American archæology, and has fine collections of Indian antiquities. In the vicinity are many points of scenic interest, notably Mount Tom (1215 feet), ascended by an electric railway from Holyoke, and Mount Holyoke (955 feet). Holyoke is governed under a revised charter of 1896, by a Mayor, elected annually, and a city council, two-thirds of whose members are elected at large for two years, the remainder by wards for one year. The subordinate offices are filled as follows: appointed by the Mayor—board of public works, fire commissioners, board of health, city marshal and assistants, city solicitor, and inspector of milk; appointed by the Mayor with the consent of the council—sealer of weights and measures and inspectors of animals and provisions; elected by the council—water commissioners, city physician, poor overseers, city auditor, and city messengers; by the people—all others. The annual income and expenditures of the city amount to about $1,780,000 and $1,745,000 respectively, the main items of expense being $50,000 for the police department, including amounts for police courts, jails, etc.; $70,000 for the fire department, and $175,000 for schools. The city owns and operates its water-works, and has voted to acquire the gas and electric-light plants. Population, in 1890, 35,637; in 1900, 45,712. See MOUNT HOLYOKE COLLEGE.

HOLYOKE, MOUNT. A steep ridge of greenstone 5 miles southeast of Northampton, Mass., rising 955 feet above sea-level (Map: Massachusetts, B 3). A carriage-road winds upward to the summit, and a mountain railway carries passengers up a precipitous incline to a hotel built on the summit in 1821. The view here obtained of the Connecticut River and valley has long been famous as one of the finest in New England.

HOLY PHIAL, ORDER OF (Fr. *Sainte Ampoule*). The name of an order of knighthood which formerly existed in France. It was composed of four persons, usually the first in point of rank, family, and fortune in the Province of Champagne, who were styled *Barons de la Sainte Ampoule*. At the coronation of the French kings, they were delivered to the dean, priors, and chapter of Rheims, as hostages for the return of the holy phial in which the coronation oil was kept. The phial, according to legend, was brought from heaven by the Holy Ghost in the form of a dove and put into the hands of Saint Remigiris at the coronation of Clovis (q.v.). The holy phial preserved at Rheims was broken by Ruhl, a member of the Convention, in 1793. The badge of the order was a cross of gold enameled white, cantoned with four fleurs-de-lis, and on the cross a dove descending with a phial in its beak, and a right hand receiving it.

HOLY ROMAN EMPIRE. The name now given to the Empire erected by Charles the Great (q.v.), King of the Franks, in Western Europe, usually dated from his coronation, at Rome, by Pope Leo III. in 800; or, more technically, to this Empire as revived in 962 by Otho the Great (q.v.). In theory the Holy Roman Empire was a continuation of the Western Empire, which was

overthrown by the barbarians in 476. When Charles the Great was crowned Emperor by Leo III. he thought of himself as the successor of Augustus, Trajan, and Marcus Aurelius, and styled himself Augustus. This theory prevailed throughout the Middle Ages. Louis the Pious, Lothaire I., Louis II., Charles the Bald, and Charles the Fat were crowned as Roman emperors. After the deposition of the latter (887), which was followed by the disruption of the great Frankish Empire, the Imperial title was still held by a few princes, as Arnulf, King of Germany, and Berenger I., King of Italy. In 962 Otho the Great, after wresting the royal crown of Italy from a descendant of Charles the Great, had himself crowned Emperor of the Romans by Pope John XII., and inaugurated the Roman Empire of the German nation. From that time the King of Germany was usually Emperor. The Empire consisted of Italy and the lands whose rulers recognized the overlordship of the German monarch; but theoretically the Emperor was the ruler of all Christians in Western Europe, and some emperors, as, for example, Henry VI., dreamed even of a world-wide empire. At different periods the rulers of Hungary, Poland, Denmark, Jerusalem, and Cyprus were to a greater or less extent vassals of the Roman Emperor. Until the reign of Frederick Barbarossa the name had been merely 'Roman Empire;' Frederick added the designation 'Holy,' either to vindicate its sacred character against the exclusive pretensions of the Church, or else to describe its chief function as the protection of that Church. By the close of the thirteenth century the authority of the German emperors in Italy was reduced to a mere shadow. At the close of the fifteenth century the Swiss cut loose completely from the Empire. In the Netherlands the Imperial authority had come to an end long before their connection with the Empire was declared to be severed in an article of the Peace of Westphalia (1648).

The early German kings were elected by the chief men of the nation with the assent of the other freemen. Gradually the chief nobles secured almost entire control of the elections, but there was no fixed mode of procedure. At the election of Lothair in 1125, for example, a committee consisting of ten from each duchy was chosen to select an Emperor. In the thirteenth century—by a process of evolution, which it is not possible to trace now—the number of electors had been fixed at seven, but there was a dispute as to who were included in the seven. This was settled in 1356 by the Golden Bull of Charles IV., which determined that the electoral college should be composed of the Archbishops of Mainz, Treves, and Cologne, the King of Bohemia, the Count Palatine of the Rhine, the Duke of Saxony, and the Margrave of Brandenburg. The Golden Bull also declared that the electoral votes were attached to the office, not to the persons, and descended in the case of the lay principalities by right of primogeniture. This continued to be the constitution of the electoral college until 1623, when Ferdinand II. arbitrarily transferred the vote belonging to the Count Palatine to Maximilian of Bavaria. At the Peace of Westphalia (1648) an eighth electorate was created for the Palatinate. In 1692 the ninth electorate, that of Hanover, was instituted. The Imperial elections were held at Frankfort-on-the-Main and the coronation city was Aix-la-Chapelle. The Emperor at some time during his reign went to Rome to receive the Imperial crown at the hands of the Pope. The last ceremony of this kind took place in 1530, when Charles V. was crowned at Bologna by Pope Clement VII. The successor-elect to the Emperor of the Romans was styled King of the Romans.

During the so-called Interregnum following on the death of the last Hohenstaufen Emperor there was a double election (1257), both Richard of Cornwall and Alfonso X. of Castile being made Emperor, one receiving four votes and the other three. Their election may be taken to illustrate the theory held by some at the time, that a man of any nationality might be chosen to the Empire; but their total failure to obtain anything but the mere Imperial title proved that as a matter of fact the sovereignty of the Holy Roman Empire could be held only by a Germanic prince. After 1438 all the emperors but two belonged to the House of Hapsburg.

Charles the Great and his immediate successors followed the old German custom of calling together, at frequent intervals, the nobles and freemen for consultation about the public welfare. As feudalism developed these assemblies ceased, and the Emperor called together only such of his vassals as he chose. Their meetings were called Imperial Diets (*Reichstage*). In the thirteenth century the cities became very influential, and consequently their representatives were summoned to the Diets. As the power of the emperors declined, the Diets took a more prominent part in the administration of the Empire. Their functions were judicial as well as administrative. In the fourteenth century it came to be fixed that the Diet consisted of the three classes: electors, princes, and representatives of the cities. The lesser nobility had no voice in the Diet. But the power of the Diet was slight, because it was concerned only with Imperial matters, and the Empire had ceased to be of real importance as a factor in European politics. This was clearly shown in 1496, when Maximilian I. attempted to unite the Imperial estates against the French invasion of Italy. The Diet which he summoned did nothing to check the French, but with the Emperor's consent created the Imperial Chamber (q.v.) a supreme tribunal for the preservation of peace within the Empire. It consisted of a president and sixteen members, who could not be removed from office. It held its sessions at Frankfort, Speyer, and other cities until 1698, when it was established permanently at Wetzlar. Gradually the Imperial Chamber became an important factor in the maintenance of peace within the Empire. The Emperor was jealous of it, as he had no control over it. Consequently he attempted to transfer some of its authority to the Aulic Council (q.v.), a somewhat similar body for Austria, which was under his control. During the first half of the sixteenth century the Aulic Council interfered in the affairs of Italy, the Netherlands, and other portions of the Empire. After that time, however, it was again restricted to Austrian interests alone.

The Empire came to an end in 1806, when Francis II. resigned the Imperial crown after having assumed (1804) the title of Emperor of Austria. After the time of the Hohenstaufen, whose dynasty came to an end in 1254, the Em-

pire rapidly sank in importance, and owed any real authority which it possessed to the strength of the ruler who was Emperor. Still the possession of the title gave some additional prestige. By the Peace of Westphalia (1648) the bonds which held the Empire together were greatly loosened, the right being accorded to the individual States to enter into foreign alliances. In the eighteenth century Voltaire said of the Holy Roman Empire that it was neither holy, nor Roman, nor an empire. During its earlier existence, however, it was a very important factor in the history of Europe. Consult: Bryce, *The Holy Roman Empire* (London, 1864); Fisher, *The Mediæval Empire* (2 vols., London, 1898). See GERMANY; ITALY, and the articles on the individual emperors, with the books cited.

HOLYROOD (hō'lī-rōōd) **PALACE.** The former residence of the Scottish Kings in Edinburgh. It was rebuilt between 1671 and 1679 by King Charles II. of England from the designs of Sir William Bruce of Kinross, after the almost total destruction by fire in 1560 of the prior palace built by James IV. It occupies the site of the famous Augustinian Abbey of the Holy Rood erected by King David I. in 1128, at the place where, according to a fabulous story, he was miraculously saved from the attack of a hunted stag by the interposition of the lost holy cross or rood which fell from the stag's antlers into the King's hands, and at the sight of which the animal turned and fled. The black rood of Scotland, as it was called, was brought to Scotland by Saint Margaret about the year 1070 and became one of the kingdom's heirlooms. It is known to have fallen into the hands of the English at the battle of Neville's Cross in 1346, but its disappearance, in course of time, gave currency to the above fable. The sole remains of the abbey are the ruins of the church which, anciently, was a safe refuge for criminals, and remained so for debtors until the abolition of imprisonment for debt in 1880. Holyrood is interesting as the scene of many historical events, including the term of Queen Mary's residence and of Rizzio's murder in 1566. It is the occasional residence of the British sovereigns, and since the death of Queen Victoria has undergone thorough renovation. Consult: *Historical Description of the Monastery and Chapel Royal of Holyrood House* (Edinburgh, 1819); Wilson, *Memorials of Edinburgh* (Edinburgh, 1848).

HOLY SEPULCHRE. The place where Jesus was entombed. According to the New Testament data, the sites of the crucifixion and burial of Jesus were not far apart (John xix. 41), outside Jerusalem (Heb. xiii. 12), and near a road (Mark xv. 29; Matt. xxvii. 39). The tomb itself was in a garden (John xix. 41), and apparently on a slope. The place of crucifixion was called Golgotha (Mark xv. 22; Matt. xxvii. 33; John xix. 17), an Aramaic word meaning skull. Calvary is but the anglicized form of the Latin *calvaria*, skull. There is no evidence for supposing that the locality was sufficiently elevated to be called a hill or mount. The Gospels imply that the site was well known when they were written, but the references are not full enough to make a modern identification easy or certain.

The traditional site of both Golgotha and the tomb of Jesus is that now covered by the Church of the Holy Sepulchre, 400 to 500 yards west of the northern part of the Haram esh-Sherif, or temple area, and well within the modern city of Jerusalem. Here Constantine the Great built a beautiful church on the spot then supposed to be the place of the Ascension. This identification was not seriously disputed until Jonas Korte, in 1741, claimed that, being within the city walls, it could not be correct. Korte supposed that the modern north wall was in existence at the time of the crucifixion, but in fact it was built later. In 1841 Edward Robinson, in his *Biblical Researches*, disputed the correctness of the traditional site, on the supposition that the second wall of Josephus—i.e. the north wall in Christ's day—passed to the north of it, and in that case it must have been within the city. Since Robinson, this has been felt to be the chief and fatal obstacle to the view that the modern church actually covers the spot where Jesus was buried. But the excavations and measurements of Conrad Schick (1888 and later) have made it all but certain that the wall in Christ's day lay south and east of the disputed site, which therefore was outside the city, and may well have been the scene of the crucifixion and burial. Of other proposed sites, two, both outside the modern city, near the Damascus Gate, have received strong support. The question is still unsettled, but the drift of competent opinion is toward acceptance of the traditional view.

A few years after the crucifixion, the northern area of Jerusalem was inclosed by a third wall, as it was becoming thickly settled. There is no reason to suppose that the early Christians forgot where the crucifixion and burial had occurred, though there is no probability that they venerated the place as holy. In the Jewish war with Rome (66-70), this part of the city was occupied by the Roman army preparatory to the assault on the second wall. From its capture by Titus (70) to the rebellion of Bar-Cochba (132-35), the city was practically in ruins, though not entirely desolate. After suppressing this rebellion Hadrian rebuilt Jerusalem as a heathen city, calling it Ælia Capitolina, and absolutely forbidding Jews to enter it. On the site of the temple a shrine to Jupiter was built, and on that of the supposed tomb of Jesus a temple to Venus was erected (by Hadrian or one of the later emperors). Incidentally this may be evidence that even then Christian tradition pointed out that spot as worthy of veneration. In the third century the holy places of the city and vicinity began to attract pilgrims from various parts of the Empire, though there is no evidence that any visited this particular spot. In the fourth century the pilgrimages became more popular, and when through Constantine I. the Empire became nominally Christian, it was but natural that the Emperor, urged on, doubtless, by his mother, determined to rescue the holy sepulchre from oblivion and disgrace. What guided Constantine in selecting this spot was, without doubt, the tradition already current. On removing the accumulated rubbish, the workmen came upon a rock tomb. So astonishing was this coincidence that it was counted as simply miraculous that the precious grave, so long hidden away, should at last have come to light. Legends soon began to multiply—e.g. that Helena, Constantine's mother, miraculously discovered the true cross near by, of which Eusebius, the contemporary

and well-informed witness, says nothing. (See CROSS, INVENTION OF THE.) Constantine now built here a magnificent church. Over the grave was erected a beautiful gilded dome open to the sky, supported by columns and surrounded by a wall, the inside diameter being about 65 feet. From the rotunda eastward extended the basilica, 250 feet in length, with its nave and two aisles, the nave ending in a semicircular choir. Still further to the east, connected with the basilica by three gateways, was the atrium, surrounded with colonnades and containing basins for the customary ablutions. From the atrium three gates led out into the propylæum, which connected the whole edifice with the market street to the east. The entire length of the church or cathedral so constructed was about 475 feet. It was due, doubtless, to the necessities of the situation that the propylæum and atrium were to the east rather than, as usual, west of the basilica. In the south aisle, a knob of the native rock, with a cleft in it (the grave of Adam, according to legend), rose a few feet above the level of the floor, inclosed within a silver fence. This was supposed to be the rock in which the cross was set—i.e. Golgotha proper. In A.D. 336, ten years after its foundation, Constantine's church was dedicated by the Synod of Tyre. For nearly three hundred years the edifice remained intact, famed for its beauty, one of the chief attractions for the numerous pilgrims constantly visiting Jerusalem. During this period legends grew apace, and numerous miraculous events were associated with the locality. In 614 the church was destroyed, at least partially, by the Persians under Chosroes II. Steps were taken at once by Modestus, acting Bishop of Jerusalem, to rebuild the edifice, and after ten years' labor (616-26) the work was completed. The new buildings were not of the same plan or dimensions or beauty as their predecessor. The rotunda was rebuilt as a separate church—of the Resurrection—and on the site of the large basilica of Constantine a smaller one, the Martyrium, over the place where the cross was said to have been found, was erected. Southeast of the rotunda a new church in honor of the Virgin was built, while over Golgotha, now outside of the basilica, a chapel was placed. These edifices remained, with occasional damage and consequent repairs, until their destruction by Hakim, Caliph of Egypt, in 1010. With the assistance of the Byzantine Emperor they were restored in 1048, with some changes of plan. In 1140 the Crusaders began a general rebuilding of all the edifices on a larger scale. The new church was dedicated July 15, 1149, but not completed until 1168. The Church of the Crusaders was destroyed in 1244, but again rebuilt (c.1300). Extensive alterations and improvements took place in 1555 and 1719. In 1808 the rotunda was burned and much other damage done to the western buildings. The restoration, the work of the Greeks and Armenians, was completed in 1810. Since that time, with the exception of the renewal of the dome in 1868 by Napoleon III. and Alexander II. of Russia, the buildings have undergone no serious alteration.

For plan of the present buildings, with extended descriptions, consult Baedeker's *Palestine and Syria* (Leipzig, 1898); for the plan and extent of the buildings of Constantine, Mommert, *Die heilige Grabeskirche zu Jerusalem in ihrem ursprünglichen Zustande* (Leipzig, 1898); for the best bibliography, Guthe's article in the Hauck-Herzog *Realencyklopädie* (Leipzig, 1899).

HOLY SEPULCHRE, KNIGHTS OF THE. An order of knighthood instituted, probably by Pope Alexander VI., for the guardianship of the Holy Sepulchre, and the relief and protection of pilgrims. The Pope was originally the grand master, but he subsequently ceded his rights to the Guardian Father of the Holy Sepulchre at Jerusalem. The knights were held to strict rules of honor, faith, and purity, but in return they had the most unusual and extraordinary privileges conferred on them. They were exempt from taxation, could marry, could, as an organization, possess property, could legitimatize bastards, and could cut down and bury the bodies of criminals who had been hanged. After a temporary union with the Hospitalers, the order was reconstructed in 1814, both in France and in Poland, and is still in existence, its members being chosen by the Guardian of the Holy Sepulchre out of noble and devout pilgrims. The badge of the order consists of a cross potent of red enamel, with four similar smaller crosses between its arms, surmounted by a crown and held by a black ribbon. The collar is made up of small crosses like the badge.

HOLY SPIRIT. See HOLY GHOST.

HOLY SPIRIT PLANT, or **DOVE PLANT.** Names given to a species of orchid, *Peristeria elata*, found in Central America, especially in the vicinity of Panama. It is an epiphytic orchid, with large, striated green pseudobulbs, which bear three to five lanceolate leaves, often a yard long and six inches across. The flower-stem springs from the base of the pseudobulbs, and is four to six feet high, a third of its height bearing creamy-white, fragrant flowers, an inch or more in diameter, the inner part of which is often tinged with crimson or other shades of red. The name is derived from the shape of the united column of style and stamens. This column resembles a conventional dove hovering with expanded wings in the vase formed by the petals. It is used in religious festivals in Central America as symbolical of the Holy Spirit; hence its name, 'el spirito santo.' See ORCHID.

HOLY STONE. A miraculous rock at Ardmore, Ireland, which is said to have floated from Rome with robes, a bell, and a lighted taper for Saint Patrick.

HOLYSTONE. A piece of soft stone, usually sandstone, used in scrubbing decks. To holystone a deck is to scrub it, using holystones. Holystones are smooth on one side at least, and have a small depression on the other to receive the end of a handle or stick by which they are pushed back and forth. To increase the scrubbing power of the stones, the decks are wetted and sand is sprinkled over them prior to holystoning. The derivation of the term is supposed to be from the fact that holystoning used chiefly to be done on Saturday as a preparation for Sunday inspection, church, etc.

HOLY THURSDAY. See ASCENSION DAY; HOLY WEEK.

HOLY WAR, THE. (1) The first of Thomas Fuller's historical writings (1639). It is a history of the Crusades, and very popular up to the time of the Restoration. (2) A religious allegory, explained on the title-pages as "made

by Shaddai upon Diabolus," by John Bunyan (1682).

HOLY WATER (Lat. *aqua benedicta*). Water blessed by a priest for religious uses, and employed in the Roman Catholic and Oriental churches. In most ancient religions, the use of lustral or purifying water not only formed part of the public worship, but also entered largely into the personal acts of sanctification prescribed to individuals. The Jewish law contained many provisions to the same effect; and Christ, by establishing baptism with water as the necessary form of initiation into the religion instituted by Him, gave His sanction to the use. The usage of sprinkling the hands and face with water before entering the sanctuary, which was prescribed in the Jewish law, was retained, or at least very early adopted, in the Christian Church. It is expressly mentioned by Tertullian in the end of the second century. And that the water so employed was blessed by the priests we learn from Saint Jerome, and from the Apostolic Constitutions, which contain a formula for the purpose. That now given in the Roman missal and ritual has been preserved unaltered from the sacramentary of Saint Gregory. It includes an exorcism (q.v.) and the admixture of salt which has been blessed. The water so prepared is sprinkled by the priest on the congregation before high mass (this rite being called the *Asperges*, from the first word of the anthem which is sung during its progress), and is publicly employed as part of the rites for funerals and for the blessing of various objects and persons; that used in the consecration (q.v.) is prepared in a special manner. The ordinary holy water is also used privately by devout Roman Catholics on entering and leaving the church, and at other times. It is considered by them as included among sacramentals (q.v.). Although it is difficult to fix the precise time, it cannot be doubted that the practice of mingling salt with the water is of very ancient origin.

HOLY WATER VASE, or STOUP. A receptacle, known in France as *bénitier*, for holy water, placed at the entrance of Roman Catholic churches, so that those who come in or go out may dip their fingers in it and cross themselves. It is frequently in the form of a shell and usually attached to the wall. The kind of a vessel known as *pila* in Italy stands on a base of its own.

HOLY WEEK. The week immediately preceding Easter, and especially consecrated to the commemoration of the passion of Christ. In the Roman Catholic Church, the special characteristics of the celebration of the Holy Week are increased solemnity and gloom, penitential rigor, and mourning. If any of the ordinary Church festivals fall therein, it is transferred till after Easter. All instrumental music is suspended in the churches, the altars are stripped of their ornaments, the pictures and statues are veiled from public sight; manual labor, although it is no longer entirely prohibited, is by many persons voluntarily suspended; the rigor of fasting is redoubled, and alms-deeds and other works of mercy sedulously enjoined and practiced. All Church services of the week, moreover, breathe the spirit of mourning, some of them being specially devoted to the commemoration of particular scenes in the passion.

Palm Sunday commemorates the triumphal entry of Christ into Jerusalem, and is observed by the blessing of palm branches, which are carried in the procession as they were by the people of Jerusalem on that day. Spy Wednesday is the old English name for the day which commemorates the betrayal of Christ by Judas. Holy Thursday (also called Maundy Thursday) is the commemoration of the Last Supper and the institution of the Eucharist. With this in mind, white vestments are worn at the mass (only one mass is celebrated on this day), after which the altars are solemnly stripped and washed by the clergy. (See also FOOT-WASHING.) The matins of the last three days, generally sung on the preceding evening (see TENEBRÆ), constitute an impressive service. On Good Friday the mass is not celebrated, the day being the commemoration of the one sacrifice of the great High Priest; but a special service is held, called the 'mass of the presanctified,' including the communion of the priest from the host reserved from the previous day on the 'altar of repose.' (For the ceremony of the 'adoration of the cross,' see CROSS.) Holy Saturday was in the earliest times set aside for the solemn administration of baptism and orders; the present services of the day begin to partake of the gladness of Easter (q.v.). In the Anglican communion the observance of the week in a similar spirit is prescribed, and the Scripture selections all have a bearing upon the events commemorated. Good Friday is a legal holiday in England and Ireland, and its observance is largely increasing, even among the non-liturgical denominations throughout the English-speaking world.

HOLYWELL, hō'lī-wĕl. A municipal and Parliamentary borough and market-town in Flintshire, North Wales, 4½ miles northwest of Flint (Map: England, C 3). It has limestone quarries, coal and lead mines, and numerous establishments for smelting, manufacturing shot, zinc, etc. There are also manufactures of cottons, flannels, and galloons, paper, and Roman cement. Holywell owes its origin to the renowned well of Saint Winifred, which is said to be the most copious spring in Britain. Its waters were believed to be efficacious in curing diseases, and are still resorted to by Roman Catholic pilgrims. The well is covered by a fine Perpendicular chapel attributed to Margaret, mother of Henry VII. In the vicinity are remains of the old Saxon Abbey of Basingwerk, and in the town is Saint Buenos College for Roman Catholic priests. Population, in 1891, 2894; in 1901, 2652.

HOLZ, hôlts, ARNO (1863—). A German poet and critic, born at Rastenburg. Before he was nineteen he was engaged in journalism, and in 1882 published a volume of poems, *Klinginshere*, which won the Augsburg Schiller Prize. In a second volume, *Deutsche Weisen* (1884), written with Jerschke, and in the *Buch der Zeit* (1885 and 1892), his extremely modern tendency appears, and the attention to details and the attempt at photographic realism is carried even further in *Neue Gleise* (1892), in which he collaborated with Johannes Schlaf (q.v.). His realistic theory is further illustrated in the plays *Socialaristokraten* (1896) and *Die Blechschmiede* (1902), the latter a satiric dialogue, and is defended by Holz in *Die Kunst* (1891 et seq.), and *Revolution der Lyrik* (1899).

HOLZBAUER, hôlts'bou'ĕr, IGNAZ (1711-83). An Austrian composer, born in Vienna. Despite the opposition of his parents, who intended him for the law, he studied music, and in 1745 became kapellmeister to Count Rottal and at the Court Theatre of Vienna. He was later kapellmeister at Stuttgart and at Mannheim. He spent much of his time in Italy, where most of his operas were produced. They were popular, and include: *Il figlio delle selve* (1735); *Alessandro nell' Indie* (1759); and *La clemenza di Tito* (1780). He composed, in addition, a great quantity of Church music, and excellent concertos, string quartets, and 196 symphonies. He died at Mannheim.

HOLZSCHUH, hôlts'shōō, DIETRICH. A German pretender, also called TILE KOLUP. He laid claim to the throne as Frederick II., who died in 1250. In Cologne (1284) his claim was ridiculed, he was ducked in a sewer, and driven from the city. At Neuss he fared better, and in 1285 went to Wetzlar and there held court; but on the approach of Rudolf he was turned over to the King and was burned as a traitor (1285). Consult: Meyer, *Tile Kolup* (Wetzlar, 1868), and Petri, "Der falsche Friedrich," in vol. ii. of *Zeitschrift des Bergeschen Geschichtsvereins* (Bonn, 1864).

HOMAGE (from OF. *homage, hommage,* Fr. *hommage,* Prov. *homenatge, homenage,* from ML. *hominaticum,* homage, from Lat. *homo,* man). In feudal law, the formal acknowledgment of the service which the vassal owed his lord. The form was ordinarily as follows: The vassal knelt before his lord, placed his hands between his lord's hands, and declared himself the lord's vassal for his fief. The lord then gave him a kiss and raised him from his knees. Homage and fealty (q.v.) were usually parts of the same ceremony, but were not synonymous. Consult Luchaire, *Manuel des institutions françaises* (Paris, 1892). See FEUDALISM.

HOMAGE ANCESTRAL. An ancient form of English land tenure of a privileged character. It was a form of the tenure of free and common socage (q.v.) and existed "where time out of mind a man and his ancestors had held by homage" only, in lieu of all other services. The alienation of an estate held by homage ancestral converted it into an ordinary socage tenure by homage, and freed it from the peculiar privileges which attached to it by virtue of its ancestral character.

HOM'ALONO'TUS (Neo-Lat., from Gk. ὁμαλός, *homalos,* level + νῶτον, *nōton,* back). A genus of fossil trilobites of large size, found in the Silurian and Devonian rocks, and characterized by the absence of trilobation of the thoracic segments. See TRILOBITES.

HOM'ALOP'SIDÆ. See HERPETON.

HOMAT'ROPINE (from Gk. ὁμός, *homos,* same + Eng. *atropine,* from Neo-Lat. *atropina,* from *Atropa,* deadly nightshade, from Gk. Ἄτροπος, *Atropos,* name of one of the Fates, the inflexible, from *a, a,* not + τρόπος, *tropos,* a turning, from τρέπειν, *trepein,* to turn). A by-product in the manufacture of atropine, used chiefly in preparing the eye for examination. For this purpose the hydrobromate, which is freely soluble in water, is employed. Its action is similar to that of atropine, but less powerful and less prolonged. The dilatation of the pupil passes off in from 24 to 36 hours, while that resulting from atropine lasts several days. Homatropine is often combined with cocaine when used for dilating the pupils. For internal use it is inferior to atropine.

HOMBURG VOR DER HÖHE, hôm'bōōrk fôr dĕr hē'e. A fashionable watering-place, largely frequented by English, in the Prussian Province of Hesse-Nassau, situated at the foot of the Taunus Mountains, 11 miles northwest of Frankfort (Map: Germany, C 3). It has an old castle which formerly belonged to the landgraves of Hesse-Homburg, and is now used by the Prussian royal family. The landgraves resided here from 1622 to 1866. The elaborate Kurhaus contains a museum of antiquities. The splendid gambling resort here was closed in 1872. The chief mineral spring is the Elisabeth-Brunnen, the water of which is very rich in salts, and is extensively exported. Other springs are rich in iron, and the waters of several of the springs are only used for bathing. The annual number of guests exceeds 12,000. Homburg has some manufactures of machinery and soap. Population, in 1900, 9635. The environs are delightful. Remarkable remains of extensive Roman intrenchments are to be seen in the vicinity.

HOME, DANIEL DUNGLAS (1833-86). A Scotch spiritualist medium, born near Edinburgh. He was descended on his mother's side from a Highland family noted for its gift of 'second sight.' When a child he was brought to the United States, and before he was twenty he was widely known as a medium. On the testimony of William Cullen Bryant, Professor Wells of Harvard, and other well-known men, it is recorded that knocking on the walls, the sliding about of the furniture, and the 'levitation' of the medium himself in the air occurred without the slightest recourse to trickery so far as they could observe. When he returned to England in 1856, his séances were attended by many prominent people, including Robert Browning and his wife. Mrs. Browning is said to have believed in spiritualism, but her husband disbelieved, and was inspired to write *Mr. Sludge, the Medium.* In 1856 Home became a Catholic while at Rome; but in 1864 was expelled from the city as a sorcerer. Dr. Robert Chambers and Dr. Lockhart Robertson were among his converts, and a number of scientists were convinced of the genuineness of his powers, including Sir William Crookes, who published an account of the experiments made with him, entitled *Researches in the Phenomena of Spiritualism* (1874). In 1866 Home became secretary of the Spiritual Athenæum, for the propagation of spiritualism. He instituted a vigorous campaign against professional mediums and scrupulously abstained from taking money at his séances. He published *Incidents in My Life* (2 vols., 1863-72), and *Lights and Shadows of Spiritualism* (1877). Consult: Madame Home, *D. D. Home: His Life and Mission* (London, 1888), and *The Gift of D. D. Home* (ib., 1890).

HOME, Sir EVERARD (1756-1832). An English surgeon, born at Hull, the son of an army surgeon. He studied at Westminster School, and in 1773 resigned a scholarship in Trinity College, Cambridge, to study under John Hunter (q.v.), who married Home's sister. Home was long connected with the College of Surgeons, was its pro-

fessor of anatomy and surgery, later master, and in 1821 its first president. It seems impossible to free Home from censure for burning Hunter's valuable manuscripts, of which he was custodian, or from the charge of using them in his work on *Comparative Anatomy* (1814-23), which gains what value it has from that fact. Among Home's other writings are: *The Properties of Pus*, which won a gold medal from the Lyceum Medicum Londinense (1788); a biographical notice of Hunter, prefixed to Hunter *On Blood, Inflammation, and Gunshot Wounds* (1794); *Practical Observations on the Treatment of Strictures in the Urethra and Œsophagus* (1795); *Observations on the Treatment of Ulcers on the Legs* (2d ed. 1801); *Practical Observations on the Diseases of the Prostate Gland* (1811-18); and *On the Formation of Tumors* (1830).

HOME, HENRY, Lord KAMES (1696-1782). A Scottish judge and author, born at Kames. He entered the bar in 1724, was raised to the bench in 1752, with the title of Lord Kames, and was made one of the lords of judiciary in 1763. As a coarse but able judge, he is mentioned by Scott in *Redgauntlet* (ch. i.). In 1728 he published *Remarkable Decisions of the Court of Session from 1716 to 1728*. The materials for this work were in 1741 embodied in his *Dictionary of the Decisions of the Court of Session* during its whole history. He is best known, however, by *Essays on the Principles of Morality and Natural Religion* (1751), containing a solution of the question of human freedom, which brought on him the suspicion of infidelity; *Introduction to the Art of Thinking* (1761); and, above all, the celebrated *Elements of Criticism* (1762), the work on which his fame now chiefly rests. In 1774 appeared his *Sketches of the History of Man*. While thus occupied with judicial and literary labors, he took a very active interest in agriculture, writing a useful tract entitled *The Gentleman Farmer, Being an Attempt to Improve Agriculture by Subjecting It to the Test of Rational Principles* (1776). His last work, *Loose Thoughts on Education* (1781), was written in his eighty-fifth year. Consult Lord Woodhouselee (A. F. Tytler), *Memoirs of the Life and Writings of Home* (Edinburgh, 1807).

HOME, JOHN (1722-1808). A Scottish dramatist, born at Leith. He was educated at the University of Edinburgh, and prepared for the Church. During the uprising of 1745 he fought as volunteer on the Hanoverian side. In 1747 he became minister of Athelstaneford, in East Lothian, where he wrote his famous tragedy of *Douglas*. Performed at Edinburgh in 1756, and at London in 1757, it was received with enthusiasm. For his plot Home used the popular Scottish ballad of *Childe Maurice*, and in a less degree Shakespeare's *Othello*. The play, though turgid in diction, has great merits. It was the best English tragedy since Otway. The clergy of the Scottish Kirk, opposed to the theatre on principle, were scandalized by the production. After a bitter controversy Home resigned his charge (1757). He became secretary to Lord Bute, tutor to the Prince of Wales (afterwards George III.), and received liberal pensions. In 1770 he married and returned to East Lothian, and after a time settled in Edinburgh. Besides *Douglas*, Home wrote other plays, which either failed or met with moderate success. Among them are: *Agis*, *Aquileia*, *Fatal Discovery*, *Alonzo*, and *Alfred*. He also wrote a *History of the Rebellion of 1745*. Consult *Works*, with memoir by Henry Mackenzie (Edinburgh, 1822); and for *Douglas* alone, Wilson, *Poets and Poetry of Scotland* (London, 1875).

HOME AS FOUND. A novel by J. Fenimore Cooper (1838). It is a sequel to *Homeward Bound*, and, like it, is a criticism of American social conditions.

HO'MER. A city and the parish-seat of Claiborne Parish, La., 50 miles east by north of Shreveport; on the Louisiana and Northwest Railroad. It is the commercial centre for a productive cotton-growing district (Map: Louisiana, C 1). Population, in 1890, 1132; in 1900, 1157.

HOMER (Lat., from Gk. Ὅμηρος). A name for the early epic poetry of Greece. The less critical of the ancients attributed to Homer many minor poems, as the *Hymns*, the *Margites*, the late *Batrachomyomachia* (Battle of the Frogs and Mice), and many of the lost so-called Cyclic Epics, dealing with the early legends. To the more thoughtful he was the author of the *Iliad* and the *Odyssey*. The skeptical 'separators' (chorizontes) denied him the *Odyssey*. To us he is the unknown poet who chiefly shaped the *Iliad* and possibly the *Odyssey*. His date is placed by Herodotus about B.C. 850; by the moderns, anywhere from 900 to 1100. At any rate, he is the first name in European literature. The *Iliad* is an episode in the legendary siege of Troy, or Ilium, a real town of which Schliemann has excavated the remains at Hissarlik, a hillock in Northwestern Asia Minor. This siege is probably an idealization of the prolonged struggles of Achæan and Æolian invaders from Greece with the old (Phrygian?) possessors of the soil. In the legend it is undertaken to recover the beautiful Helen, wife of King Menelaus of Sparta, who had eloped with Paris, son of King Priam of Troy. In the tenth year of the war Achilles, the Achæan (Thessalian) hero, quarrels with the commander-in chief, Agamemnon, King of Mycenæ, about a captive girl, Briseïs, and sulks in his tent, to the great loss of the Greeks, until aroused by the death of his dearest friend Patroclus. Then he hurls himself into the battle again and slays the slayer, Hector, the chief bulwark of Troy, with whose solemn burial the poem concludes.

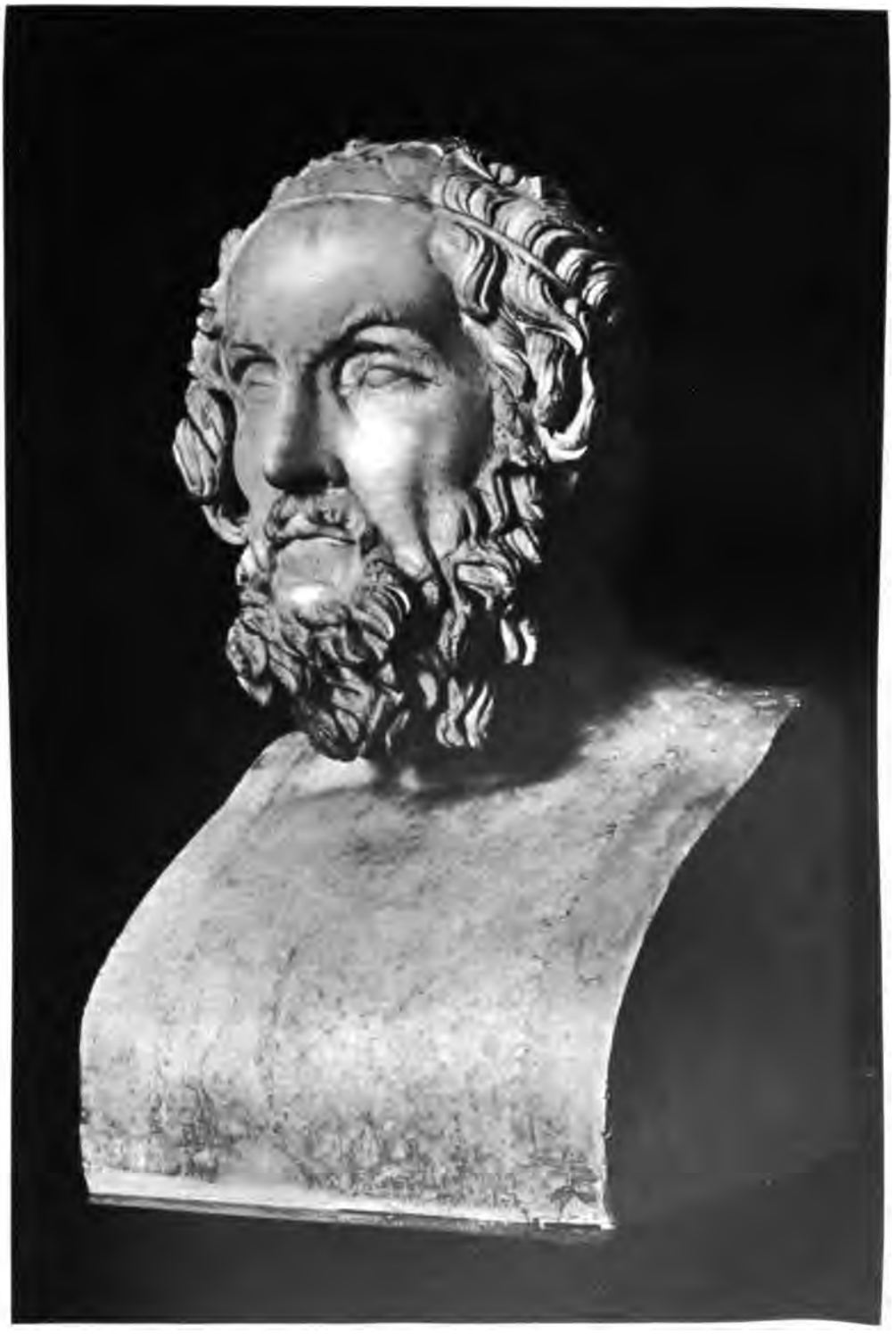
The *Odyssey* relates, likewise in twenty-four books, the surprising experiences of Odysseus after the ten years' siege of Troy, wandering for ten years more, yearning to see the rocky isle of Ithaca. Underplots describe the life of his faithful wife, Penelope, persecuted by the importunate wooing of rude suitors, and the adventures of his son, Telemachus, who in the tenth year goes forth in search of his father. In the end, Odysseus returns, joins Telemachus, slays the suitors, and is at last recognized by Penelope. A literature does not thus begin with two long artistic and skillfully constructed epics. We must assume behind the *Iliad* shorter epic ballads such as the bard Phemius in the *Odyssey* chants to the suitors, and Demodocus recites at the Phæacian Court, hymns to the gods, and songs of the 'glory of men,' such as Achilles, idle in his tent, sings to the music of a lyre won from the spoils of a captive town. The systematic mythology of the poems, the number of

clearly defined personalities which they present, the profusion of detail about things and persons and places, their literary art, poetical diction, and mastery of the hexameter—all these things presuppose a long historical and literary development. But of this we know nothing except by analogy and inference from the poems themselves. The manifestly spurious ancient 'lives' are fictions, in many cases fashioned from minor poems attributed to 'Homer.' Homer, they tell us, was born of the nymph Critheis and the river Meles (at Smyrna), and hence called Melesigenes. The name 'Homer' was variously derived from the Greek word for hostage, because he was a hostage in youth, or from a dialectic word for blind, because he lost his sight. Homer, the 'Lives' continue, wandered from city to city of Asia Minor earning his bread by reciting his poetry or by 'teaching,' and immortalized by name in his poems many of those who treated him kindly. Some poems he actually gave to others who won fame by them—to Stasinus of Cyprus, e.g. he gave as his daughter's dowry the *Cypria*, one of the so-called Cyclic Epics, of which only a few fragments remain. He died, as an oracle had foretold, through chagrin at his inability to read the riddle of the fishermen: "What we caught we left, what we caught not we bring," which referred not to fishes, but to an animal more 'familiar to man.' After his death, "Seven cities claimed the mighty Homer dead, where living Homer begged his daily bread."

All this and much more is fable. Modern scholars ask, rather: What is the origin of epic poetry in Greece? Can we detect in the *Iliad* traces of the ballads or shorter lays out of which we may conceive it to have been composed? Can we break up the *Iliad* into two chief groups of lays—the wrath of Achilles proper, and the general picture of the siege of Troy, by which this original framework was enlarged? What features of style, language, and manners mark the *Odyssey* as later than the *Iliad*? What parts of the *Iliad* most resemble the *Odyssey* in these features? Can we dissect the *Odyssey* into a 'return of Odysseus' and a 'Telemachiad'? Was the 'story of Achilles' originally composed in Thessaly in the Æolic dialect, then transferred to the scene of the struggles of early Greek colonists in Northwestern Asia Minor, and finally Ionicized, enlarged, embellished, and chanted by minstrels in the halls of Ionian nobles and merchant princes on the Lydian coast? Does the *Odyssey* reflect the travelers' tales brought back to Ionian seaports by the first navigators of the Euxine and the Mediterranean? What is the precise relation of the life depicted by Homer to the traditional legend of early Greek history on the one hand, and on the other to the apparently similar civilization revealed at Troy, Mycenæ, and Tiryns by the spade of Schliemann, and conjecturally carried back to the third millennium B.C. by recent discoveries in Crete?

These questions are debated by specialists, but with little unanimity of result. Meanwhile the *Iliad* and the *Odyssey* abide. They may be studied: (1) As a picture of early Greek life; (2) as literature; (3) in their historic influence.

Homer is the most objective of poets. In him mind has not yet been turned back upon itself. It is a mirror of the world. If the heroes dine, the ox is consecrated to the gods, slain, cut up, roasted, carved, and served up in our presence. We assist at all the details of the hero's toilet, or of his arming for battle. Homer does not enumerate the parts of a ship or a bed; but he shows us Odysseus building the craft that is to bear him away from the isle of Calypso, or the bed whose secret reveals his identity to Penelope. We watch every step in the launching of the vessel that bears Chryseïs back to her father. We are not merely told that the ox sacrificed by Nestor has gold-tipped horns; we see the goldsmith come with the tools of his craft to lay on the gold. In consequence, we know the life of the Homeric man more intimately than that of any other primitive people—than that of the Hebrews or of our own Teutonic ancestors. This lore has been collected in three huge double volumes of Homeric 'Realien,' or real things, by the German Buchholz, and every history of Greece contains its chapter on early Greek life, religion, government, and manners, drawn from the same source. And this wealth of concrete detail is a striking, if not the chief, literary quality of Homeric poetry. Homer does not "beat in the void his luminous wings in vain." He does not analyze and refine. He is not dominated by any one great unifying religious or patriotic idea, like Vergil or Dante or Milton. He does not delay to moralize or reflect except in brief pregnant sentences. He flows on and on in a broad, pellucid stream of narrative, description, and, above all, action. "The multitude of things in Homer is wonderful" (says Hazlitt)—"the splendor, the truth, the power, the variety." The great gods of Homer—Zeus, Apollo, Athena, Hera, Poseidon—have remained for 3000 years as ideal types for all subsequent poetry and sculpture. His personages—Achilles, Hector, Nestor, Odysseus, Helen, Andromache, Penelope, Nausicaa—live for the imagination to-day as no others save those of Shakespeare's greatest tragedies. The berserker battle rage and impassioned eloquence of Achilles still stir the sluggish blood like wine. The great pathetic or dramatic episodes—the parting of Hector and Andromache, the death of Sarpedon, the horses of Achilles mourning for Patroclus, Hecuba baring her bosom to her son from the walls of Troy, the dirges for Hector—are still the despair of imitators. The *Odyssey* is yet the most interesting story-book in the world. In short, the Homeric poems are still, as Matthew Arnold said, "the most important poetical monument existing." The most distinctive literary quality of that poetry is due to its intermediate position between the literary epic, as *Paradise Lost*, and the supposedly spontaneous popular epic, as the *Edda*, the *Kalewala*, or the *Chanson de Roland*. It has all the simple, childlike charm of the one, all the lucidity, architectonic order, and noble diction of the other. The primitive feelings still preserve their freshness and force, but they appeal to us through the medium of a noble and dignified art. But though an artist, and perhaps a conscious artist, the Homeric poet is not like his successors, Apollonius of Rhodes, Vergil, Tasso, Milton, conscious of an inimitable model, of a long line of predecessors, and of a code of critic-formed rules. Matthew Arnold's four canons of Homeric style are well known: Homer, he says, is rapid, plain, and direct in syntax and words, plain and direct in matter and ideas, and yet withal eminently noble—a master of the grand style in simplicity. There is space only to mention some minor traits:



HOMER

FROM AN ANTIQUE BUST IN THE LOUVRE, PARIS

(1) The stereotyped epithets, 'cloud-compelling Zeus,' the 'wine-dark' or 'unharvested' sea, the 'rosy-fingered dawn,' 'the swift-footed Achilles,' the 'red-cheeked ships;' (2) the peculiar Homeric simile which, suggested by one point of resemblance, is continued for the sake of the picture into details where the likeness ceases. It is cleverly imitated by Matthew Arnold in *Sohrab and Rustum*. There are nearly 200 such similes in the *Iliad*, many of them containing precious detail about Homeric life. Those drawn from lions and the chase are particularly vigorous. To the Greek, Homer was Bible, Shakespeare, Milton, and Domesday Book in one. Later forms of poetry were looked upon as evolutions or borrowings from Homer. He was the foundation of education, and many cultiyated Greeks knew the *Iliad* by heart. Even in the prime of the Attic drama professional rhapsodists recited the *Iliad* and *Odyssey* to enthusiastic audiences of thousands. Ethical reflection took its first texts from Homer, and was largely occupied in the criticism of the conduct and character of his personages. Purer religious ideas presented themselves in the form of a censure by Plato and Xenophanes of Homeric anthropomorphism, and the allegorical interpretation of literature was invented as a reconciliation. The first beginnings of literary and linguistic criticism among the Greek sophists attached themselves to Homeric problems. Lexicography probably originated in books of Homeric glosses. The conception of text criticism arose in the effort to establish a sound Homeric text. And the critical science of the great Alexandrian scholars, Zenodotus, Aristophanes of Byzantium, and Aristarchus, had its origin and achieved its greatest triumphs in the study of Homer.

It is in the modern world that the famous Homeric Question begins, if we ignore slight anticipations by Bentley and Vico, with Wolf's Latin *Prolegomena*, published in 1795. This was partly called forth by the recent publication of the Venetian scholia, which revealed how much the true text had been debated by the critics of antiquity. Wolf also collected stray notices in ancient authors to the effect that Solon or Hipparchus required the rhapsodists to recite Homer in due succession or from prompting, and that Pisistratus first reduced the scattered poems of Homer into one body. He inferred that the *Iliad* and the *Odyssey* were not originally composed as we have them, but were put together out of preexisting materials. He confirmed this view by the argument (now refuted by facts) that writing was unknown, or at least rare, in early Greece, and that a long epic could not have been composed without writing. Since Wolf's time, Lachmann, Hermann, Nitzsch, Grote, Christ, and a host of others have elaborated theories of the composition of the *Iliad*. The debate between the partisans of lays stitched together and an original framework expanded and interpolated often degenerated into a logomachy. The tendency now is toward the second hypothesis. Proof is in the nature of things unattainable.

The imitation of Homer through Vergil by Tasso, Camões, and Milton is too large a theme for our space. The critics of the seventeenth and eighteenth centuries elaborated rules for the correct epic which have been entertainingly parodied by Macaulay in his prophetic account of the 'Wellingtoniad.' Pope's translation (about 1720) long remained a classic and the model of poetical diction. It of course failed to satisfy the taste of the romantic revival at the end of the century, or to meet the demands of the new scholarship born about the same time in Germany. Many attempts have been made to supersede it in popular favor; but, despite its artificial rhetoric, it still remains for the majority of English-speaking readers the one poetical translation of Homer. The early versions of Hobbes and Ogilby are of interest only to professional students of literature. Chapman is praised on the faith of Keats's noble sonnet, and because of occasional spirited passages and exquisite lines. But the rugged rhythms, the obscurity of the syntax, the fantastic Elizabethan conceits, and the long uninspired tracts of doggerel make him intolerable in continuous perusal. Cowper, in his blank-verse version, aimed at uniting Miltonic stateliness with fidelity to Homeric simplicity, but succeeded only in being pompous and dull. Since the publication of Matthew Arnold's classic lectures *On Translating Homer*, we have had, among others, the estimable blank-verse translations of Lord Derby and of Bryant, and Way's spirited rendering in rhymed anapæstic hexameter. No definitive translation of Homer is possible, for every generation must reinterpret him in order to blend Homeric sentiment with its own in the measure demanded by its taste. Of late the majority of readers prefer the literal prose versions in the slightly archaic and consciously simple English of Lang, Leaf, and Myers (*Iliad*), and Butcher and Lang (*Odyssey*).

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Good text editions are those of Dindorf-Hentze and Caner. A good annotated (English) edition of the *Iliad* is that of Leaf (London, 1888), and of the *Odyssey* that of Hayman (London, 1882). The fullest Homeric lexicon is the *Lexicon Homericum* of Ebeling (Leipzig, 1885), or in English the Homeric Dictionary, by Keep-Autenrieth (New York, 1891). For the general study of Homeric antiquities, consult: Buchholz, *Homerische Realien* (2d ed., 3 vols., Leipzig, 1887); Helbig, *Das Homerische Epos* (Leipzig, 1887); and Anderson-Engelmann, *Pictorial Atlas to Homer* (New York, 1892). See EPIC POETRY; GREEK LITERATURE.

HOMER, APOTHEOSIS OF. A celebrated relief containing many figures, now in the British Museum. It was found in the Appian Way in the seventeenth century, and probably dates from the first century A.D.

HOMER, WINSLOW (1836—). An American painter, born in Boston. He had been in a lithographer's shop in Cambridge, and contributed sketches to magazines, before he became a pupil in the National Academy of Design, at the same time taking lessons from Frederic Rondel. During the Civil War he was special artist for *Harper's Weekly*. He went to New York in 1859, and in 1864 exhibited his first large picture, "Prisoners from the Front." The following year he was made an academician. Afterwards he settled in Scarboro, Maine. Between the years 1864

and 1884 he produced a number of genre subjects, usually taken from American life, such as "Home, Sweet Home," "Cotton Pickers," "In the Field," and "A Visit from the Old Mistress." All these show his independent realism and vigorous individuality. He began his sea pictures with the "Life Line" (1884). The series includes: "Eight Bells," "Danger," "Launching the Boat," "The Tempest," "The Peril of the Sea," and "The Lookout" (1897). They are all essentially dramatic studies of sturdy fisher-folk and 'longshoremen, and prepared the way for the purely marine pictures which he did later. Among these are: "A North Easter," "The Gulf Stream," and, particularly, "The Maine Coast," a magnificent marine of stormy skies, black rocks, and driving spray, which is his masterpiece. The strong color and broad, virile workmanship in Homer's pictures attracted much attention at the Paris Exposition of 1900. He is also an admirable painter in water-color.

HOMERIDES, hō-mĕr'ĭ-dēz, or **HOMERIDÆ** (Lat., from Gk. Ὁμηρίδης, *Homēridēs*, descendant of Homer, from Ὅμηρος, *Homēros*, Homer). The name of a family or clan in the island of Chios, often mentioned; Strabo says that they claimed descent from Homer, and were adduced by the Chians to prove that Homer himself was a Chian. The name Homeridæ, however, is used by Pindar and by others frequently to mean persons who recite the Homeric poems, i.e. rhapsodists; and it is in this sense that the name is commonly used. The Homeridæ of Chios have played a large part in the theories of some scholars as to the transmission of the Homeric poems; but there is no evidence that they were a guild of poets or even of rhapsodists.

HOMER PIGEON RACING. See PIGEON-FLYING.

HOME RULE. A term in British politics, designating the particular movement, begun in 1870, to secure for Ireland a local legislature, and thus recognize and satisfy the persistent sentiment of Irish nationality. The question of Home Rule, ignored by Pitt in the Act of Union of 1800, was revived by O'Connell's agitation for repeal. With the failure in 1848 of that movement, hostility to British rule passed from the field of constitutional exertion to that of violence and revolution. But neither the doctrinaire fiasco of 1848 nor the plots of the Fenians brought any realization of the national aspirations. After twenty troubled years of conspiracy and secret crime, the concession by Gladstone of Church disestablishment and land reform called the thoughts and hopes of the Irish people once more to constitutional activity. In 1870, a year after the Act of Disestablishment was passed, and while Gladstone's first Land Bill was still under discussion in Parliament, the first step was taken in the movement for Home Rule.

On May 19th in that year, there assembled at the Bilton Hotel, Dublin, a number of Irishmen of the better class, representing all shades of political and religious belief. The dominant element was Protestant and Conservative. Discontented with the concessions made by Gladstone's Government, they were ready to consider some plan for taking out of British hands the control of Irish affairs. After free discussion, it was resolved "that the true remedy for the evils of Ireland is the establishment of an Irish Parliament, with full control over our domestic affairs." In accordance with this opinion, a permanent organization was soon afterwards effected, under the name of 'The Home Government Association of Ireland.' Its declaration of principles announced as its only object the obtaining of a distinct Parliament for Ireland, to regulate her internal affairs, while leaving to the Imperial Parliament all questions affecting the colonies, foreign relations, and the stability and defense of the Empire. With this declaration the movement for Home Rule was formally inaugurated.

The history of the Home Rule movement from 1870 to the present time may be divided into four periods: First, the leadership of Isaac Butt (1870-79); second, the merging of Home Rule into the land agitation (1879-86); third, the adoption of the principles by the Gladstonian Liberals (1886-93); and fourth, the Conservative policy of 'killing Home Rule by kindness.'

FIRST PERIOD. This was the time of development and definition. From the outset the Home Rule idea was favorably received among the better classes of the Irish people, though ancient religious antipathies often blocked the way. Among the lower classes—those particularly in which Fenianism had found its chief support—the new form of constitutional agitation was slow to inspire confidence. Under the direction of Isaac Butt, however, who had made himself popular by his legal services in behalf of arrested Fenians, considerable progress was made, and at bye-elections several Home Rulers, including Butt himself, were elected to Parliament. In the fall of 1873 the Home Government Association was replaced by the Irish Home Rule League, a new and more comprehensive organization, whose skillful management secured the return of sixty Home Rulers in the general election of 1874. For the next five years, under the leadership of Isaac Butt, they acted as a distinct party when Home Rule or Irish interests were at stake, but on other questions followed their individual preferences. In fact, during this period, outside of Ireland, there was very little interest in the subject, and English Liberal and English Conservative alike had voted against Butt's annual motion for an Irish Parliament. But an awakening was to come, when Parnell, who entered the Commons in 1875, began to advocate his policy of 'obstruction,' applying it—aided by a little group of followers—to all questions alike, whether Irish, English, or Imperial. In this course he was opposed by Butt and the majority of the party at that time; but through this policy Parnell succeeded in arousing the English people to a discussion of the subject, and in winning, partly perhaps by means of the hatred he excited toward himself on the part of the old British parties, the enthusiastic support of Irishmen to a degree which Butt's milder course had never done.

SECOND PERIOD. Butt died in the spring of 1879. The Home Rule Party chose as his successor William Shaw, whose methods it was known would be those of Butt. But Parnell was the rising man in Irish circles. In this same year, by throwing himself heart and soul into the land agitation, and assuming the presidency of the Land League, he became the idol of the Irish masses. During the four succeeding years Home Rule was entirely overshadowed by the great agrarian issue. The general elections of 1880

showed an increase of the Home Rule delegation in Parliament from 60 to 66. But the extreme views of Parnell and his followers on the land question tended to alienate the moderate element in the party, already disgusted with his Parliamentary tactics. During the desperate struggle made by the Parnellites against the Coercion Bill in January, 1881, Shaw and his followers formally withdrew from the Home Rule Party in Parliament. This action was significant of a great change in the character of the party outside of Parliament. By connecting Home Rule with the land question, Parnell drew to his support a great following which Butt had never won; but he lost the Conservative and aristocratic element, which had practically inaugurated the movement. A Catholic peasantry instead of a Protestant middle class became the chief support of the party. With this absorption of the larger element one end was achieved which has been a source of about equal glory and reproach to Parnell—the physical-force faction, hitherto apathetic, was drawn into the constitutional agitation. The Irish National League, organized October 17, 1882, was the formal expression of the Parnellite policy. Its programme combined essentially the principles of the Home Rule League and those of the recently suppressed Land League. In the elections of 1885 the success of Parnellism was demonstrated. The Nationalists returned 86 members to the House of Commons, and secured the balance of power between the Liberals (333) and the Conservatives (251). Of the 103 members from Ireland, 85 were followers of Parnell.

THIRD PERIOD. With an absolute Liberal majority in Parliament, so skillful a leader as Gladstone had found it almost impossible to transact business in the face of Nationalist obstruction. Now that Parnell held the balance of power, and could displace Ministries at will, the conduct of the Government on any principle known to British practice seemed hopeless. On January 27, 1886, the Nationalists aided the Liberals to overthrow Lord Salisbury's Government, just as in the preceding year they had joined the Conservatives against Mr. Gladstone. The Conservatives now made advances looking to an understanding between the Nationalists and themselves, but without results. On the other hand, Gladstone, after careful consideration and consultation, decided to accept Home Rule as a Liberal principle, so on the 6th of April he brought in his famous Home Rule Bill. In it was embodied the long-sought provision for a distinct legislative body for Ireland, with powers extending to all subjects except those specifically reserved to the Parliament at Westminster. At the same time a sweeping measure for land purchase was announced, with the declaration that the two should be inseparable, together forming a complete scheme for the settlement of the Irish question. Parnell, with certain qualifications, accepted the bill on the part of the Irish Nationalists, and his party threw themselves heartily into alliance with the followers of Gladstone. The question of Home Rule now became one for the people of Great Britain to settle. With the adoption of the Irish demand by Gladstone, a great section of the Liberals declined to follow their old leader. Protesting against anything which looked like a step toward separation of the two islands, they took the name of Liberal Unionists, and ultimately entered into alliance with the Conservatives. Gladstone's bill was defeated on the second reading by 343 to 313, 93 Liberals voting in the negative. Upon the appeal to the constituencies, the adversaries of Home Rule gained a majority of 113 over the combined Gladstonians and Nationalists. Lord Salisbury assumed power with a policy of coercion, with possibly some eventual measure of concession in reference to local government in Ireland. Home Rule remained the most prominent issue throughout the four succeeding years, the Gladstonians expressing confidence in the ultimate support of a British majority, a belief which the bye-elections seemed to justify, as the Liberals gained 16 seats in 99 contests. In the winter of 1890-91 a divorce case in which Parnell was corespondent brought much odium upon him, and raised the question of his retirement from the leadership of his party. Gladstone announced that he could not hope to hold the Liberals to the Nationalist alliance unless Parnell resigned. The latter rejected all suggestions of his own withdrawal, and by his course alienated a large section of his Parliamentary followers. The result was a schism in the Irish Nationalist Party, which made the future success of the Home Rule movement exceedingly doubtful. The death of Parnell, in October, 1891, only served for the moment to intensify the animosity of the Parnellite faction toward the majority of the Home Rulers, who accepted the leadership of Justin McCarthy (q.v.). The elections of July, 1892, resulted in a Liberal majority in the House of Commons of 40, so that Gladstone again became Premier, and in March, 1893, introduced a bill granting Home Rule to Ireland. It provided for an Irish legislative body of two houses, the members of the Upper House to be chosen by electors having a property qualification, and for complete self-government in local matters. The difficult question of Ireland's representation in the Imperial Parliament was first decided in favor of the 'in-and-out' plan—Irish members voting on some questions, not on others—but later in favor of a reduction of its membership in the House of Commons from 103 to 80, giving them the same rights as to other members. The bill passed the Commons September 1st (301 to 267), but was overwhelmingly defeated in the Lords, receiving only 41 votes out of a total of 450. Gladstone resigned in March, 1894, and Lord Rosebery assumed the Premiership, professing adherence to Home Rule, but doing nothing for it during his Ministry, which came to an end in June, 1895.

FOURTH PERIOD. This period opened with the Conservatives in power, the Home Rulers split into cliques and factions, and the Liberals demoralized and lukewarm toward the cause of the Irish Nationalists. The Conservatives, believing that Irish discontent had its source in economic conditions, in poverty and want, passed, under the cry of 'killing Home Rule by kindness,' a land act which simplified the rent problem, provided for land purchase, tended to bring a peasant proprietor class into being, and in general ameliorated economic conditions. In 1898 a Local Government Bill was introduced, and became a law in 1899, which placed county and municipal governments in the hands of the people, with provisions for an almost universal suffrage. In part due to improved conditions, in part due to these reforms, public agitation had almost ceased, and

it seemed as if 'Balfourian amelioration' was on the point of success, when the Boer War broke out. Under the impulse of this war, the warring Irish factions came together, accepted John E. Redmond as a common leader, revived their demand for an Irish Parliament, and in the election of 1900 chose 81 members to the House of Commons to express their cause. Believing that the Local Government Act had already proved the capacity of the Irish people for self-government, asserting that the British Parliament had too much to do to do it well, and insisting on the justness of their cause, Redmond and his 80 followers intend to block legislation whenever they can and whenever it will benefit their cause, until the British people and Parliament are forced to accede to Ireland's demand for Home Rule.

The literature on Home Rule in Ireland is very extensive, and only a few of the best works can be mentioned: McCarthy, *The Case for Home Rule* (London, 1887); O'Brien, *Irish Wrongs and English Remedies* (London, 1887); Chamberlain, *Home Rule and the Irish Question*, speeches, 1881-85 (London, 1887); Dicey, *England's Case Against Home Rule* (London, 1887); Gladstone and others, *Handbook of Home Rule, Being Articles on the Irish Question* (London, 1887); Hurlburt, *Ireland Under Coercion* (2 vols., Boston, 1888); the London *Times*, *Report of the Proceedings of the Special Committee* (4 vols., London, 1890); Gladstone, *Special Aspects of the Irish Question* (London, 1892); Lloyd, *Ireland Under the Land League* (London, 1892); and Pollock, "Home Rule and Imperial Sovereignty," published in *Oxford Lectures and Other Discourses* (London, 1890). There is also an almost unlimited amount of magazine literature.

HOMESPUN, ZEKIEL and CICELY. A brother and sister, in Colman the Younger's comedy *The Heir at Law*. They are simple country people, showing the best traits of their class.

HOMESTEAD (*home*, AS. *hām*, Goth. *haims*, OHG. *heim*, Ger. *Heim;* connected with Lith. *kemas*, Gk. κώμη, *kōmē*, village, Skt. *kṣēma*, abode, from *kṣi*, to dwell + *stead*, AS. *stede*, Goth. *staþs*, OHG. *stat*, Ger. *Statt*, place; ultimately connected with Eng. *stand*). In law, an estate in land, used as a home by the tenant or owner thereof, and to a greater or less extent protected by law from the claims of creditors. This right of exemption of the 'homesteader,' as he is termed, is a modern privilege created by statute and was unknown to the common law. It does not exist in England, but is peculiar to the United States, where it is everywhere recognized, excepting in Rhode Island, Pennsylvania, Delaware, Maryland, and the District of Columbia. It does not constitute a distinct form of estate in land, but belongs to the class of exemptions from the claims of creditors, which, originating in the common law, has been greatly extended by the humane policy of American law. See EXEMPTION.

HOMESTEAD. A borough in Allegheny County, Pa., eight miles southeast of Pittsburg; on the Monongahela River, and on the Pennsylvania and the Pittsburg and Lake Erie railroads (Map: Pennsylvania, B 3). It has one of the largest steel plants in the United States, employing about 6000 men, and producing both structural steel and nickel-steel armor plate. There is a Carnegie library. Settled in 1871, Homestead was incorporated in 1880, the date of the charter now in operation, which provides for a mayor, elected every three years, and a unicameral council, in whose power rests the appointment of chief of police, street commissioner, and water-works engineer. The water-works are owned and operated by the borough. In 1892 Homestead was the scene of a notable strike, which was attended by such rioting as necessitated the interference of State troops. Population, in 1890, 7911; in 1900, 12,554.

HOMESTEAD LAWS. Homestead laws are of two classes: those enacted by Congress and those enacted by State Legislatures. The primary object of the first class is to enable citizens without capital to acquire homes. The main object of the second class is to secure homes, once acquired, against the claims of creditors. Legislation of the first class has done much to stimulate the settlement and improvement of wild, unoccupied land. That of the second class has saved countless families from pauperism.

The Federal homestead laws begin with the Act of 1862, now a part of the United States Revised Statutes (§§2289-2317). Their policy is to give portions of the public lands to those who will settle, cultivate, and make permanent homes upon them. Any person who is the head of a family, or who is twenty-one years of age and is a citizen of the United States, or who has filed his declaration of intention to become such, may acquire a tract of unappropriated public land, not exceeding one hundred and sixty acres, on condition of settlement, cultivation, and continuous occupancy as a home by him for the period of five years, and of the payment of certain moderate fees. It is expressly declared that no lands acquired under this statute shall in any event become liable to the satisfaction of any debt contracted prior to the issuing of the patent therefor by the Government to the settler. This provision was inserted for the purpose of protecting debtors and of inducing them to settle upon the public domain. Its constitutionality was questioned, but was sustained by the courts. It would be difficult to point to any enactment of Congress more wise in conception, just in policy, and beneficial in its results than this homestead statute and its amendments. Under their provisions, more than 85,000,000 acres of unoccupied public lands have been transferred by the United States to homestead settlers. During the fiscal year ending June 30, 1901, the Commissioner of the General Land Office reports that "the original homestead entries, final homestead entries, and commuted homestead entries aggregated 111,390, and embraced 15,455,057.46 acres for actual *bona fide* homes to American settlers."

The term 'original entry' refers to the proceeding by which a person enters a tract of land as his homestead. Its important features are the filing of an affidavit, prescribed by statute, with the register of the land office in which he is about to make the entry, and the payment of a fee of five dollars if his entry is for not more than eighty acres, or of ten dollars if it is for more than that amount. The 'final entry' refers to the proceedings connected with the issue of a certificate of title or patent by the United States to the person making the original entry, or to his widow, heirs, or devisees. Ordinarily the patent does not issue until the expiration of five

years from the date of the original entry, and then only upon furnishing the evidence required by statute of the actual occupancy of the land and its cultivation by the claimant during that period. Provision is made, however, for shortening this term by 'commuting,' that is, paying the minimum Government price for the land. Upon such payment, the homesteader may obtain a patent at any time. It is also provided that the term which a homestead settler served in the United States Army, Navy, or Marine Corps, "during the Rebellion," or in "the Spanish War," or "in suppressing the insurrection in the Philippines" may be deducted from the five years required to perfect his title and to receive a patent for his original entry.

Passing now to State homestead laws, we shall find, as we have already stated, that their object and tenor are quite different from those of the Federal Government. Their aim, it has been judicially declared, "is to provide a place for the family and its surviving members, where they may reside and enjoy the comforts of a home, freed from any anxiety that it may be taken from them against their will, either by reason of their own necessity or improvidence, or from the importunity of their creditors." This policy of protecting citizens and their families from the miseries and demoralizing influences of destitution, of fostering the disposition to improve and to take pride in a permanent homestead, has commended itself to both legislators and judges. The former have enacted laws providing for large exemptions to the homesteader, while the latter have, with few exceptions, construed such laws very liberally in his favor. In most of the States, the benefits of this legislation are confined to families, although in a few commonwealths they are extended to any resident, whether he has a family dependent upon him or not.

State legislation provides three distinct ways in which a homestead may be secured to the family against the debts of its owner. The first method is by a prescribed form of public notice properly executed and recorded. It must contain a statement of the facts showing that the person making it is the head of a family; a statement that such person resides on the land and claims it as a homestead; a description of the land, and an estimate of its actual cash value. The second method is by actual occupancy and use. The third method is by a proceeding in a court of justice. Its principal characteristics are an application to a designated court, a notice to creditors, and a judicial decree setting apart certain property as a homestead.

It is not to be understood that homestead property is exempted from every sort of claim against its owner. As a rule it is subject to debts contracted before the homestead was duly recorded or set apart as such; to the liens of mortgages and judgments which were on the property when it was set apart; to claims for unpaid purchase money for the property, as well as for such improvements to the property as entitle the creditor to a mechanic's lien (q.v.) thereon; and to taxes and assessments for public improvements.

The amount of land which may be exempted under homestead laws varies in the different States. In some the limits are those of acreage, in others those of cash value. The former range ordinarily from 40 to 160 acres; the latter from $500 to $5000. Consult: Thompson, *Homesteads and Exemptions* (San Francisco, 1886); Waples, *Homesteads and Exemptions* (Chicago, 1892).

HOME, SWEET HOME. A popular song by John Howard Payne, in his opera, *Clari, or the Maid of Milan*, first produced in 1823. The music of the song is by the composer of the opera, Sir Henry Bishop, who is said to have adapted it from an old Sicilian air.

HOMEWARD BOUND. A novel by J. Fenimore Cooper (1838). It relates the adventures of passengers on the packet *Montauk*, which was blown out of her course to the coast of Africa.

HOMICIDAL MANIA. The impulse to take life in one mentally disordered. In melancholia, in mania, in general paresis, in paranoia, and other insane conditions, the homicidal impulse is not infrequent. Indeed, in normal mental action the desire to kill is not infrequently present, but is controlled. In the various stages of insanity this control is either diminished, or through hallucinations or delusions, the motive is stronger and uncontrollable, and murder results. It is impossible to determine beforehand whether an insane person will or will not take another's life. Often such an act is apparently the first symptom of the insanity. It is fruitless to generalize concerning such acts; the obvious lesson is that the slightest symptoms of disturbed mental action should be carefully noted and proper precautions taken to prevent accidents. This caution is particularly pertinent in the case of puerperal women in whose family there has been any taint of insanity.

HOMICIDE (OF., Fr. *homicide*, from Lat. *homicidium*, manslaughter, from *homo*, man + *cædere*, to kill). The killing of one human being by the act, procurement, or omission of another. In primitive communities, we find that it does not subject the slayer to criminal prosecution by the State. It is thought of, not as an offense against the common weal, but simply as a wrong to the slain man's kindred; a wrong which they are at liberty to redress by vengeance upon the slayer or his kindred. But this policy leads to the perpetuation of blood feuds and to great waste of human life. Accordingly, at a very early time, the practice is introduced of buying off the injured kindred; of appeasing the feud by a money payment. Then a scale of compensation is fixed either by custom or by legislation, graduated generally by the rank of the person slain. In Anglo-Saxon law this is known as *wergild*—a man's price. At first the acceptance of such compensation is left to the choice of the injured kindred. They may take it and stay the feud, or they may reject it and enforce their right of private vengeance. But as the State grows more powerful, and the death of its citizens is felt to be a harm to the common weal, public authority compels the injured kindred to accept the compensation and not to pursue the feud. Then comes the final stage of legal development, in which the unlawful taking of human life is considered as primarily a wrong to the State, a public offense which cannot be compounded by private bargain. See AVENGER OF BLOOD; BLOOD FEUD; BLOOD-MONEY; ASYLUM; WEREGILD; etc.

Homicide is a generic term, including the crimes of manslaughter (q.v.) and murder (q.v.), as well as the non-criminal forms of killing

known as excusable and justifiable homicide. This article will be confined to the two latter species. By the early common law an important distinction was made between excusable and justifiable homicide. The slayer in the latter case was not liable to any punishment, while in the former he was. In other words, excusable homicide was not legally excusable. Just how far it subjected the slayer to criminal punishment is uncertain. Lord Coke declares that it rendered him liable to death, but Blackstone and Stephen insist that his liability did not extend beyond the forfeiture of goods. At present neither excusable homicide nor justifiable homicide is punishable at all, but the two terms are still retained in use in England and in many of our States. The signification of each, however, has been varied by modern legislation from the common-law meaning. At common law excusable homicide was of two kinds: killing by accident or misfortune, and killing in self-defense. At common law, justifiable homicide was of three kinds: killing by a public officer in conformity to a judicial sentence; killing by an officer or his assistant when necessary to overcome unlawful resistance to legal process, or to the performance of a legal duty, including killing by military forces in time of war or riot; and killing to prevent the commission of an atrocious crime.

Homicide is not wholly excusable unless it is committed without legal fault on the part of the slayer. The killing may not have been planned or thought of—it may have been accidental—yet if it resulted from the slayer's unlawful conduct, it is not a case of excusable homicide, but of manslaughter or murder, as the case may be. So, too, homicide is justifiable only when it is inflicted in strict accordance with lawful authority. A sheriff who inflicts the death penalty upon a convict in a manner not authorized by the judicial sentence which he undertakes to execute does a criminal, not a justifiable act. An officer cannot justify the unnecessary killing of even the worst malefactor that is resisting arrest. Nor is a person at liberty to take the life of a brutal assailant unless he can show that he had reasonable ground to believe that the assailant was about to commit a felony or do some great personal injury to the slayer or to some member of his family or other person in his presence, and that there was imminent danger of the assailant's accomplishing his design.

Consult: Stephen, *History of the Criminal Law of England* (London, 1883); Clark and Marshall, *Law of Crimes* (Saint Paul, 1900); and the authorities referred to under CRIMINAL LAW.

HOMILDON, hŏm'ĭl-dŏn, or **HUMBLEDON** (hŭm'b'l-dŏn) **HILL.** An elevation near Wooler, in Northumberland, England, not far from the Scottish border, noted as the scene of a battle in which the English, under the Earl of Northumberland and his son, Harry Hotspur, overthrew a Scottish army under the command of Sir Murdoch Stewart and the Earl of Douglas, September 14, 1402. The victory at Homildon Hill was soon followed by the rebellion of the Earl of Northumberland and his son. See HENRY IV.

HOM'ILET'ICS (from Gk. ὁμιλητικός, *homilētikos*, relating to conversation, from ὁμιλία, *homilia*, conversation, from ὁμιλεῖν, *homilein*, to converse, from ὅμιλος, *homilos*, assembly, from ὁμός, *homos*, similar + ἴλη, *ilē*, εἴλη, *eilē*, company, from εἴλειν, *eilein*, to crowd together). As the term is now used, the science of sermon-writing. Originally the religious discourses were less formal than they became later (see HOMILY), and so were properly called 'homilies.' The earliest writer on the subject of homiletics is Saint Augustine, whose book *De Doctrina Christiana* is in some sense an adaptation of profane rhetoric to sacred uses. Rabanus Maurus and Isidore of Seville also incidentally treat the subject; but the nearest approach to a systematic treatment in mediæval literature is to be found in Hunibert, *De Eruditione Concionatorum*. Saint Carlo Borromeo's *Instructiones Pastorum* was a part of his general scheme for the improvement of clerical education; and in the ecclesiastical course, as well of Catholics as of Protestants, homiletics occupies an important place. Textbooks on homiletics have been written by Bautain, Broadus, Claude, Dabney, Hoppin, Kidder, Phelps, Shedd, Storrs, Vinet, and many others.

HOMILIA'RIUM (ML., from Lat. *homilia*, Gk. ὁμιλία, *homilia*, conversation, homily). A collection of homilies for the use of the clergy either to read to their congregations or for their own edification. Such collections were in use from the sixth century, when the great majority of the clergy were too ignorant to write their own sermons. The homilies of the Venerable Bede were in familiar use among the clergy in all parts of the West, and we find in the letters of the early mediæval time traces of an interchange of sermons, original or otherwise, between bishops and clergy, even in distant countries. Alcuin made an homiliarium, which, strangely enough, considering its author, passed out of mind and was only discovered in 1892. What since the fifteenth century has been called his is really a revision of that by Warnefried mentioned below. One of the many reformatory measures of Charlemagne was a compilation of homilies under the title of 'Homiliarium,' which was made under his direction by the deacon, Paul Warnefried, a monk of Monte Cassino and one of his chaplains. It was compiled in the end of the eighth century, and contains homilies for all the Sundays and festivals of the year. It is the most famous of these collections. Maximus of Turin (fifth century, homilies in Migne, *Patrol. Lat.*, lvii.) is more drawn upon than any other author, but Bede comes next, and then Leo the Great, Gregory the Great, Augustine, and others. The language was, of course, Latin. Many synods directed the clergy to translate these sermons for their flocks, and the collection continued in use for this purpose down to the sixteenth century. It was printed at Speyer in 1482, and again at Cologne in 1557, and is reprinted in Migne, *Patrol. Lat.*, xcv. A collection of English homilies turned into verse, that they might be more readily remembered by the people, appears to have been composed about the middle of the thirteenth century. This collection, affording a metrical sermon for every Sunday and festival day in the year, exists in manuscript; and a portion of it was edited with introduction and notes by John Small, librarian to the University of Edinburgh (*English Metrical Homilies*, Edinburgh, 1862). When the Reformation was introduced into England the unfitness of the clergy to preach was so keenly felt that a book of homilies was prepared and sent forth by authority of Edward VI. (1547), and again under

Elizabeth (1563) a second book, and the reading of these homilies was enjoined. The two books were reprinted at Oxford, 1859. See HOMILY; HOMILIES OF THE CHURCH OF ENGLAND.

HOMILIES OF THE CHURCH OF ENGLAND. A collection of sermons, the first part of which was published in 1547, the first year of the reign of Edward VI., to be read in the churches, partly in order to supply the defect of sermons, but partly also to secure uniformity of doctrine, and to guard against the heterodoxies, old and new, which threatened the unconsolidated Church. The second part was published in 1563, at the same time with the Articles, under Elizabeth. The titles are twenty-one in number. The homilies are not now read in churches; but they are frequently appealed to in controversies as to the doctrine of the Anglican Church on the points of which they treat. The precise degree of authority due to them is matter of doubt.

HOM'ILY. In ecclesiastical usage, a discourse held in the church, and addressed by the minister to the congregation. The practice of explaining in a popular form the lessons of Scripture read in the synagogues had prevailed among the Jews, and appears to have been adopted in the Christian churches from the earliest times. The discourses employed for this purpose were of the most simple character; but with the exception of one ascribed to Hippolytus (q.v.), we have no sample of this form of composition earlier than the homilies of Origen, in the third century. Taking these as a type, the early Christian homily may be described as a popular exposition of a portion of Scripture, accompanied by moral reflections and exhortations. It differs from the sermon (Gk. λογος, Lat. *oratio*) in eschewing all oratorical display, and in following the order of the scriptural text or narrative, instead of being thrown into the form of a rhetorical discourse or a didactic essay. The schools of Alexandria and Antioch appear to have been the great centres of this class of sacred literature, and in the early centuries and mediæval times many preachers continued to use the homiletic form; and even in the modern Church many have regarded it as the best medium of scriptural instruction. See HOMILIARIUM; HOMILETICS; HOMILIES OF THE CHURCH OF ENGLAND.

HOMINE REPLEGIANDO, hŏm'ĭ-nē rē-plē'-jĭ-ăn'dō (ML., for replevying a man). The title of an old writ in English law, meaning to bail a man out of prison. It was an ancient form of the writ of habeas corpus, by the later form of which, as now employed, it has been superseded in England and generally in the United States. In a few of the American States, however, the older writ has recently been revived in an amended form, as being better adapted to the purpose of securing the release of a prisoner on bail than the more usual writ of habeas corpus (q.v.).

HOMING PIGEON, or HOMER. The name among fanciers for that breed of domestic pigeon, also called 'carrier,' used in carrying messages and in long-distance races. The name refers to its proclivity for returning to its home with the utmost possible speed and directness when liberated at a distance. See PIGEON.

HOMIN'IDÆ (Neo-Lat. nom. pl., from Lat. *homo*, man). The family to which man belongs, and which, together with the various families of monkeys, baboons, and apes, forms part of the order Primates. Among the characters which distinguish the Hominidæ are: (1) The posture is completely erect; (2) the anterior appendages are provided with hands, the posterior with feet; (3) the feet have the inner digit greatly enlarged and non-opposable, forming a great toe; (4) the body is sparsely haired, except on the top of the head; (5) the lower jaw has a prominent ridge, the chin; (6) the facial angle exceeds 60°; (7) the brain is more than double the size of that of apes, and the cranial capacity three times as much; (8) the teeth stand in an uninterrupted series without a space in front of the upper incisors; (9) man has the power of speech. In his general organization man is so closely related to the higher apes that it is difficult to draw a hard and fast line between the Hominidæ and the lower groups. See *Anthropoid Apes*, under APES.

HOMMEL, hŏm'mel, FRITZ (1854—). A German Orientalist, born at Ansbach. He was educated at Leipzig, and in 1877 became connected with the library of Munich, and was made docent of the university, in which he was appointed professor in 1885. His principal writings, aside from contributions to Oriental journals, are: *Die Namen der Säugethiere bei den südsemitischen Völkern* (1879); *Zwei Jagdinschriften Asurbanipals* (1879); *Die semitischen Völker und Sprachen* (1883); *Geschichte Babyloniens und Assyriens* (1885); *Der babylonische Ursprung der ägyptischen Kultur* (1892); *Aufsätze und Abhandlungen arabistisch-semitologischen Inhalts*, vols. i.-iii. (1892-1902); *Südarabische Chrestomathie* (1893); *Die altisraelitische Ueberlieferung in inschriftlicher Beleuchtung* (1896); *Sumerische Lesestücke* (last ed. 1899); *Der Gestirndienst der Alten Araber* (1900).

HOMME QUI RIT, L', lŏm' kē rē' (Fr., the man who laughs). A romance by Victor Hugo (1869), the story of a boy whose face has been mutilated so that he always has the appearance of laughing. The central thought of the romance is the antithesis between physical and moral characteristics.

HO'MOCŒ'LA. See HETEROCŒLA.

HO'MŒOP'ATHY (from Gk. ὁμοιοπάθεια, *homoiopatheia*, similarity of feeling, from ὁμοιοπαθής, *homoiopathēs*, subject to like feeling, from ὅμοιος, *homoios*, similar + πάθος, *pathos*, feeling). A distinctive system of medicine elaborated by Sampel Hahnemann (q.v.) upon the suggestions of a number of predecessors, and published in 1796. His chief dicta enunciated at that time were as follows:

"Every powerful medicinal substance produces in the human body a peculiar kind of disease; the more powerful the medicine, the more peculiar, marked, and violent the disease." "We should imitate nature, which sometimes cures a chronic disease by superadding another, and employ, in the disease we wish to cure, that medicine which is able to produce another very similar artificial disease, and the former will be cured, *similia similibus*." He was brought to this conclusion through observing the toxic effects of drugs, as recorded in the various works on materia medica, which he was translating

from English into German, and by experiments made upon himself and others in corroboration. It is not claimed that Hahnemann first noted similarity of drug action and diseased condition, for many times in previous medical history had isolated instances been noticed; but he was the first to urge a general application of his principles and to state the propositions upon which were based the new treatment. In 1806, in a treatise entitled *The Medicine of Experience*, he indicated the name by which the new system of treatment should be known, and thenceforward HOMŒOPATHY designated the science and art, as did 'homœopathic' the practitioner.

In 1810 he published the *Organon of Rational Medicine*, which became and remains the embodiment of the fundamental methods of homœopathy. These fundamentals may be stated briefly thus:

(1) Proving of medicines upon the healthy.

(2) Selection and administration of medicines according to the law of similars.

(3) The single remedy.

(4) The minimum dose.

A medicine is 'proved,' according to the homœopathic method, as follows: A fluid extract or a tincture of a drug is selected for 'proving.' Of this medicinal preparation a dose of one drop, two drops, or five drops is given to a healthy person at certain intervals, during which the person notes his symptoms. Gradually increasing doses are administered until the experimenter is satisfied and a set of tables of symptoms, believed to be caused by the drug in the healthy person, have been compiled. These tables of symptoms are then compared with symptoms noted in various diseases. Upon discovering that a disease presents a similar set of symptoms to those noted, by the healthy person, as caused by the test drug, the homœopathist argues that this drug will be the remedy for this disease. His method of reasoning is that if a drug produces certain symptoms in health it will cure a disease which causes similar symptoms. Upon this basis lies the fundamental 'law of similars,' generally stated in Latin, *similia similibus curantur*.

In the way just described, Hahnemann proved upon himself and others more than ninety drugs. Societies were formed for the purpose; and since his death many medicinal substances have been tested to learn toxic, pathogenic, and curative power, if any. Thus each drug had its pathogenesis or 'picture,' and the one corresponding to the totality of diseased symptoms as elicited from the patient by the physician, if administered, would, according to the homœopathic claim, result in a cure. No two drugs having precisely the same picture and no two patients the like totality of symptoms, he therefore individualized his cases, and declared that a single remedy should be given. Later in life he modified this to some extent, and, recognizing the *genus epidemicus*, prescribed without seeing the patients, as in the cholera epidemic of 1831.

When he began prescribing according to his law, he gave massive doses; but, believing that the human system when diseased is much more sensitive than in health, he gradually lessened the quantity. Then it was that he wrote the *Spirit of the Homœopathic Doctrine*, in which he argued the morbific cause of disease and the dynamization of remedies. In regard to disease, Hahnemann recognized the *morbific cause*, which, acting upon the *morbid properties* in the tissues, developed *disease*. Therefore, he argued, disease is a morbid property developed into an active pathological state by the influence of a corresponding morbific force. Likewise regarding drugs. His idea was that the drug forces are cosmic principles or agents of the same order as the disease-developing forces; the germinal principles inherent in the plant correspond with the morbid properties in the tissues, and drugs correspond with the fully developed disease. He believed that the morbific cause is in closer affinity with the drug than with the tissues of the organism, and this union secures the restoration of the organism to a state of physiological harmony. He said, "As the human organism, even in health, is more readily influenced by drugs than by natural morbific agents, this influence is felt in the highest degree by an organism which is properly predisposed by disease, provided the artificial drug disease is homœopathic to the natural malady. Hence the smallest dose of the remedial agent is sufficient for a cure, for the spiritual power of the medicine does not, in this instance, accomplish its object by means of quantity, but by potentiality and quality; a larger dose might be injurious, for this reason, that a larger dose does not only not overcome the morbid affection more certainly than the smallest possible dose of the homœopathically administered agent, but likewise imposes a complex medicinal disease, which is always a malady, though it runs its course in a shorter time." Herein lie the doctrines of small doses and 'medicinal aggravations.' From this mode of accounting for a cure in accordance with the law 'Similia similibus,' there naturally followed the 'potentization' of drugs, according to Hahnemann.

The attenuation was accomplished in the following manner: If the drug was a vegetable substance, a strong tincture was made and called mother-tincture. Of this, two drops were taken, added to 98 drops of alcohol, and agitated. This was marked first dilution. Two drops of this with 98 drops of alcohol constituted the second dilution, the third in a similar manner, and so on. This constituted what was known as the centesimal scale. Some preferred adding one drop of tincture to nine drops of alcohol, the label being first decimal, second, third, etc., according to the number of attenuation desired. Insoluble substances were triturated with sugar of milk in the proportions of one grain of the drug to 99 of sugar, or 9, as the physician deemed best. When the fifth trituration was reached, the substance, now claimed to be soluble, was dissolved in distilled water, and the further process carried on with alcohol as in the case of tinctures.

Hahnemann writes, quoting from the first American edition of *Organon de Medicini* (Philadelphia, 1836): "Diseases are *dynamic* (spiritual) aberrations, which our *spiritual* existence undergoes in its mode of feeling and acting—that is to say, *immaterial* changes in the state of health" (p. 19). "A homœopathic dose, however, can scarcely ever be made so small as not to amend and, indeed, perfectly cure" (p. 157). "It will stand good as a homœopathic rule of cure, refutable by no experience whatever, that the *best dose* of the rightly selected medicine is ever the *smallest*" (p. 187). When describing the preparation of 'potences' of fluid dilutions,

the author says: "These manipulations are to be conducted thus" (by adding 2 drops of a preceding 'potence' to 98 drops of alcohol and shaking twice) "from the first up to the thirtieth or decillionth development of power, which is the one in most general use" (p. 200). The effect of shaking, on homœopathic medicines, "is so energetic that latterly I have been forced by experience to reduce the number of shakes to two, of which I formerly prescribed ten to each dilution" (p. 205). "The best mode of administration is to make use of small globules of sugar, the size of a mustard-seed; one of these globules having imbibed the medicine, and being introduced into the vehicle, forms a dose containing about the three-hundredth part of a drop; for three hundred of such globules will imbibe one drop of alcohol." "By placing one of these on the tongue, and not drinking anything after it, the dose is considerably diminished. But if the patient is very sensitive, and it is necessary to employ the smallest dose possible, and attain at the same time the most speedy results, it will be sufficient to let him smell once" (p. 207).

The directions for smelling a 'remedy' are as follows: "The patient should hold the phial containing the globule under one nostril, when one momentary inhalation of the air in the phial is to be made; and if the dose is intended to be stronger, the same operation may be repeated with the other nostril" (p. 191). Hahnemann considered mesmerism a homœopathic remedy. He says: "This curative power, of whose efficacy none but madmen can entertain a doubt, which through the powerful will of a well-intentioned individual, influences the body of the patient by the touch, acts homœopathically, by exciting symptoms analogous to those of the malady" (p. 210).

In 1813 an epidemic of typhus fever occurred in Leipzig, during which it is said that seventy-three patients were allotted to Hahnemann for treatment. Of these it is claimed that but one died. Many of his claims were denied and many of his ideas were ridiculed. As a result of the opposition of the apothecaries' guild he was forbidden to prepare his own medicines for pay. In spite of all opposition, he and his pupils continued their practice and gave the remedies gratuitously when they were not allowed to take pay. Finally, opposition and social ostracism so discouraged Hahnemann that he left Leipzig in 1820 for Rothen, where, under the patronage of the Duke of Anhalt, he had a certain vogue. Up to this time homœopathy was centred in the person and teachings of Hahnemann; but now that he was absent, his pupils, already having become doctors of medicine, began, in 1821, the publication of the first homœopathic journal, the *Archive of the Homœopathic Method of Curing*. This publication was continued until 1843. The growth of homœopathy in Germany has ever been slow. In Austria, homœopathy was first officially known in 1819, in which year the Emperor Francis I. decreed that the method should be forbidden. Afterwards it was tacitly permitted, and the decree was revoked in 1837. Since 1846 there has been no governmental interference with individual preference. Homœopathy was introduced into Russia in 1823. There, as elsewhere, its pioneers were laymen, and its growth has been slow. It was introduced into Great Britain in 1827, by Quin, a physician. Shortly after, the medical opposition was so great as to prevent those who desired to practice it from obtaining a decree entitling them to register as physicians. At present there are no restrictions placed upon any person desiring to practice this system, but there are no legally incorporated schools for instruction. In France, homœopathy was first systematically tried in the year 1830. It steadily grew in favor until 1835, when Hahnemann, settling in Paris, gave the cause a powerful impetus. He grouped around him a large number of able men, and until his death in 1843 Paris was the Mecca of homœopathy.

The laws of France, as of most countries in Europe, discriminate against homœopathy, and no place of public preferment or emolument is allowed them. It is believed that there are no legalized homœopathic medical colleges in Europe.

In the United States, and in other young countries, homœopathy has been most active. Dr. Hans B. Gram, a native of Boston, educated at Copenhagen, first began the practice of homœopathy in New York City. The novel method was adopted by many, and many became earnest advocates of the system. Later, and about the same time, there came into notice men and women, generally and very largely of the laity, who, without knowledge of disease or of science, began to report cures with the aid of homœopathic 'remedies.' Domestic practice was so easy, by means of a cabinet of phials filled with globules and a book giving complete instruction for the use of homœopathic medicines as adapted to any symptoms, without the need of a diagnosis of disease, that the new cult grew rapidly. Soon there came from over the sea men who had learned the science and art from Hahnemann and his associates, and as a help to the more perfect understanding of this way, the first homœopathic college was established at Allentown, Pa., in the year 1835. While the converts to homœopathy have never been subjected to positive repressive legislation, yet they have been buffeted by the same storm of opposition as greeted their brethren in other lands. In order that the cause might be strengthened and physicians record progress, the publication of the *American Journal of Homœopathy* was begun in 1835. The American Institute of Homœopathy, the oldest national medical association in the country, was organized in 1844, though there were already societies in the States of Pennsylvania, New York, and Massachusetts. The existence of most of the local societies is mainly due to the suggestion and fostering care of the American Institute, to which they annually report.

In 1900 there were in the United States about 15,000 homœopathic physicians, and about eighteen medical colleges in which homœopathic therapeutics are taught. Considering its age, homœopathy is especially rich in theoretical and practical literature. The most exhaustive work on any division of the subject is the *Encyclopædia of Materia Medica*, by the late Prof. T. F. Allen, M.D., of New York City. Every department of medicine has been treated by homœopathic authors. Perhaps the chief factor in the spread of homœopathy in this country, especially in the newer portions of the Western States, is the equality of all schools of medicine and all qualified practitioners before the law. For many years homœopathists in this country taught only

therapeutics and practice, and as a result all the earlier, and for many years most of the well-equipped, native American physicians were graduates of the regular school. Finally, homœopathic medical schools were established, in which all the branches of medicine were taught, and the inexplicable terms 'homœopathic surgeon' and 'homœopathic obstetrician' came into use. The influence of the school has been waning for some years. In 1883 the *Hahnemannian Monthly* said: "A few years ago the editors of the *New York Medical Times* dropped from the title of their journal the distinctive word 'Homœopathic'; now they boldly urge the renunciation of the word as applied to our school of medicine. If we are emancipated from the thraldom of sect, we shall not only save our school from imminent dissolution, but shall also become an integral part of the medical profession of the day, honored as true, broad, liberal, progressive physicians. But if we cling to a name which by no means represents the catholicity and spirit of the new school, we are doomed to annihilation."

In the large cities of the Eastern States, great numbers of graduates of homœopathic medical schools have taken courses of study in post-graduate departments of regular medical colleges, and afterwards, while retaining the term homœopathic, practice medicine principally according to the regular principles, using 'old-school' drugs in 'old-school' dosage. The editor of the *New York Medical Times* (homœopathic) asserted that there are only two 'pure' homœopathic practitioners in that city.

Whether due to its influence or not, since the advent of homœopathy the repulsiveness in taste and appearance as well as the size of the dose of old-school remedies have been greatly modified; and in a vast number of cases suggestion and encouragement together, perhaps, with placebos, have taken the place of active medicinal treatment, and natural recuperative power has worked the cure. It is certainly true that without the resort to and adoption of regular 'old-school' remedies homœopathy would have died out except among those who love mystery and prefer magic to medicine. Few and rare today are the practitioners who adhere to the potentization tenets of Hahnemann, or who are content to treat symptoms in ignorance of the disease present.

The terms 'allopathy' and 'allopathic' came into use after the invention of the words 'homœopathy' and 'homœopathic,' and were used by the adherents of the new school in designating the old school and its practitioners, through a mistaken idea. The terms are etymologically incorrect. See HAHNEMANN.

HOMŒOPATHY, AMERICAN INSTITUTE OF. The oldest national medical organization in the United States, its first session having been held in New York City, on April 10, 1844. Its objects are the reformation and augmentation of the Materia Medica, and the furthering of the principles of homœopathy. It has two thousand members, divided into bureaus on various lines of medicine and surgery, and meets annually in the large cities of the country. The institute publishes annual volumes of "Transactions," including reports and original papers.

HO'MOGENE'ITY, LAW OF. The product of two homogeneous integral functions of the mth and the nth degree, respectively, is a homogeneous, integral function of the $(m+n)$th degree. The value of this principle in checking the process of multiplication of homogeneous functions is evident. The notion of homogeneity may be extended to irrational and fractional functions. In this case the degree is determined by introducing a factor k into each variable, and observing the degree of the factor k in the resulting function.

HOMOIOUSION, hō'moi-o͞o'si-on. See HOMOOUSION.

HOMOL'OGA'TION (from ML. *homologare*, to homologate, from Gk. *ὁμολογεῖν*, *homologein*, to agree, from *ὁμόλογος*, *homologos*, agreeing, from *ὁμός*, *homos*, same + *λόγος*, *logos*, word, from *λέγειν*, *legein*, to say). In the civil law, the judicial confirmation of an award, or of an accounting, or of any other administrative or judicial proceeding. In Scotch law, an act or course of conduct which confirms or approves of something which otherwise might be invalid. Thus, an informal deed, though useless in itself, yet if acted on by one or both parties, will be set up and made valid as against the party homologating. To constitute homologation, a clear knowledge of what the party is doing is necessary. Cf. ESTOPPEL.

HOMOL'OGOUS SERIES. See HYDROCARBONS.

HOMOL'OGY (from Gk. *ὁμολογία*, *homologia*, conformity, from *ὁμόλογος*, *homologos*, harmonizing, from *ὁμός*, *homos*, same + *-λογία*, *-logia*, account, from *λέγειν*, *legein*, to say). (1) In biology, a term used to indicate structural correspondence based on blood-relationship, as opposed to analogy, which is applied to functional resemblance, such as that between the wings of a bird and those of a butterfly. Different sorts of homology have been recognized. There is the homology of the different parts of the body; namely, serial homology, as of the front and hind paired fins of fishes, or the arms and legs of man; antimeric homology, as of the petals of a flower or the right and left sides of the body. There is homology of corresponding organs in different individuals. This is most certain in individuals of the same species; somewhat less certain between genera and families; often doubtful between orders and classes; usually speculative between phyla. The criteria of homology are: (a) The criterion of connections. A part having similar relations in two species, and making similar connections is homologous in the two cases. (b) The criterion of structure. Homologous parts have a fundamental similarity of structure. (c) The criterion of development. Homologous organs arise from the same germ-layer in corresponding parts of the body and develop in the same fashion. Despite these clear-cut criteria, homologies are practically often very difficult of determination, particularly beyond the limits of a class.

(2) In geometry, figures which are in perspective are often spoken of as homologous, because the centre and axis of perspective introduced by Poncelet were called by Chasles centre and axis of homology. (See PERSPECTIVE; GEOMETRY.) The term is used in another sense to signify the relation of reciprocity or duality (q.v.) which exists between geometry and algebra.

LAW OF HOMOLOGY. Given two sets of con-

cepts, G (geometric) and A (algebraic), such that to every concept in set G (for example, a rectangle, or a line) shall correspond a concept in set A (say, a product, or a number); and to every relation between any two of one set (for example, equality) a relation (in this case equality) between the corresponding two of the other, then all language, reasoning, and conclusions as to the one set may be applied to the other set.

This correspondence of one symbol, one operation, one result, etc., of algebra, to one symbol, one operation, one result, etc., of geometry, or, as it is called, this 'one-to-one correspondence,' suggests many theorems of geometry that would otherwise remain unnoticed. E.g.:

Geometric Theorems.	Algebraic Theorems.
If $x, y, z, \ldots$ are line segments, and $xy, xz, \ldots$ represent the rectangles of x and y, x and $z, \ldots$, and $x(y+z)$ represents the rectangle of x and $y+z$, and x^2 represents the square on x, then	If $a, b,$ are numbers, and $ab, ac \ldots$ represent the products of a and b, a and $c, \ldots$, and $a(b+c)$ represents the product of a and $b+c$, and a^2 represents the second power of a, then
1. $x(y+z)=xy+xz$.	1. $a(b+c)=ab+ac$.
2. $(x+y)^2=x^2+y^2+2xy$.	2. $(a+b)^2=a^2+b^2+2ab$.
3. $x^2-y^2=(x+y)(x-y)$.	3. $a^2-b^2=(a+b)(a-b)$.

HOM'ONYMS (Lat. *homonymus*, from Gk. *ὁμώνυμος*, having the same name, from *ὁμός*, *homos*, same + *ὄνομα*, *onoma*, name). Words that agree in form, but differ in origin and meaning. A familiar example of this class of words is *sound*, which in its different meanings goes back to the Latin *sonus*, Scandinavian *sund*, and Anglo-Saxon *gesund* and *sundian*. Many homonyms are often distinguished by the accent, as *absent*, the adjective, and *absent*, the verb. Strictly speaking, these are not homonyms, but homographs, since the exact correspondence is confined to the spelling. A third term is also used—'homophones,' words that agree in the sound, but not necessarily in the spelling. Thus *write*, *wright*, and *rite* are homophones.

HOMOOUSION, hō'mō-o͞o'sĭ-on (Gk. *ὁμοούσιον*, *homoousion*, consubstantial, from *ὁμός*, *homos*, same + *οὐσία*, *ousia*, essence). A term of Greek theology, employed against the Arians at the Council of Nicæa (A.D. 325), to denote that in the doctrine of the Trinity the Son is "of the same essence [or substance] with the Father." According to the received text of what we call the Nicene Creed, the article in question reads: "And [I believe] in one Lord Jesus Christ . . . being of one substance with the Father." The word *homoousion* is much older than the Council of Nicæa. Not to speak of its employment by Gnostics, like Basilides, it is found in the writings of Irenæus, in the latter half of the second century, and not infrequently in the third century. It was rejected by a synod held in Antioch, against Paul of Samosata (268 or 269), where it seems to have borne a meaning somewhat different from that which was applied to it by Athanasius. In the fourth century the word aroused a long and bitter controversy. The Athanasian party defended it; the Arians attacked it on every side. In the progress of the struggle various alternatives were proposed. Some extreme Arians wished to substitute *heteroousion* (of a different substance) for *homoousion*, thus affirming the direct opposite of what the orthodox party insisted upon. Others, less radical and largely indifferent to the real issue involved, suggested the colorless term *homoion* (similar), meaning simply the Son 'is like' the Father. Others still were willing to go so far as to use the word *homoiousion* (i.e. the Son is 'of a like essence, or substance,' with the Father). After nearly sixty years of theological warfare, the Church, at the Council of Constantinople (381), reaffirmed its allegiance to the *homoousion* doctrine, and now applied it not simply to the Son, but also to the Holy Ghost, thus completing the dogma of the Trinity, which has ever since remained the orthodox faith of Christendom.

Consult: Harnack, *History of Dogma*, vol. iv., translation (London, 1898); Athanasius, *Select Works*, translation in the *Nicene and Post-Nicene Fathers*, second series, edited by Schaff and Wace, vol. iv. (New York, 1892); Dubose, *The Ecumenical Councils* (2d ed., New York, 1897). See Arius and Nicene Creed.

HO'MOPH'ONY (Gk. *ὁμόφωνος*, *homophōnos*, having the same sound, from *ὁμός*, *homos*, same + *φωνή*, *phōnē*, sound). The style of modern music where one voice or melody predominates. The other voices are not independent, but serve chiefly to furnish the harmonic basis for the leading voice. Thus it is directly opposed to the older polyphony (q.v.), where all voices were independent and of equal importance. See Antiphony; Monody.

HOMOP'LASY. A term proposed by Lankester to express, as he says, 'the parallelism of genetically distinct organs.' Its meaning by some is expressed by the word 'convergence,' now in frequent use. It is due to the action of similar or identical habits or environment on a part or parts of an animal or on the entire animal. Lankester's definition is: "When identical or nearly similar forces, or environments, act on two or more parts of an organism which are exactly or nearly alike, the resulting *modifications* of the various parts will be exactly or nearly alike." Lankester illustrates homoplasy by the case of the remarkable coincidence in the pteropod mollusks and cephalopod mollusks of appendages around or near the mouth provided with suckers. Osborn asserts that homoplasy has been confused with 'parallelism' and 'convergence,' which may affect absolutely non-homologous structures. *Homoplasy*, he says, should be confined to structures in which there is an element of homology. *Convergence* may be restricted to cases of 'parallelism' between animals of entirely unrelated groups or classes, like the following: Marsupial mice, and other animals of that group exactly resemble placental mice, etc.; whales resemble fishes owing to their similar adaptation to the water. Many cases of so-called mimicry (q.v.) appear to be instances of convergence. Legless lizards may be mistaken for snakes. There are multitudes of such examples, and the resemblance or parallelism is so exact as to have often misled well-trained zoölogists.

HOMOP'TERA (from Gk. *ὁμός*, *homos*, same + *πτερόν*, *pteron*, wing). A suborder of the Hemiptera including insects with wings (when present) of uniform thickness throughout. It contains some of the most destructive of insects and others that are the most beneficial. It includes the cicadas, lantern-flies, spittle-insects, leafhoppers and treehoppers, plant-lice, scale-insects, and others. A few of the scale-insects fur-

nish materials that are useful to man, such as cochineal lac and wax. A famous scale-insect is the 'San José' scale, and the mealy bugs of greenhouses are well-known representatives of this group. See HEMIPTERA; BUG; COCHINEAL; APHID; CICADA; FROTH-FLY; SCALE-INSECT.

HOMOSPORY (from Gk. *ὁμός*, *homos*, same + *σπόρος*, *sporos*, seed—literally, 'spores similar'). A word generally used only in connection with such plants as have a distinct alternation of generations (q.v.). The sexless generation (sporophyte) in the alternating series produces spores, which in turn produce the sexual generation (gametophyte). Among the liverworts and mosses (bryophytes), most of the ferns and their allies (pteridophytes), these spores are all alike in appearance and power, each in germination producing a gametophyte which bears both male and female organs. The term contrasts with 'heterospory' (q.v.), a condition in which the sporophyte produces two kinds of spores, unlike in size and power, the larger of which produce female gametophytes, the smaller male gametophytes. All the seed-plants (spermatophytes) are heterosporous, as well as the water-ferns, quillworts, and little club-mosses among the pteridophytes. Isospory is the same as homospory.

HOM'OTAXY, or **HOM'OTAX'IS** (from Gk. *ὁμός*, *homos*, same + *τάξις*, *taxis*, arrangement, from *τάσσειν*, *tassein*, to arrange). A geological term which signifies a similarity in the succession of strata in different regions as shown by the included life forms. See GEOLOGY.

HOMS, hŏms, or **HEMS**, hĕms (Lat. *Emesa*). A city of Syria, situated near the right bank of the Orontes, about 32 miles south of Hamah (Map: Turkey in Asia, G 5). It is built chiefly of black basalt; has crowded houses and narrow streets, and is surrounded by old half-ruined walls. Although there are now no ancient buildings remaining, the antiquity of the city is attested by numerous fragments of columns, by Greek inscriptions, and the foundations of ancient baths with specimens of mosaic pavements. The town has considerable trade in silk, cotton, oil, and gold ware, and has also some manufactures. The population is estimated at 60,000, including about 6500 Christians. Ancient Emesa was celebrated chiefly for its splendid temple of the sun, one of the priests of which, Elagabalus, or Heliogabalus, was raised to the Imperial throne of Rome. Under the walls of Emesa, Zenobia was defeated by the Emperor Aurelian in A.D. 272. The city was taken by the Saracens in 636, when its old Semitic name, Hems, was revived. In 1099 the Crusaders rode through its opened gates. Here the Egyptian army, under Ibrahim Pasha, defeated the Turks in July, 1832.

HOMURAI. See HORNBILL.

HO-NAN, hō'nän' (Chin., south of the river). One of the eighteen provinces of China proper, bounded on the north by the provinces of Shan-si and Chih-li, on the east by Shan-tung, Kiang-su, and Ngan-hwei, on the south by Hu-peh, and on the west by Shen-si (Map: China, D 5). It lies between the parallels of latitude 32° and 37° N., and the meridians of longitude 110° and 116° E.; area, 65,104 square miles. The eastern part is comparatively level, and belongs to the Great Plain, while in the western section spurs of the Fu-niu range of mountains with a southeast trend are found. Its principal river is the Hoang-ho, which traverses the northern part from west to east. The soil is fertile, and in addition to the usual cereals, produces cotton, hemp, indigo, and tobacco. Patches of the remarkable formation called loess (q.v.) by Richthofen, and 'lake loam' or terrace deposit by Pumpelly, are found in both the northern and southern parts. Ho-nan is rich in minerals, iron, lead, tin, copper, etc., and has enormous deposits of anthracite coal, which has hitherto been mined only by native methods. The capital, Kai-fung (or fĕng), is situated 11 miles south of the Hoang-ho and near the point where in 1853 the river burst its banks and took a new course to the northeast through Shan-tung to the Gulf of Pe-chi-li, instead of southeast through Kiang-su to the Yellow Sea as formerly. Kai-fung is a station on the new *Lu-Han* or Hankow-Peking Railway. The people of the province are notorious for lawlessness and turbulence. Population, 22,000,000.

HONDA, ŏn'dȧ. A city of Colombia, situated on the Magdalena, in a mountainous region, 55 miles northwest of Bogotá (Map: Colombia, C 2). The town has a very hot climate, as the surrounding mountains shut off the cool winds. It is important as the head of navigation, and the transit point of the trade for Bogotá, as well as the depot for the tobacco and quinine from the Ambalema District. Population, 4000. Honda received its town charter in 1643. In 1805 it was destroyed by an earthquake.

HONDECOETER, hŏn'de-kōō'tĕr, MELCHIOR D' (1636-95). A Dutch animal painter. His grandfather, GILLIS (died 1627), was a landscape painter at Amsterdam, and his father, GISBERT D'HONDECOETER (died 1653), painted animals. Melchior was born at Utrecht, and studied under his father and his uncle, Jan Weenix (q.v.). From 1659 to 1663 he lived at The Hague, and after that at Amsterdam, where he received the freedom of the city in 1688, and resided until his death, April 3, 1695. He stood in high favor with the Dutch magnates, and while at The Hague was employed by William III., afterwards King of England, to paint his menagerie. His grandfather had made a considerable name in that form of art. Hondecoeter painted every kind of animal, but his favorite subjects were cocks, hens, ducks, and peacocks, which he delineated with wonderful correctness and truth. He depicts, with great charm, motifs like the maternity of the hen, and he even lends beauty to subjects like 'cock-fights,' and "Ducks in a Pond." No one has excelled, or even equaled him, in painting the feathered tribe. The landscapes which he introduced as backgrounds to his pictures are equally true to nature, and finished with a delicate lightness and transparency of touch that harmonizes admirably with the subject of the piece. The museums of France, Germany, and Austria, and the private and public collections of England have fine examples of his work, but his masterpieces are at Amsterdam and The Hague. His most celebrated work is "La plume flottante" (the Floating Feather), in the Museum of Amsterdam, representing a pond full of water-fowl.

HONDO, hŏn'dō, or **HON-SHIU**, hŏn'shyōō' (Chino-Japanese, chief island). The name of the chief island of the Empire of Japan, often,

but incorrectly, called Nippon or Niphon (Map: Japan, E 6). Nippon is not the name of any one island, but of the entire Japanese Empire. The application of the erroneous name Nippon to the chief island originated with Kaempfer (q.v.), the Jesuits who wrote previously to him knowing Japanese geography too well to use the misleading term. Of late years the Japanese, studying geography in the Western fashion, and seeing the necessity of a name for their chief island, have called it Hondo. Hondo lies between latitude 24° 14′ and 41° 33′ N., and longitude 130° 44′ and 142° 14′ E., and has an area (with its isles) officially computed in 1894 at 87,771 square miles, with a population (December 31, 1898) of 33,327,918. It comprises the circuits of Tokaido, Go-Kinai (or the five home provinces), Tozando, Hokurikudo, Sanindo, Sanyodo, and one province of Nankaido (the other four provinces of this circuit forming the island of Shikoku). For administrative purposes Hondo is divided into 3 fu and 34 ken (or prefectures), and contains 447 districts, 34 large cities, 10,618 villages. Of its taxable area in acres, 7,250,000 are in rice-fields, 3,898,550 in arable land, 752,787 in building lots, and 15,490,807 in forest, besides 774,743 acres of untaxed land. Its shape is a crescent, with horns toward Asia. A remarkable difference in climate is noted between the eastern and the western halves of Hondo, the former, under the influence of the Kuro-Shiwo, or gulf stream of the Pacific, being mild and warm; the latter receiving the cold winds, and under the influence of cold currents having a more severe climate. The promontories of Hondo are now dotted with well-equipped lighthouses, and the island is well supplied with railways and telegraphs.

HONDT, hŏnt, **HOND**, or **HONDIUS**. A Flemish family of painters and engravers. Jodocus or Josse (1546-1611) was born at Wacken. To avoid the troubles in the Netherlands, then in the throes of the war with Spain, he went to England and became an engraver of maps and a maker of mathematical instruments. He also engraved some portraits, such as those of Queen Elizabeth, Henry IV., Drake, and Cavendish; some plates for Mercator's *Atlas Major* (1605), and other works. He often added to his signature the figure of a dog, in allusion to his name.—His son, Hendrik (1588-1658), called the Younger, was born in London. He was also an engraver, and is said to have executed many plates, but his works are confused with those of another Hendrick Hondt (1573-1648), born at Duffel in Brabant, the son of William Hondt, and a pupil of Jan Wierix. The first named opened a studio at The Hague, and during fifty years produced many plates, including a series of portraits of the great reformers, Wyclif, Melanchthon, Knox, Calvin, and Savonarola, and a series of painters, besides genre and historical subjects.—Another William Hondt (1601-c.1632) was the son of Hendrick (1573-1648). He was born at The Hague, and is said to have been Court painter to Ladislas IV., King of Poland. His works include a portrait of the King, and a number of engraved portraits after Van Dyck and others, notably one of himself after that master.—Abraham (1638-95), a painter and engraver, was born at Rotterdam. He was the grandson of Jodocus or Josse Hondt, and was known especially as a painter of dogs. He went to London while very young, and under Charles II. acquired a great reputation for his studies of the chase. He also painted torch-light scenes, and left some rare water-colors. There is a "Wild Boar Hunt" by him in the Metropolitan Museum of Art, New York City.

HONDURAS, hŏn-dōō′rȧs, *Sp. pron.* ôn-dōō′-rȧs. A republic of Central America, bounded by the Caribbean Sea on the north and northeast, Nicaragua on the southeast, Labrador and the Pacific Ocean on the southwest, and Guatemala on the west (Map: Central America, D 3). Area, estimated at over 46,000 square miles. It is a mountainous country, a plateau in the interior, with low coast lands. The only plains of important extent are along the coasts of both oceans, and on the lower courses of a few rivers. The widening of river valleys in the interior results in small plains, many of them at a considerable elevation. The mountains occupy a proportionately larger area than in neighboring Guatemala, but the ranges are inferior in extent and height, though some peaks rise to about 8000 feet. Volcanoes have recently played a smaller rôle than in any other country of Central America, though there are an important number of extinct volcanoes, one of which formed the island of Sacategrande in the Gulf of Fonseca. In the western half of Honduras, young eruptive rocks cover as large an area as all the other geological formations together, while in the eastern half very little of the surface is formed of volcanic outpourings of recent geological times, though the older eruptive rocks are largely represented, particularly in the north. The coasts have a long Atlantic and a small Pacific frontage. The Atlantic ports are Trujillo, Ceiba, and Puerto Cortés. Amapala has one of the best natural harbors on the Pacific coast. The water parting between the Atlantic and Pacific rivers is far to the south, so that most of the drainage is to the Atlantic Ocean. Some of the Atlantic rivers are navigable, among them being the Coco or Segovia (known also as the Wanks), which forms part of the boundary with Nicaragua.

In the interior the climate is healthful, and on the whole temperate. The coast lands, owing to their small elevation, have a much higher temperature. Honduras, swept by the trade winds receives an enormous quantity of rain, and the tropical vegetation is very luxuriant. The broad Atlantic coastal lowlands, however, receive much less rainfall than the mountain regions of the interior, where most of the water vapor brought by the east winds is condensed. The result is that though the eastern lowlands are covered with vast forests of mahogany, cedars, and other cabinet woods, in which also sarsaparilla and other medicinal plants abound, vegetation in the east is not so luxuriant as in the higher regions inland, where there are boundless forests of pines and other conifers so dense that one may travel for days without being able to see more than 100 yards in any direction. The Pacific coast is driest, and a dry period prevails from November to May. The Atlantic coast is not healthful for the white race, and its products are mainly those of the forest and tropical fruits. The interior, from 1500 to 7000 feet, produces tropical products in the lower zone, coffee in the middle zone, and the products of temperate climates in the upper belt. Numerous relics of a former civilization are found in some districts, most of them

being the ruins of temples and other religious edifices.

For flora and fauna, see AMERICA.

MINERAL RESOURCES. The country is richer in minerals than any other Central American State excepting Nicaragua. They include gold, silver, copper, zinc, iron, lignite, etc. Lack of capital and energy, however, has prevented the large development of these resources. The mining activities are practically confined to the washing of gold from the rivers and the production of some silver in the southern part of the country, these metals being the largest exports.

AGRICULTURE. The soil is very rich; but in spite of its unusual fitness for agriculture, Honduras is the most backward State of Central America. The natural conditions are conducive to the cultivation of almost all the products of Central America, but the sparsity of population as well as the lack of transportation facilities stand in the way of agricultural development. More attention is paid to stock-raising and to the cultivation of bananas and other fruits in the Atlantic coastal region than to any other branch of farming. Steamers carry a large quantity of bananas and cocoanuts to the United States. Tobacco, sugar, maize (the chief food staple), coffee, rice, etc., are all grown in quantities sufficient to supply the local demand, and considerable coffee is sold abroad. The almost prohibitive export duties have brought about a considerable increase in the live stock of the country. The exports of live cattle, however, as well as of hides, are not unimportant. Sheep, goats, and swine are few in number.

TRANSPORTATION. With regard to transportation facilities the situation in Honduras is worse than in any other of the Central American States, although the natural obstacles in the way of a railway line from coast to coast are less than in most of the other States. The construction of a narrow-gauge line from Puerto Cortés on the Atlantic to the Gulf of Fonseca on the Pacific was begun in 1868 by an English company, which had secured from the Government a land grant of ten square miles per mile of road constructed, and extensive mining and lumbering privileges. Bonds to the amount of $30,000,000 were issued and sold, but the work was discontinued after about 60 miles, or one-fourth of the road, was constructed. Since then all efforts to resume construction have been unsuccessful, and the part completed, between Puerto Cortés and La Pimenta, has been operated with varying success by several companies. A mule train is three weeks on the road between Puerto Cortés on the Atlantic and the Pacific port of Amapala, a journey that might be made in less than a day if this railroad were completed. Several concessions for shorter roads have been obtained by foreign companies from the Government. There are a number of tolerable wagon-roads, but most of the traffic is still carried by mules. The telegraph lines of the country had 2730 miles of wire in 1899.

COMMERCE. The commerce of Honduras is naturally insignificant in view of the general backwardness of the country. The imports in 1900 were estimated to amount to 1,074,050 pesos gold, of which over two-thirds came from the United States. The exports were valued at over 2,635,600 pesos gold, and consisted of precious metals, fruit, cattle, coffee, cabinet woods, tobacco, hides, and skins. The skins of the roebuck and the feathers of tropical birds are also important in trade. One-half of the exports of Honduras find their way to the United States, the remainder being principally divided between Germany and the other Central American States. The chief articles imported from the United States to Honduras are breadstuffs, cotton manufactures, iron and steel manufactures, and beverages, almost the entire import trade being usually with this country.

GOVERNMENT. The Constitution of Honduras, as modified in 1894, provides for a republican form of government. The executive power is vested in the President, elected by popular vote for a term of four years. The Chamber of Deputies, which is intrusted with the exercise of the legislative power, is composed of Deputies elected directly for four years, at the rate of one Deputy for every 10,000 inhabitants. The President is assisted in his duties by a Cabinet of Ministers. For administrative purposes the republic is divided into 15 departments, administered by governors appointed by the President. The administration of justice is in the hands of a supreme court, situated at the capital, and a number of minor tribunals and justices of the peace. The capital is Tegucigalpa.

FINANCE. The chief sources of revenue are customs duties and the spirits, powder, and tobacco monopolies. The revenue for 1900-01 was estimated at 2,423,000 pesos, and the expenditure at 2,416,824 pesos, of which about one-third was spent by the Department of War. The finances of the country are in a deplorable condition, owing to the expenditures incurred during the war with Salvador and Guatemala, and to the continuous civil strife as well as to general mismanagement. Thus the external debt of the country amounted in 1900 to $26,992,850, while the arrears of interest at the same period amounted to $64,498,440, bringing up the foreign indebtedness of the country to $91,491,290. The internal debt amounted in 1900 to 1,800,812 pesos.

DEFENSE. Military service is obligatory upon every able-bodied citizen between the ages of eighteen and forty. The active army is very small, being estimated at only about 500 men. The militia numbers over 40,000.

POPULATION. The population of Honduras was 587,500 in 1900, exclusive of (uncivilized) Indians. Most of the population are called aboriginal 'Indians.' The number of persons of pure European descent is very small. Religious freedom is provided for by the Constitution, and no religion is officially recognized by the State. The prevailing religion is Roman Catholic, but there are also a number of Protestant churches. Education is supported by the State to a considerable degree, but the present facilities are far from adequate. In 1901 there were nearly 800 primary schools, of which 700 were national, all attended by about 29,000 pupils. There are also a high school for girls, and a normal school, both situated at Tegucigalpa, besides six national colleges and seven other educational institutions that receive subventions from the Government. There is also a national industrial school. Most of the departments of the republic are provided with national colleges, and there are also some institutions for higher education. As regards penal and charitable institutions, there

are a penitentiary and general hospital at Tegucigalpa; also a hospital at Amapala.

HISTORY. The coast of Honduras was discovered by Columbus in 1502. The first settlement was made in 1524, by Cristóbal de Olid, a lieutenant of Cortés, sent to take possession of the country in the name of his commander. Olid founded the town of Triunfo de la Cruz, and set up an independent government. Cortés set out in person to bring Olid to terms, and after a tedious march of six months over the mountains and rivers of Mexico and Central America, he reached the little colony in the spring of 1525. There he reënforced the colonists and founded the town of Natividad de Nuestra Señora, on Caballos Bay, returning to Mexico in 1526. A royal Governor was appointed to rule the province. The mines of Honduras were valuable, but under Spanish government the colony developed slowly. In 1539 the province was made an audencia of the Captain-Generalcy of Guatemala. The laws enacted for the protection of the natives were systematically disregarded. In 1821 Honduras revolted from Spain, and was annexed to the Mexican Empire. In 1823 it joined the federation of Central American States which was formed in October of that year, and lasted until 1838, when it was virtually dissolved, although the President's term did not expire until February 1, 1839. In 1849-51 Honduras formed a union with Salvador and Nicaragua, which ended in 1863 in war between the contracting parties. Between 1856 and 1860 the usual course of internal dissension was interrupted by the filibustering exploits of William Walker (q.v.). In 1871 war broke out between Honduras and Salvador and Guatemala, and after peace was declared, in 1874, a revolution in the interests of the ex-President, Medina, took place. Other States interfered, and the Guatemalan candidate, Soto, acted at first as provisional President, and was elected to that office in April, 1877. In 1880 the national capital was removed from Comayagua to Tegucigalpa and Soto was reëlected President. In 1899 General Sierra was chosen President for the term ending in 1903.

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HONDURAS, BAY OF. An inlet of the Caribbean Sea, between British Honduras, Guatemala, and Honduras (Map: Central America, D 2). It forms several inlets and contains the island of Turneffe, and the Bay Islands, of the coast of Honduras.

HONDURAS, BRITISH. See BRITISH HONDURAS.

HONE, PHILIP (1780-1851). An American merchant and politician. He was born in New York City, where with his brother he built up a good business as an auctioneer. In 1816 he established the first savings bank in New York; was Mayor of the city in 1826; and founded the Mercantile Library Association. He had been a Federalist, joined in the formation of the Whig Party and, it is said, gave it that name. He was prominent in national politics, where he opposed Jackson, and later condemned abolition, and was a man of taste and some learning. He wrote a diary for the years 1828 to 1851, which, edited in part by Tuckerman (1889), gives valuable impressions of life in New York and of the early days of the Whig Party.

HONE, WILLIAM (1780-1842). An English author, born at Bath. He was brought up in the strictest piety, even learning to read and write from the Bible. When ten years old he was apprenticed to a London attorney. He afterwards set up as bookseller, but did not succeed. He gained a contemporary notoriety by his satires on the Government, which were illustrated by Cruikshank. For his parodies on the prayer-book he was prosecuted, but acquitted. His *Political House that Jack Built* (1819) ran through 54 editions. Withdrawing from politics, he produced works of more permanent value, as: *Ancient Mysteries* (1823); a new edition of Strutt's *Sports and Pastimes* (1830); *Every Day Book* (1826-27); *Table Talk* (1827-28); *The Year Book* (1832); and many cheap and popular reprints. During his last years he frequently preached. He died at Tottenham. Some of the most characteristic of Hone's works have been reprinted by W. Tegg: *Every Day Book*, *Table Talk*, and *Year Book* (1873); and *The Three Trials*, an account of his prosecution by the Government (1876).

HONES (AS. *hān*, Icel. *hein*, stone; ultimately connected with Lat. *cuneus*, Gk. *κώνος*, *kōnos*, wedge, Skt. *śāna*, whetstone, from *śā*, *śi*, to sharpen), or WHETSTONES. A particular class of stones used for the purpose of sharpening edge-tools, such as razors, knives, scythes, etc. They are usually cut into pieces of convenient size, according to their intended uses. The finest kind of hones are those called oil-stones; these are hard, compact, and so very siliceous that they readily wear down the hardest steel; they are varieties of slate, derived from the argillaceous schists of the Paleozoic period. These stones are found in Turkey, Bohemia, Persia, in the Harz Mountains, in Styria, in the United States, Spain, Peru, and in Siberia. In Great Britain several localities yield hone-stones of excellent quality, and none better than the celebrated Water-of-Ayr stone, which is much used for polishing copper plates, as well as for hones. The hones used for sharpening scythes, etc., are usually made of coarse-grained sandstone. One of the best American stones for hones comes from Arkansas. In addition, there are artificial stones formed from

abrasive materials, which possess advantages for certain purposes. See ABRASIVES.

HONES'DALE. A borough and the county-seat of Wayne County, Pa., 32 miles northeast of Scranton; on the Lackawaxen River, and on the Delaware and Hudson Company's and the Erie railroads (Map: Pennsylvania, F 2). It has a public library and several public parks. As the centre of a highly productive coal-mining district, Honesdale carries on an extensive coal trade, and manufactures cut glass, boots and shoes, silk and woolen goods, axes, foundry products, elevators, flour, etc. Population, in 1890, 2816; in 1900, 2864.

HONEST GEORGE. A nickname given to George Monck, first Lord Albemarle.

HONEST MAN'S FORTUNE, THE. A play by Fletcher and Massinger and possibly others, performed in 1613 and printed in 1747. Accompanying it is a set of verses, *Upon an Honest Man's Fortune*, signed by Fletcher.

HONEST MAN'S REVENGE, THE. See ATHEIST'S TRAGEDY, THE.

HONEST WHORE, THE. A play in two parts by Dekker, and perhaps Middleton, the first part of which was published in 1604. The earliest extant edition of the second part was not printed until 1630. Its full title as originally published is *The Honest Whore, with the Humours of the Patient Man, and the Longing Wife.*

HONEY (AS. *hunig*, OHG. *honag*, *honang*, Ger. *Honig*, of uncertain origin). A thick, sweet liquid, of more or less pronounced flavor, produced by bees of various kinds and by other insects. The neuter or working bees gather the nectar from the nectaries of flowers (and other sweet substances if flowers are lacking), extracting it by means of the proboscis and passing it into the crop or honey-bag. The bee disgorges the honey into the cells of the comb. Apparently the sweet substance undergoes some change in the honey-bag, as honey differs in flavor from the nectar of the flowers from which it is gathered. The consistency of honey varies with age, and is influenced by its source, that from some flowers being much thicker than that from others. The flavor also varies with the source from which it is gathered, that from clover, sweet clover, basswood or linden flowers, for instance, being very agreeable; that from buckwheat is darker colored and less liked by some. Age also affects the flavor. Some honey which at first has a weedy taste loses this on keeping.

Honey has on an average the following percentage composition: Carbohydrates, 81.2; water, 18.2; protein, 0.4; and ash, 0.2. The carbohydrates are made up of dextrose and lævulose in about equal proportion. Honey sometimes contains a little wax and some aromatic bodies, which give it flavor. The best and newest honey is clear and contained in a white comb. Older honey is of a yellowish tone, and sometimes darker. On standing, dextrose sometimes crystallizes out from liquid honey and renders it opaque or often thick. The composition of honey varies somewhat according to the food of the bees, their age, season, etc. It is a favorite article of diet, owing to its sweet taste and agreeable flavor. The actual food value depends upon the sugars (carbohydrates) present. Like all other carbohydrate foods, it is a source of energy. Honey has a fairly high fuel value, on an average—1520 calories per pound. It is, however, generally eaten for its flavor rather than for its true food value. To the ancients, who were unacquainted with sugar, it was of more importance than it is now. Taken in moderate quantity honey is wholesome and laxative, but persons suffering from digestive disorders often find that it aggravates their symptoms, and there are persons in health who, owing to some idiosyncrasy, cannot eat honey without distress. Its therapeutic action is probably not very great, but it is frequently employed in mixtures prescribed for allaying coughs and in various agreeable cooling drinks used in febrile and inflammatory affections. It should be mentioned that honey occasionally possesses poisonous properties, due to the flowers from which it was gathered. The poisonous honey of Trebizond is gathered from Azalea pontica. In America, poisoning has occurred from eating honey gathered from laurel (*Kalmia latifolia* and *Kalmia angustifolia*). Many other instances of poison honey are on record.

Honey is marketed in the comb and also extracted from it. The latter, sometimes called 'strained' honey, is frequently adulterated with commercial glucose. It is stated that much of the so-called honey which is sold contains none of the product gathered by the bee, and is entirely artificial. Of sixty-six samples of honey examined by the Massachusetts State Board of Health, fifteen were adulterated with cane-sugar or commercial glucose or both. One sample contained as high as 88 per cent. of commercial glucose. See also BEE.

HONEY-BADGER. See BADGER; RATEL.

HONEY-BEAR (so called from its fondness for honey). The Malayan sun-bear (*Ursus Malayanus*). One of the native names is Aswail. See BEAR.

HONEY-BEE. See BEE; BEE-KEEPING.

HONEY-BERRY. See MELICOCCA.

HONEY-BUZZARD, or PERN. A large hawk of the genus Pernis, peculiar in having the lores closely covered with feathers, which overlap one another like scales. The food of honey-buzzards consists, not of honey, but chiefly of bees, wasps, and their young, in quest of which these birds dig up the ground to get at the nests of the insects. They feed also partly on other insects, and less frequently on lizards, small birds, and the like. The several species are natives of the Old World.

HONEYCOMB (AS. *hunigcamb*, from *hunig*, honey + *camb*, connected with *comb*, OHG. *kamb*, *champ*, Ger. *Kamm*, comb, Gk. *γόμφος*, *gomphos*, OChurch Slav, *zǫbŭ*, Skt. *jambhya*, tooth). (1) See BEE; HONEY. (2) In a gun, a condition of erosion which, eating into the rifling of the barrel, alters the direction of the projectile or bullet, and renders the firearm both dangerous and unserviceable. It is caused by the action of exploded gunpowder, and is a consideration of grave importance in the selection of ammunition for army purposes.

HONEY'COMB, HENRY. A nom-de-plume of Leigh Hunt representing a professed descendant of Will Honeycomb, one of the *Spectator* editors.

HONEYCOMB, WILL. A member of Addison's mythical *Spectator* Club. He is an authority on matters pertaining to the fashionable world.

HONEY-CREEPER. A bird of the family Cœrebidæ, a passerine family of tropical and subtropical America, especially abundant in the West Indies. They are small birds, four or five inches in length, but usually of very handsome plumage. The colors are frequently brilliant, blue being especially common. The bill is very slender, sharp, and often decurved, and the tongue is deeply bifid and penicillate. The honey-creepers are very closely allied to the American warblers, of the family Mniotiltidæ, so common throughout the United States. About forty species are known, one of which, the banana-quit, has occasionally strayed to Florida. They probe the corollas of flowers for the minute insects contained therein (not for the honey) and often hover before them like humming-birds, which some of them hardly exceed in size or fall below in brilliance. Consult: Gosse, *Birds of Jamaica* (London, 1847); id., *A Naturalist's Sojourn in Jamaica* (London, 1851).

HONEYDEW. A term applied to the sweetish secretion which under certain conditions drips from the water-pores of the leaves of some trees. It is a form of 'bleeding' which appears only when an abundant supply of moisture (reducing evaporation) and a high temperature permit the development of a considerable sap-pressure in the live cells. Some kinds of manna are the dried honeydew or the saccharine exudations of certain plants. Very generally this exudation, as it dries, coats the surface of leaves and branches with a clammy film, to which everything brought by the atmosphere adheres, thus closing the pores of the plant and impairing its health.

The name honeydew is often applied to a saccharine secretion of certain insects, notably the plant-lice, the flea-lice (Psyllidæ), certain scale-insects and white flies (Aleyrodidæ), and certain leaf-hoppers or tree-hoppers. Of the latter, *Proconia* (*Oncometopia*) *undata* secretes the most abundant supply, and is the cause of the phenomenon often described as 'weeping trees.' The honeydew secreted by all of these insects is frequently very abundant, giving the foliage and bark of trees a glistening appearance, and frequently attracting swarms of bees, ants, wasps, and other honey-loving insects. It is usually secreted from the anus, and with the tree-hoppers is ejected forcibly in a spray, or several small drops at frequent intervals, so that a tree in which they are very numerous appears to be 'weeping.' Honeydew affords a welcome nidus for the spores of certain of the smut-fungi, and an affected tree is likely soon to become black with smut. Thus an olive orchard in California or Southern Europe, the leaves of which turn black, will surely be found to be infested with a scale-insect (*Lecanium oleæ*) which secretes a quantity of honeydew. Orange and lemon plantations sometimes suffer great injury from the abundance of honeydew; and it has been proved a cause of very great loss in the coffee plantations of Ceylon. See APHID.

HONEY-EATER, or HONEY-SUCKER. A name sometimes given to some of the Oriental sun-birds (q.v.), but also the common name of a large family of birds nearly allied to these peculiar to Australia and the islands of that part of the world. This family, Meliphagidæ, of the order *Passeres*, has a long curved sharp bill (see Plate of CREEPERS), not so slender as in humming-birds and sun-birds; the tongue terminates in a pencil of delicate filaments, the better to adapt it for sucking honey from flowers, or juices from fruits. These are a part of the food of the honey-eaters, but they also devour insects in great numbers. They are birds of elegant form, and generally of gay plumage. Most of them have a long and broad tail. They are vivacious and active, and keep up a continual chattering. Some 200 species of this family are known, arranged in about 25 genera. Examples are elsewhere described under BELLBIRD; BLOODBIRD; PARSON-BIRD; etc. Compare FLOWER-PECKER, and see CROSS-FERTILIZATION.

HONEY-GUIDE, INDICATOR, or MOBOC. The popular name of a family of birds ranked in the vicinity of the barbets (q.v.) and woodpeckers (q.v.), but differing from these families in characters which show a slight approach to cuckoos, and also, in some respects, to creepers. About a dozen species are known, mostly natives of Africa, and found in almost all parts of it, but one species occurs in India, one in Malacca, and one in Borneo. They have acquired their name from guiding men to honey, a curious instinct prompting them to flutter near the traveler with frequent repetitions of a cry which resembles the syllable *cherr;* and it is said that if followed they almost always lead to a place where a bees' nest may be found. This story has been denounced as fabulous, but reliable observers vouch for its truthfulness. The birds are very fond of honey, and always reap a harvest after man has once opened up a bee-tree and taken what honey he wants. It is said that the Kaffirs never fail to leave a generous meal for the bird which has guided them to the tree. The honey-guides are small birds of dull plumage and rather stout bill. They generally build pensile nests, and lay white eggs, but some species are said to lay their eggs in the nests of other birds, as the European cuckoo and the cowbird do. See Plate of TROGON, HOOPOE, etc.

HONEY-LOCUST, *Gleditschia triacanthos*, also known as sweet locust and black locust, and in Great Britain as three-thorned acacia. A lofty and beautiful tree of the natural order Leguminosæ, a native of the rich valleys from Ontario through the basin of the Mississippi. It is not found wild on the Atlantic coast of North America, although often planted for ornament in the vicinity of habitations. The flowers, which are small, greenish, and in spikes, usually have, when perfect, six stamens and one pistil, but are very generally unisexual. The leaves are twice pinnate, without terminal leaflets, and derive a peculiar gracefulness from the numerous small light-green shining leaflets. The tree is furnished with numerous sharp triple spines. The pods are long, flat, pendulous, often twisted; the seeds large, brown, and enveloped in a pulp, which, when the pod is ripe, is very sweet. Sugar has been made from it, and when fermented it yields an intoxicating beverage, in use among the American Indians. The honey-locust attains a height of 70 or 80 feet. The wood resembles that of the American locust-tree (see ACACIA), but is more coarse-grained. A variety is common in which the trees are nearly without thorns. The honey-locust is valuable for windbreaks, hedges, and other plantations. A

from Kentucky and Missouri to the Gulf region and along the Atlantic from South Carolina to Florida. A third species, *Gleditschia Texana*, is a large tree in Texas, where it attains a height of more than a hundred feet.

HONEY-MAKING ANT. Any of several species of ants of the genus Myrmecocystus, inhabiting Colorado, Arizona, New Mexico, and Mexico. Like other ants, they live in colonies, in subterranean nests, the entrance to which is in a small raised mound. The honey is obtained at night from small galls on oak-leaves by foraging workers which come home considerably distended with honey. With the honey they feed the other workers and the young in the hill, and what is left over is communicated to a number of ants which simply serve as living receptacles. These live honey-bags cling to the roof of the cavern and move very little, and in time their abdomens become enormously distended. According to McCook, these living storehouses merely retain the honey until it is needed by the colony during the winter, when it is given out from the surcharged crops to feed the colony. An ant with similar habits, but of the genus Melophorus, has been described by Lubbock from Australia, and still another genus (Plagiolepsis) has more recently been discovered in South Africa. In Mexico these ants are eaten by the natives. Consult: McCook, *The Honey Ants of the Garden of the Gods*, etc. (Philadelphia, 1881); Comstock, in *Standard Natural History*, vol. ii. (Boston, 1884); Sharp, in *Cambridge Natural History*, vol. vi. (New York and London, 1900). See ANT.

HONEYMOON, THE. A comedy in five acts, by John Tobin. It was produced after the author's death in 1805, and frequently reprinted. It is partly based on Shakespeare's *Taming of the Shrew*, and its style is strongly influenced by the Elizabethan dramatists.

HONEY-MOTH. See WAX-MOTH.

HONEY-POD. See MESQUITE-TREE.

HONEYSTONE. See MELLITE.

HONEY-SUCKER. A bird of the family Meliphagidæ, or some related form, as the diamond-bird; an indefinite term for a somewhat indeterminate assemblage of Oriental and Australian birds. See HONEY-EATER.

HONEYSUCKLE (AS. *hunisuce*, *hunisuge*, from *hunig*, honey + *sūcan*, *sūgan*, OHG. *sūgen*, Ger. *saugen*, Lat. *sugere*, to suck), *Lonicera*. A genus of plants of the natural order Caprifoliaceæ. The species number one hundred or more, all of which are indigenous in the Northern Hemisphere. They are shrubs, often twining, and have the flowers either in whorls or in pairs. The calyx is short and five-toothed; the corolla, tubular-funnel-shaped, five-cleft, generally two-lipped; the fruit a three-celled and many-seeded berry. About half the species of Lonicera, as well as many hybrids, are in cultivation. The common honeysuckle, or woodbine of England (*Lonicera periclymenum*), is very abundant in woods and thickets in most parts of Great Britain. On account of its beautiful cream-colored flowers and their delightful fragrance, the honeysuckle is often planted in shrubberies. It is said to be the 'twisted eglantine' of Milton. Very similar to this is the perfoliate honeysuckle (*Lonicera sempervirens*), a twining green shrub, called in America the coral honeysuckle, is a native of the Southern United States, often planted on account of its beautiful scented flowers, red on the outside and scarlet within. The Japanese honeysuckle (*Lonicera Japonica*) has become established in the eastern part of the United States, having escaped from cultivation. The berries of the honeysuckle are nauseous. The name honeysuckle is also given to shrubs very different from this genus, but of which the flowers abound in honey, as to species of Banksia in Australia, Diervilla, Aquilegia, etc., in the United States. Rhododendron viscosum is called swamp-honeysuckle in North America.

HONEYSUCKLE ORNAMENT. See ANTHEMION.

HONEYWOOD. The hero of Goldsmith's play *The Good-Natured Man*. He carries his generous folly so far as to resign to another the woman whom he loves and who loves him in secret. He is cured by a trick of his uncle, Sir William, who returns from abroad in disguise and exposes the hypocrisy of the other suitor.

HONFLEUR, ôn'flēr'. A seaport town in the Department of Calvados, France, on the southern shore of the estuary of the Seine, seven miles from Havre, which lies on the opposite shore (Map: France, G 2). The town lost much of its former commercial importance, owing to the silting of its harbor, and the proximity of Havre. Since 1860 a floating basin and other harbor improvements have revived in a measure its waning commerce, and thriving fishing industries and a considerable trade in agricultural and animal products are carried on. The United States is represented by a consular agent. Population, in 1901, 9610. Honfleur, founded in the eleventh century, was of considerable strategical importance during the wars between France and England.

HONG-KIANG, hông'kyäng', or **WESTERN RIVER.** See SI-KIANG.

HONG KONG, hông kông (Chin., Fragrant Streams). An island belonging to Great Britain, lying off the southeast coast of China, from which it is separated by a narrow channel (one-fourth mile at its narrowest), known as *Ly-e-Mun* or (Carpfish Pass,' at the mouth of the Chu-kiang or Pearl River (Map: China, D 7). It is 75 miles southeast of Canton, and 38 miles east of Macao. Consisting of a range of granitic hills, it has little level land, its coast-line is very irregular, and its shores are steep and precipi-

south coast, by deep inlets, the chief of which are Ty- (or Tai) tam, and Shek-pai Wan. It is between eight and nine miles long, from east to west, and nearly four miles in average breadth. Area, 20 square miles. The highest of six mountain peaks is Victoria Peak, with an elevation above sea-level of 1825 feet.

Geologically, Hong Kong is entirely of igneous origin, its prevailing rock being a gray rapidly disintegrating syenite upheaved and penetrated by porphyritic rocks and basaltic trap. The climate of the island is very trying to foreigners. The temperature seldom exceeds 93° F.; the minimum summer temperature is 75°; but the rainfall in certain seasons is sometimes excessive. The driest month of the year is December, and winter generally is the most delightful part of the year. The sanitary arrangements are good, but the Chinese quarter is sometimes visited by epidemics.

Notwithstanding the rocky character of the island and its generally barren appearance, Hong Kong possesses a rich and varied flora, which corresponds as a rule with that of Assam, Sikkim, and Nepal. Bentham, in his *Flora Hongkongensis* (London, 1861), enumerates 1056 species of flowering plants and ferns, divided into 591 genera and 125 orders. The fauna of the island includes only a few species of kingfisher, some singing birds and rock-pigeons; several varieties of snakes and lizards are found, and scorpions and centipedes abound. Insect life is more plentiful, and includes the mosquito, and a flying cockroach from an inch to an inch and a half or two inches long. Ants, both white and red, are abundant and destructive. Fish are plentiful in the surrounding waters, and a most wonderful variety is daily marketed.

The population consists principally of Chinese from the mainland. In 1897 it was 236,382, of whom only about 9000 were Europeans and Americans, and about 2000 East Indians and Japanese. The boat population numbers nearly 18,000. The great bulk of the population is found in the city of Victoria (called by the Chinese Kwan-tai-lo), which stretches for nearly four miles along the north shore, opposite the rocky peninsula called by the Chinese Chim-sha-tsui, but better known as Kow-lung ('nine dragons'), about 1½ miles distant. Here are the Government buildings and the great business houses and warehouses stretching along the water-front or perched in terrace-like rows on the steep hillsides, while far up on the Peak are many handsome bungalows. The buildings are substantial and imposing, and usually white. The more prominent are the Government House, City Hall, the Clock Tower, and the Anglican and Roman Catholic cathedrals. There are a public garden, several hospitals and cemeteries, two public libraries, many clubs, and a race-course. The streets, which are well made and well kept, are lighted with gas and electricity, and a plentiful supply of water is brought from Taitam by an aqueduct three miles long. The principal mode of conveyance is by jinrikisha in the more level parts, and sedan chairs, and these are now supplemented by an inclined plane and steam tramway two-thirds of the way to the Peak.

The harbor is capacious and safe, though exposed at times to typhoons. Four square miles of the peninsula of Kow-lung, which juts out harbor on the north and west, have been held by the British since 1860, under a lease obtained from the Governor-General of the two Kwang provinces of China. This was a base of operations during the Anglo-French punitive expedition to the north in that year, and since then has served as a sanatorium for the inhabitants and the troops stationed here. In 1898 an extension (to 376 miles) of the territory and a lease for 99 years were granted by the Chinese Government of Peking, and the peninsula now forms part of the Colony of Hong Kong. Here are dry docks and warehouses, some tanneries, etc., and here also is a station of the Chinese Imperial Maritime Customs, to check smuggling to the mainland of China. The hill of the Sung Emperors, with many historical associations, has been set apart as a recreation ground.

On the opposite side of the island are several small centres of population, the most important of which is Aberdeen, on the inlet known as Shek-pai Wan. Here are the sugar-refineries, ship-building yards, and foundries, etc., and two large graving-docks, the larger of which is 465 feet long, 80 feet wide, and has a depth on the sill of 24½ feet at spring tides. The chief industries of the colony are sugar-refining, cotton spinning and weaving, tanning, rope-making, ship and boat building; the manufacture of cement, drain-pipes, tiles, black-wood furniture, paper, bamboo, and rattan ware, etc. There is also a vermilion factory, and among the natives many hands are employed in wood and ivory carving, gold-beating, and the production of gold, silver, copper, iron, and sandalwood wares. Granite-quarrying is an important industry, and large quantities of dressed stone are exported annually. Hong Kong is a free port, and has no custom-house, and its commercial activities are chiefly distributive. The amount of business can only be inferred from the harbor-master's reports.

In 1898, 77,293 vessels, with a tonnage of 15,938,174 tons, entered port, and 79,629 vessels, of 17,265,780 tons, cleared. The trade of the port is chiefly with Great Britain and her colonies, the open ports of China, Japan, and the United States. The only commodity that pays a tax is opium. In 1898, 39,392½ chests were imported, and 37,828½ (= 43,142,525 catties) were exported. For trade purposes the Mexican and Hong Kong dollar are legal tender, and bank-notes issued by the three great banks doing business here are in circulation.

The island was ceded to Great Britain by Kishin, the Chinese Commissioner, and was occupied by British forces in January, 1841, but this treaty was disallowed by the Emperor. In the following year, however, it was ratified by the treaty made at Nanking. On June 26, 1843, Hong Kong became by proclamation a separate colony, but continued to be governed by the Minister Plenipotentiary to China until 1857. Since that date its affairs have been administered by a Governor and an executive council composed of the Colonial Secretary, the officer commanding the troops, the Attorney-General, the Registrar-General, the Treasurer, and the Director of Public Works. There is also a legislative council of ten, of whom five are official, and five unofficial members. Of the latter three are nominated by the Crown—one of them must be a Chinese, one is nominated by the Chamber of Commerce, and one

tered by a supreme court, a police court, and a marine magistrate's court. In 1898 the police force consisted of 630 men, of whom 112 were Europeans, 226 East Indians, and 292 Chinese.

The public revenue is derived chiefly from land taxes and land sales, licenses, fees of court, the post-office, rent of Government property, light and harbor dues, opium, etc. In 1898 the total revenue was $2,918,159, and the expenditure $2,841,805, leaving a surplus of $76,354. The chief items of expenditure were: Public works, $428,828; military purposes, $519,274; police, $222,163; sanitary purposes, $101,613; education, $72,420; and jails, $57,954. The contribution for Imperial defense is £40,000 per annum. There is an Imperial garrison of several regiments, and a local volunteer artillery corps of over 100. The China naval squadron has its headquarters here, and the defenses are of great strength.

EDUCATION. In 1898 there were in the colony 109 educational establishments, with 8522 pupils, and of these 16 were Government schools. Queen's College, a Government institution, had 1344 students on the roll. Besides this there are Saint Paul's College, an Anglican institution, and many missionary and private schools. A number of ably conducted newspapers, both Chinese and English, are published. Consult: Mayer and Dennys, *Treaty Ports of China and Japan* (London and Hong Kong, 1867); Norman, *The Far East* (London, 1898).

HONI SOIT QUI MAL Y PENSE, ô'nē' swä kē mäl ē päns (Fr., Evil to him who evil thinks). An exclamation traditionally ascribed to Edward III. It is said to have been uttered at a ball when the King tied about his leg a garter which the Countess of Salisbury dropped while dancing. The words form the motto of the Order of the Garter (q.v.).

HONITON, hŏn'ĭ-ton. A market-town and municipal borough in Devonshire, England, on the Otter, 16 miles northeast of Exeter (Map: England, C 6). It is famous as the original manufacturing seat of 'Honiton lace.' Its manufacture was introduced by the Lollards during the reign of Elizabeth. The Vale of Honiton is famous for its butter. The town maintains its own water-supply. Population, in 1891, 3216; in 1901, 3270.

HONOLULU, hŏn'ô-lōō'lōō. The capital and commercial centre of the Hawaiian Islands, situated on the southern coast of the island of Oahu, in 21° 18′ N. latitude and 157° 55′ W. longitude, 2089 miles southwest of San Francisco (Map: Hawaii, D 2). It is wholly a modern town, surrounded by luxuriant fruit and ornamental trees and foliage, and is famed for its beauty and the loveliness of the region. It has a very healthful and mild climate, especially favorable for pulmonary troubles. The streets are well laid out, and the houses, although unpretentious, are rendered picturesque by their gardens. Honolulu has twenty-five miles of macadam streets. The area of its public parks is 194 acres. Among the public buildings are the royal palace, completed in the Italian style in 1882, the Government buildings, several churches, a museum containing interesting remains relating to the early history of the archipelago, a theatre, and a bank. There are 19 public schools and one high school, with a total attendance of 3345 library. There are manufactures of machinery. The town is equipped with a good water-supply, electric lighting and railway and telephone service. Its water-works plant, costing $1,300,000, and its electric-light plant are owned and operated by the Territorial Government. The city's municipal property had an assessed value in 1900 of about $2,500,000. The budget for that year balanced at $1,131,905. Over one-half of the expenditure was for construction and other capital outlay. There was spent on schools $128,047. The harbor is well protected by coral reefs. The light from its lighthouse is visible eight leagues. Honolulu has regular steam communication with San Francisco (with which it is also connected by cable), Seattle, Vancouver, New Zealand, Sydney, and Japan. It forms the chief outlet for the trade of the entire archipelago. It is the seat of an Anglican and of a Catholic bishop, and of a number of European consular agents, as well as of the Government officials of the islands. As late as 1815 the present capital was a mere village. In that year, at the suggestion of the American John Young, then Governor of Hawaii, it was fortified, and in 1820 it became the capital of the archipelago. Population, in 1890, 22,907; in 1900, 39,306.

HONOR. *n.* In English feudal land law, an estate or lordship made up of several manors held under one baron or lord paramount. One court baron was often held for the whole estate, but regarded as the court of each manor. It was distinct from the great manor, although the name has been sometimes applied to the latter. See MANOR.

HONOR, KNIGHTS AND LADIES OF. A fraternal benevolent society organized in Kentucky in 1877 for social and beneficial purposes. A distinguishing feature of this society is that men and women are admitted to membership on equal terms. The central authority is the supreme lodge, and the chief officer has the title of supreme protector. The Order has sixteen grand lodges and 1160 subordinate lodges, representing a total membership of 63,000. Since its organization it has dispensed benefits to the beneficiaries of deceased members to the amount of $19,000,000, and during the last fiscal year the disbursements for the same object amounted to $1,178,000.

HONOR, KNIGHTS OF. A fraternal benefit society in the United States, organized at Louisville, Ky., June 30, 1873, by the institution of Golden Lodge No. 1, with seventeen charter members. Its objects are the social, moral, and intellectual elevation of its members, the establishment of bonds of fellowship between them, and the payment of death benefits to the widows and orphans of deceased members. It is incorporated under the laws of the State of Missouri, with headquarters at Saint Louis. The supreme lodge is the executive head of the Order, and is composed of the officers and of representatives from the various grand lodges, who meet annually and enact all laws governing the Order. The grand lodges are composed of representatives from subordinate lodges, are governed by officers elected by the representatives, and they control the subordinate lodges, in accordance with the laws of the supreme lodge. The Order has paid to beneficiaries since its organization $78,094,864. The benefits disbursed during the year ending

existence at the close of 1902 36 grand lodges and 1918 subordinate lodges, representing a membership of 55,733, with insurance in force of $96,852,500.

HONOR, Maids of. See Household, Royal.

HONO'RIA, Justa Grata. A daughter of Constantius III. and sister to Valentinian III., born about A.D. 418 in Constantinople. Living at Valentinian's court in Rome, she secretly invited Attila the Hun to marry her; but as he did not entertain the proposition, she sent another invitation, and Attila, accepting it, claimed with her a portion of the Empire. As Valentinian refused to accede to such a demand, Attila invaded Gaul. Honoria's fate is unknown.

HONO'RIUS. The name of four popes and one antipope.—Honorius I., Pope 625-38. He was born of a consular family in Campania. Of his early history little is known, except that he took an active part in bringing to a close the disputes which arose in Northern Italy about the controversy of the three chapters. (See Vigilius.) As Pope his name is connected with the history of the paschal controversy in Ireland, and with that of the early Anglo-Saxon Church, and his pontificate is particularly memorable on account of the Monothelite heresy. (See Monothelitism.) Honorius, misled, it is alleged, by a statement of Sergius, Patriarch of Constantinople, expressed himself in language which would appear to condemn the doctrine of two wills of Christ. In a decree of the sixth general council (Constantinople, 680-81) Honorius is anathematized in company with many others, of whose heterodoxy there can be no doubt. Catholic theologians, however, defend his orthodoxy, or at least point out that his case is not one of those in which infallibility is claimed by the Vatican decree. It was because Döllinger (q.v.) believed that the heresy of Honorius was irrefutably established that he could not conscientiously accept the dogma of Papal infallibility, because it was retroactive and implied that there never had been a pope who was heretical. This assertion in regard to Honorius was an important factor in the Old Catholic movement. He died in 638. Consult: Döllinger, *Fables and Prophecies of the Middle Ages* (New York, 1892); Pennacchi, *De Honorii Causa in Concilio Sexto* (Rome, 1870); Willis, *Pope Honorius and the New Roman Dogma* (London, 1879). The letters of Honorius are in Migne, *Patrologia Latina*, lxxx.—Honorius II. (Lambert, Cardinal of Ostia). Pope 1124-30. He recognized Lothair of Saxony as German Emperor (see Lothair II.), and was unable to crush the growing power of Count Roger of Sicily in South Italy. (See Roger II.) His letters are in Migne, *Patrologia Latina*, clxvi. —Honorius II. was also the title taken by Peter Cadalous, Bishop of Parma, antipope to Alexander II., 1061. He died 1073.—Honorius III. (Cencio Savelli). Pope 1216-27. He crowned Frederick II. as Emperor, tried in vain to institute a crusade, and confirmed the orders of the Dominicans and Franciscans. To him we owe the famous *Liber Censuum Romanæ Ecclesiæ*, in which the income of the Church of his day is detailed. It was reprinted by Paul Fabre, *Liber Censuum* (Paris, 1899, et seq.). Consult Tauge, *Die päpstlichen Kanzleiordnungen von 1200-1500* (Münster, 1896).

HONORIUS, Flavius (A.D. 384-423). Roman Emperor of the West from 395 to 423, second son of Theodosius the Great. He was born in 384. On the death of his father, A.D. 395, the Empire was divided into two parts, Honorius receiving the western half, with Rome as his capital, while his brother Arcadius received the eastern half, with Constantinople as his capital. Honorius, being only ten years old, was put under the guardianship of Stilicho (q.v.), who was all his life the *de facto* ruler of the Western Empire. Honorius first took up his residence at Milan, and later for the most part held his Court at Ravenna. In 398 he married Maria, the daughter of Stilicho. In 401 Alaric, King of the Visigoths, invaded Italy. Stilicho, who was then in Germany, marched against him, and a great battle was fought at Pollentia in 403 (or 402), followed by another encounter at Verona. Alaric, unable to withstand Stilicho, withdrew from Italy. Another irruption of barbarians, under Radagaisus, took place in 405, which was again repelled by Stilicho, who, nevertheless, lost the favor of his master, and was treacherously slain at Ravenna, A.D. 408. Alaric was not slow to take advantage of the opportunity afforded him. In the same year he invaded Italy, and besieged Rome, which escaped only on the payment of a heavy ransom; and in the following year he again besieged and took it, raising Attalus to the Imperial purple, but a little later deposing him. In 410 the Visigothic King again appeared before Rome and handed it over to be pillaged by his troops. The death of the invader in the same year again freed Italy. A new champion of the falling Empire arose in the person of Constantius, who suppressed the rebellions of Constantine, Jovinus, and Sallustius in the northern provinces, and of Heraclian in Africa. He was now appointed the colleague of Honorius in the consulship, and received in marriage the hand of Placidia, sister of Honorius, along with a share in the Empire, which he did not long enjoy, as his death took place a few months after. The Gothic and German tribes had for some time been slowly but steadily encroaching upon the Western Empire, and Honorius's reign saw Spain, Gaul, and Pannonia, some of the finest provinces, snatched from its grasp. He died August 27, 423.

HONORS, Military. See Salutes.

HONORS OF WAR. Stipulated privileges allowed a capitulating enemy; formerly a chivalrous appreciation of his valor, but in later times dictated almost entirely by the politic or economic phase of the question. Honors of war include the retention of arms, or standards, the granting of parole, and the general treatment of the surrendered troops and stores.

HON-SHIU, hŏn'shyōō'. The most important of the group of islands constituting the Empire of Japan. See Hondo.

HONTHEIM, hônt'hīm, Johann Nikolaus von (1701-90). A German Roman Catholic prelate and writer. He was born at Treves, January

of his native city, studied canon law at Louvain under the celebrated Van Espen, and afterwards taught at Treves and Coblenz, finding time to write at Treves two voluminous works on the history of the town, *Historia Trevirensis Diplomatica* (1750) and *Prodromus Historiæ Trevirensis* (1757). But his literary career is chiefly memorable for a theological essay, *De Statu Ecclesiæ et Legitima Potestate Romani Pontificis* (1763), which by the novelty and boldness of its views created an immense sensation in the theological world. The work was composed with a view to the reunion of Christian sects. The name of the author was for a long time unknown, the work being published under the pseudonym of Justinus Febronius (a name taken from that of Hontheim's niece, a canoness at Juvigny, who was called Justina Febronia), and the system of Church government which the work propounds has been called Febronianism (q.v.). The work, immediately after its appearance, was condemned by Clement XIII., as well as by many individual bishops. It drew forth a number of replies, the most important of which are those of Zaccaria (1767) and Ballerini (1768). Pius VI., in 1778, required from Hontheim a retraction of these doctrines. This retraction, however, was modified by a subsequent *Commentary*, published at Frankfort in 1781, to which, at the desire of the Pope, Cardinal Gerdil replied. Hontheim made full submission to the Church in 1788, and died in his ninetieth year at Montquintin, in Luxemburg, September 2, 1790. Consult Mejer, *Febronius* (Freiburg, 1885), a work biased in favor of Hontheim.

HONTHORST, hŏnt'hôrst, GERARD VAN (1590-1656). A Dutch painter, called 'Gherardo dalle notti,' from his frequent painting of night scenes. He was born at Utrecht, and at first studied under Abraham Bloemaert. At twenty he went to Italy, and was greatly influenced by Caravaggio; it was here that he gained his sobriquet. When he returned to Utrecht he was made the head of the Guild of Saint Luke (1623), and opened a large school. An invitation from Charles I. took him to England in 1628. There he decorated Whitehall. After this he went to The Hague, where he lived for several years. He painted a great number of pictures, and of all kinds, including portraits. All these show a good deal of power and coarse realism. The European galleries contain many of his works. A constantly repeated subject of his is a group of several persons with musical instruments, and one of these "Concerts" (1624) is at the Louvre. His brother, WILLEM VAN (1604-66), was also a painter, particularly of portraits, in the style of his brother.

HONVÉD, hŏn'vād (Hung., land-defenders). The name given in Hungary under the earlier kings to the national champions. With the disappearance of these the word, too, disappeared; but in the summer of 1848 it was revived, and applied first to those Hungarian volunteers dispatched to the south against the Serbs, and subsequently, when the war with Austria commenced, to the whole patriotic army. Since the reconstruction of the Austro-Hungarian monarchy the name honvéd, or honvédség, has been given to the militia of the Hungarian portion of the Empire.

Bombay, British India. See HUBLI.

HOOCH, hōg, or **HOOGH**, PIETER DE (1632-81). A Dutch painter, born at Rotterdam. According to the latest biographers of this artist, he was the pupil of Nikolaas Berchem at Amsterdam, but he seems to have been more influenced by Rembrandt than by Berchem. About 1654 he went to Delft, and in 1655 was elected a member of the Guild of Saint Luke. In 1667 he was still at Delft, but at this date all positive trace of him is lost. There is some evidence that he lived in Amsterdam after this, and still later at The Hague. It is curious that such a great painter as de Hooch should not have been appreciated until our own time, but such is the case. His works are now greatly prized. The list of them includes about eighty, principally in the museums of Holland; the National Gallery of London possesses three fine interiors with figures, and there are several in the Louvre and some in private collections. He generally treated domestic scenes out of doors, where his mastery of light is unequaled by any painter of his country.

HOOCHENOO, hōō'chê-nō. A spirituous liquor concocted by the natives of Alaska, and named from one of the tribes of Indians.

HOOD, ALEXANDER (1758-98). An English navy captain. His first voyage was aboard the *Romney* with his cousin, Captain Samuel, afterwards Viscount Hood, but in 1772 he went round the world on the *Resolution* with Captain Cook. Between 1776 and 1783 he was on active service in the West Indies, but was appointed (1797) to command the *Mars* of the Channel fleet, and was one of the captains put ashore by the mutineers off Saint Helens and Spithead. The next year, when his frigate was engaged in the famous duel with the *Hercule*, Captain Hood was mortally wounded at the moment of victory.

HOOD, EDWIN PAXTON (1820-85). An English Congregationalist. He was born in London, December 18, 1820, educated privately, and became a Congregational clergyman in 1852. He held various charges, and from 1880 to his death in Paris, June 12, 1885, he was pastor of the Falcon Square Church, Aldersgate Street, London. He rendered conspicuous service in raising the funds for the Royal College for Incurables, his pamphlet, "The Palace of Pain" (1885), having brought in £2000. He was the author of numerous volumes, several of which are still read, especially his *Lamps, Pitchers, and Trumpets: Lectures on the Vocation of the Preacher* (1867), a racy volume on homiletics and the history of preaching, and *The World of Moral and Religious Anecdote* (1870). His agreeable book-making powers were exhibited in the biographies of John Milton (1852), Andrew Marvell (1853), Emanuel Swedenborg (1854), William Wordsworth (1856), Thomas Binney (1874), Isaac Watts (1875), Thomas Carlyle (1875), Christmas Evans (1881), Robert Hall (1881), and Oliver Cromwell (1882).

HOOD, JOHN BELL (1831-79). An American soldier, prominent on the Confederate side during the Civil War. He was born in Owingsville, Ky.; graduated at West Point in 1853; and remained in the United States Army until 1861, when he resigned to accept a commission in the Confeder-

he took part in the Virginia campaigns, where his gallantry gained him the rank of major-general. At Gettysburg his division was stationed on the extreme right of the Confederate line, and took part in some of the most desperate fighting of that bloody battle. In September, 1863, he was sent to the aid of General Bragg in Tennessee, and took part in the battle of Chickamauga, September 19th-20th, where he lost a leg. The next spring he again took the field and was made a lieutenant-general in Johnston's army. During the campaign by which this general sought to impede Sherman's advance on Atlanta, Hood was engaged in several battles, and on May 25, 1864, his corps was attacked by Hooker at New Hope Church. On July 17th he was given the temporary rank of general, and was appointed to succeed Johnston in command of the Army of the Tennessee. Sherman was exultant at this change, for he knew that Johnston's wearing tactics would now give place to a policy which would enable him to make good use of his superior fighting strength. On July 20th was fought the battle of Peach Tree Creek, as a result of which Hood was compelled to withdraw into the fortifications about Atlanta, and two days later the battle of Atlanta followed his flank movement toward Decatur. On July 28th he attacked the Federal forces, but was again compelled to withdraw into his fortifications. After another engagement at Jonesboro, on September 1st, he abandoned Atlanta, which was entered by Sherman on the 2d. Hood, after operating for several weeks along the line of Sherman's communications, and moving westward into northern Alabama, crossed the Tennessee River about the end of October and began to move northward through Tennessee against General Thomas. After his attack on the Federal forces under Schofield at Franklin had been repulsed (see FRANKLIN, BATTLE OF), he proceeded to Nashville, where he found Thomas stationed with a force about equal to his own. Thomas was not prepared at the outset, and for nearly two weeks the two armies faced each other. At last, on December 15th, Thomas ordered the attack. The Confederates fought desperately, but were forced back all along the line. That night Hood re-formed his army and the next day awaited the Federals on the Overton Hills. Owing to his strong position, he succeeded in repelling the first assault, but the second was more successful, and soon the Confederates were driven in utter rout. As a military force Hood's army disappeared, and on January 23, 1865, at his own request, he was relieved of his command. After the war he became a commission merchant in New Orleans and president of the New Orleans branch of the Life Association of America. He wrote a book entitled *Advance and Retreat: Personal Experiences in the United States and Confederate States Armies* (1880), and wrote a number of articles for *Battles and Leaders of the Civil War* (New York, 1887).

HOOD, MOUNT. A peak of the Cascade Range (q.v.), on the western border of Wasco County, Ore. (Map: Oregon, D 4). It is 50 miles east by south of Portland, whence it is reached by rail to Hood River, 66 miles, and thence by stage to the base of the northern glaciers. It has an altitude of 11,934 feet; there are no formidable an extensive and magnificent view.

HOOD, ROBIN. The hero of a group of English ballads, which represent him as an outlaw, dwelling in Sherwood forest, Nottinghamshire, or in Barnsdale, a woodland district in the West Riding of Yorkshire. The earliest known mention of him is in the second version of *Piers Plowman* (about 1377), where Sloth says he "knows rymes of Robyn Hood" (*Skeat*, Passus v. II. 401, 402). The oldest extant ballad of which he is hero is "A Geste of Robyn Hode," assigned to about 1400. This poem, consisting of 456 four-line stanzas, is in magnitude almost an epic. Among succeeding ballads, of which Professor Child collected thirty-nine, are "Robin Hood and Guy of Gisborne," "Robin Hood and the Monk," and "Robin Hood's Death." As early as the last half of the fifteenth century Robin Hood became a popular character in the semi-dramatic celebrations of May-day, both in England and in Scotland, and later in the regular drama, as in Ben Jonson's beautiful pastoral *The Sad Shepherd*. Robin is the ideal outlaw, courteous, liberal, and reverent. Skillful with the bow, he shoots the King's deer, but he loves the King. He takes from the rich clergy their superfluous goods, but what he does not need himself he gives to the poor. He is chivalrous toward all women, and reveres the Virgin Mary. His chief foe is the sheriff of Nottingham. With him is a numerous band. There are Little John, Scathlock, or Scarlock, Friar Tuck, Maid Marian, Much the Miller's Son, and several others. In his illness Robin goes to a prioress, who is his cousin, to be bled. She allows him to bleed to death.

Unsuccessful attempts have been made to prove the real existence of Robin. True, his career as eventually developed has all the details of authentic history; but these were taken from the ballads themselves, or from semi-historical personages, as Hereward the Wake, and Wallace, and applied to Robin. Others have tried to connect the surname Hood with Woden, the chief of the Norse gods, or with Hödr (warrior), another Norse divinity. It is now rather thought to be a variant of Hodeken, an elf in Germanic folktales. Robin is of course a diminutive of Robert. Robin Hood then seems to have been at first only an elf of the woods, about whom later gathered typical adventures of the outlaw. Robin Hood is the hero of a comic opera by Reginald De Koven (q.v.), and a late drama by Tennyson, *The Foresters*, has Robin Hood as its main character. Consult: Child, *English and Scottish Ballads* (Boston, 1883 et seq.); *Bishop Percy's Folio*, ed. Hales and Furnivall, vol. i. (London, 1867); Ritson, *Robin Hood* (London, 1795, new ed. 1885); and for an attempt to prove the existence of Robin Hood, Hunter, *The Great Hero of the Ancient Minstrelsy of England* (London, 1852).

HOOD, SAMUEL, Viscount (1724-1816). An English admiral, born at Thorncombe. He embarked at first as captain's servant, then as seaman, was midshipman on Rodney's ship (1743), was lieutenant at twenty-two and post-captain at thirty-two. During his retirement from active service (1778-80), he was commissioner of the dock yards at Portsmouth, but went to sea again under Admiral Rodney, as next to him in rank upon the North American Squadron. Hood took part in several famous naval battles in 1781-82,

he was granted an Irish peerage. He was elected member of Parliament for Westminster in 1784, was made a Lord of the Admiralty four years later, took command of the British fleet in the Mediterranean in 1793, and in 1796 was made a viscount. He was specially strong as a tactician, and his junior officer, Horatio Nelson, acknowledged his indebtedness to him in that particular, and upon his retirement wrote: "The fleet must regret the loss of Lord Hood, the best officer, take him altogether, that England has to boast of; great in all situations which an admiral can be placed in."

HOOD, THOMAS (1799-1845). An English poet and humorist, born in London, May 23, 1799. After leaving school he was placed in a merchant's counting-house, but his health failing, he was sent to Dundee. At the age of nineteen he returned to London, and studied the art of engraving with his uncle. In 1821 he became assistant sub-editor of the *London Magazine*. He contributed to it considerable verse, and made the acquaintance of its brilliant staff, which included De Quincey, Hazlitt, and Lamb. His first separate publication was entitled *Odes and Addresses on Great People*, written in conjunction with J. H. Reynolds (1825). In 1826 he published *Whims and Oddities*, of which a second series appeared during the following year. In 1829 he began the *Comic Annual*, and continued it for nine years. The same year he edited the *Gem*, one of the popular annuals, contributing to its pages his striking poem entitled "Eugene Aram's Dream." In 1824 Hood married the sister of J. H. Reynolds, and in 1831 he went to reside at Wanstead, in Essex, where he wrote his novel *Tylney Hall* (1834). While there he suffered from the failure of a publisher. In 1835, now weakened in health, he went to the Continent, where he remained five years, first at Coblenz, on the Rhine, and then at Ostend. He, however, continued his *Comic Annuals*, started *Hood's Own* (1838), containing a portrait and reminiscences, and made Smollett's *Humphrey Clinker* a framework for some humorous sketches called *Up the Rhine* (1839). In 1840 he returned to England, and began to write for the *New Monthly Magazine*, of which he became editor the following year. Here appeared "Miss Kilmansegg," his best comic poem. Withdrawing from this magazine toward the close of 1843, he started *Hood's Magazine*, January, 1844; and in the same year collected his fugitive pieces under the title of *Whimsicalities*, which were illustrated by Leech. By Christmas he took to his bed, which he never again left. During his last illness Sir Robert Peel conferred on him a pension of £100 a year, which he transferred to his wife. He died on May 3, 1845, and was buried in Kensal Green Cemetery.

Hood takes a high place both as humorist and as serious poet. He is great at once in comedy and in pathos, and he sometimes curiously mingles and combines both. As a punster he is supreme: he connects far-separated words and ideas by the most subtle analogies, and sends them loose. Much of his comedy, however, is verbal and shallow, and will be soon forgotten. It is as a poet that Hood will be remembered. His "Eugene Aram's Dream," "Song of the Shirt," and "Bridge of Sighs" are among the most perfect

Consult: *Memorials*, ed. by his daughter (London, 1860); *Literary Reminiscences* in *Hood's Own*, first series (ib., 1838); Eliot, *Hood in Scotland* (Dundee, 1885); *Works*, ed. by son and daughter (10 vols., London, 1869-73); *Poems*, ed. by Ainger, in "Everley Series" (12 vols., ib., 1897); and *Haunted House*, with memoir by Austin Dobson (ib., 1895).

HOODED CROW (so called from the marking on the head). A true crow (*Corvus cornix*) of the north of Europe, also called in England 'dun,' or 'gray,' and 'Royston' crow, and in Scotland 'hoodie.' The head, fore parts, and wings are glossy black; the remainder of the body, ash-color; the bill and feet, black. It is slightly migratory, and retreats southward in winter from the most northerly parts of Europe and Siberia when the other crows go south. Its general habits are those of the carrion-crow, with which it interbreeds extensively, so that some naturalists believe the two birds to be varieties of one species. See Newton, *Dictionary of Birds* (London and New York, 1896).

The 'hooded crow' of India is a smaller species (*Corvus splendens*) of similar appearance. It is tame to the point of being a nuisance to Europeans wherever it is numerous. Hardly a station or camp in British India, it is said, is free from a crowd of these feathered thieves. They have the amusing habit of building their nests of the wire from discarded soda-water bottles.

HOODED MERGANSER. See MERGANSER.

HOODED SEAL. A large seal (*Cystophora cristata*) inhabiting the coasts of Greenland, and North America as far south as the United States. It also occurs on the coasts of Sweden and Norway and in the Arctic Ocean. It is found generally in the icy islands, or floating ice-fields, in the open sea, and visits the land in April, May, and June. About two inches from the extremity of the upper jaw there is a cartilaginous crest, increasing in height as it passes backward to the back part of the head, where it is about seven inches high, and has a longitudinal depression in the middle, about an inch deep. This crest is an elongation of the septum of the nose, and the true nostrils open on either side of it. It is covered by a muscular hood clothed with fur. The whole apparatus is probably defensive, but may be accessory to the organ of smell, and, as the fishermen suppose, may serve as a reservoir of air while the animal is under water. The hood is wanting in the females and young. The hooded seal is polygamous and brings forth its young on the ice. It has a voice resembling the bark and whine of a dog, and when attacked weeps copious tears.

HOODED WARBLER (so called from the marking on the head). One of the most beautiful and active of the American 'fly-catching' warblers. (See WOOD-WARBLER.) It is olive-green above and yellow below, with the head, neck, and breast deep black. It inhabits in summer the Eastern United States, where it frequents thickets and undergrowth, and makes a soft, cup-like nest in low bushes. Its systematic name is *Sylvania mitrata*. See Colored Plate of WOOD-WARBLERS.

HOODIE. See HOODED CROW.

nected with OChurch Slav. *kopyto*, hoof, or with Skt. *śapha*, Av. *safa*, hoof). The exterior horny covering of the foot of many animals. The healthy soundness of the horse's foot is mainly preserved by permitting it to grow uninjured by the rasp and knife; its toughness is secured, and undue dryness and evaporation prevented, by smearing daily the crust, sole, and frog with a little glycerin, or a mixture of a pound of lard and a quarter of a pound each of tar, honey, beeswax, and glycerin melted together. Softness and brittleness of the hoof, which are common sources of cracks and corns, may be remedied by the regular use of such dressings, by placing the feet for several hours daily in thick woolen swabs, kept cool and moist by frequent applications of cold water, and by encouraging a more healthy growth of horn by occasional mild blisters round the coronary band. Cracks, or sand-cracks, as they are termed, mostly occur among horses much upon the road, cause lameness, and constitute unsoundness. When serious and recent, poulticing, thinning away of the crust about the crack, and perfect rest are essential. After the earlier heat and tenderness are removed a hot iron should be drawn at right angles to the crack, both above and below, so as to separate the diseased from the sound horn. Waxed thread or fine wire should be wound round the hoof, and a sound growth of horn stimulated by a blister round the coronet. The horse's hoofs are too hard and coarse to be employed for the making of the better class of combs and buttons, for which purpose the hoofs of cattle are extensively employed. They are, however, largely used by manufacturers of prussiate of potash and artificial manures. See CORN.

HOOFT, hōft, PIETER CORNELISZOON (1581-1647). A Dutch poet and historian, born in Amsterdam. He was the son of an Amsterdam burgomaster; received a thorough education in the classics, and made an extensive journey through France, Germany, and Italy. After his return in 1601 he studied jurisprudence at Leyden, and was appointed bailiff of Muiden. At the Castle of Muiden and in Amsterdam he gathered around him the most celebrated artists, poets, and scholars of the day, known in Dutch literary history as the 'Muiden circle.' He is considered one of the first, if not the first, of Dutch prose writers, despite his too frequent Latinisms. His letters are particularly charming, and are free from this failing. Among his poetical works are the pastoral play in Italian style, *Granida* (1615), the tragedies *Gheraert van Velzen* (1613), *Theseus en Ariadne* (1614), and *Baeto* (1626). His chief historical works are *Hendrik de Groote* (1626); *Rampzaaligheden der verheffinghe van huize Medicis* (1636); *De Nederlandsche Historien* (2 vols., 1642). The latter is one of the classics of Dutch literature and Hooft's chief work. He also translated Tacitus, of whom he was an imitator, and he is often called the 'Dutch Tacitus.' His *Poems* were published in 1636 (new complete edition, ed. P. Leendertz, Haarlem, 1864). His erotic verse is particularly notable as being the first of this genre to appear in Dutch literature. Consult his *Breven*, edited by J. van Vloten (Leyden, 1855-57).

colonies of the Netherlands, situated in the Province of Drenthe (Map: Netherlands, E 2). It has extensive peat-mines and shipyards. Population, in 1889, 11,702; in 1899, 11,924.

HOOGLY, hōōg'lī. One of the arms of the Ganges. See HUGLI.

HOOGSTRAETEN, hōg'strä'ten, SAMUEL VAN (1627-78). A Dutch painter, born at Dordrecht. He was the pupil of his father, Dirk van Hoogstraeten (1596-1640), an artist, and afterwards of Rembrandt. He began as a portrait painter in the manner of his last master, but afterwards was influenced by the Italian school and did landscape and still life. In this style he is reminiscent of Pieter de Hooch. In 1651 he went to Vienna and Rome, and also paid a visit to England (1653). He is the author of an *Introduction to the High Art School* (1678), which is full of admiration for Rembrandt. His paintings include: "A Lady Walking in a Court," "Old Jew," "Inner Court of a Fortress," and "A Sick Girl."

HOOGSTRATEN, hōg'strä'ten, JAKOB VAN (c.1454-1527). A Belgian priest and inquisitor, born at Hoogstraeten. He entered the Dominican Order and became doctor and professor of theology, and prior of the Order at Cologne. He is widely known through his connection with the celebrated humanist Reuchlin. Hoogstraten proposed to burn all the Jewish books, on the ground that they contained nothing but calumnies against Christ. Reuchlin persuaded the Emperor Maximilian against this course, and thereby incurred the enmity of the inquisitor, who subjected him to every persecution. Thereupon there ensued the polemic war called by Erasmus "The beginning of the Lutheran tragedy," and this was the occasion of the famous *Epistolæ Obscurorum Virorum*. Hoogstraten's epitaph, though composed by his enemies, is a fitting description of the man's character—*Hic jacet Hoogstratus ventum ferre patique quem potuere mali, non potuere boni.* Among his treatises are *Destructio Cabbalæ contra Reuchlinum* (1518), and *De Christiana libertate Tractatus V. contra Lutherum* (1526).

HOOK, JAMES CLARKE (1819—). An English painter, born in London. He studied in the Royal Academy, and in 1846 won a scholarship by his picture "Rizpah," and went to Italy. In 1860 he became an academician. His English pastoral subjects are most popular, though his first works were nearly always of Italian scenes. Among his paintings are: "Mother Carey's Chickens," "Breton Fishermen's Wives," "Morning After a Gale," "Market Girls," "Luff, Boy," and "A Surrey Stream." His work is characterized by strong brilliant color and fresh realistic treatment.

HOOK, THEODORE EDWARD (1788-1841). An English wit and novelist, son of James Hook, a musical composer, born in London, September 22, 1788. Educated mostly at private schools, he attended for a short time Harrow and Oxford. Between 1805 and 1811, while yet a boy, he produced, either single-handed or in conjunction with his father, thirteen comic operas and melodramas, all of which were popular at the time. His ready wit, sparkling humor, and wonderful powers of improvisation made him the delight of society; and having pleased the Prince Regent, he was appointed (1813) Accountant-General and Treas-

he held till 1818, when the discovery of a deficiency of £62,000 in the military chest caused him to be arrested and sent to England, and his effects seized and sold. The peculation, it afterwards appeared, had been committed by a clerk, who committed suicide. On obtaining his liberty, Hook supported himself by writing for the newspapers and magazines, and on the establishment of *John Bull*, a weekly Tory newspaper, in 1820, he was appointed its editor. From his connection with this bold, clever, and virulent print he derived during its prosperous state fully £2000 a year. In August, 1823, he was arrested for his debt to the Crown, and his property sold. He remained within the rules of the King's Bench till May, 1825, when he was released from custody. In 1824 appeared, in three volumes, the first series of his *Sayings and Doings*, which yielded him £2000. A second series followed in 1825, and a third in 1828, for each of which he seems to have received about 1000 guineas. Several other three-volume novels followed in rapid succession—*Maxwell; Love and Pride; Gilbert Gurney*, which contains a sort of autobiography of himself; *Jack Brag; Births, Deaths, and Marriages;* and *Gurney Married*. He died August 24, 1841. Hook's novels are sketches of contemporary manners, and as such they possess value. Exceedingly popular in their own day, they are now difficult reading, for the witty thrusts are no longer obvious. Hook himself was regarded by his later contemporaries as a jester. He is the original of Lucian Gay in Disraeli's *Coningsby*, and is introduced in *Vanity Fair* as Mr. Wagg. The better side of his character is given by Lockhart in the *Quarterly Review*, vol. xxii. (London, 1845). Consult: *Humorous Works* (London, 1873), and Barham, *Life and Remains of Hook* (London, 1849; revised 1899).

HOOK, Walter Farquhar (1798-1875). An English dean and ecclesiastical historian. He was the nephew of the humorist Theodore Hook, and the son of Dr. James Hook, Dean of Worcester. He was born in London, graduated M.A. at Christ Church, Oxford, in 1824, and received the degree of D.D. in 1837. He took holy orders in 1821, and after holding curacies in the Isle of Wight and in Birmingham, was Vicar of Holy Trinity, Coventry, from 1828 to 1837, when he became incumbent of Leeds. Here by his tact and resourcefulness he overcame strenuous opposition on the part of Dissenters and among the working classes, who objected to compulsory Church rates, won great popularity; and in 1859, when he became Dean of Chichester, left Leeds richer by 21 new churches, 29 vicarages, and 27 schools. From 1827 he was chaplain-in-ordinary to George IV., William IV., and Victoria, on the accession of the latter preaching in the Chapel Royal his famous sermon, "Hear the Church," of which 28 editions, numbering over 100,000 copies, were sold in a short time. Its great vogue was due to the original enunciation of the fact that the Anglican Church of the sixteenth century was a reformed church and a return to the early English Church founded by the Apostles. At Chichester he wrote his most important work, *Lives of the Archbishops of Canterbury* (12 vols., 1860-76). Besides sermons and devotional works he published: *A Church Dictionary* (1842; 14th petuated in Leeds by a handsome Gothic memorial church, completed in 1880. Consult Stephens, *Life and Letters of Dean Hook* (London, 1878).

HOOKE, Nathaniel (1690?-1763). A British historian, born in Ireland. He studied law, but practiced literature, beginning with a translation of the *Life of Fénelon* (1725), and *An Account of the Conduct of the Dowager Duchess of Marlborough* (1742), taken down from her dictation, and ending with a *Roman History from the Building of Rome to the Ruin of the Commonwealth* (4 vols., 1738-71), the latter half of which was not published till after his death, while the latest edition (6 vols.) came out in 1830. Hooke was the friend of many prominent characters of his time, including Pope.

HOOKE, Robert (1635-1703). An English physicist. He was born on the Isle of Wight, and was educated at Westminster School, and at Christ Church, Oxford. He assisted Boyle in the construction of his air-pump, and in 1662 was appointed curator of experiments to the Royal Society. In 1664 he became professor of geometry in Gresham College, London. In 1667 he was appointed city surveyor, though his model for rebuilding the city of London after the great fire of 1666 had not been adopted. From 1677 to 1682 he was secretary to the Royal Society. Though a man of extraordinary acuteness of perception and inventive genius, Hooke did not always enjoy the esteem of his contemporaries, owing to his peevish and excitable temper. He claimed priority—in many cases justly—to some of the most important discoveries and inventions of the time, and authorities admit that he was the first to recognize clearly that the problem of planetary motion should be treated as a purely mechanical one. He undoubtedly grasped the fundamental principle upon which Newton subsequently constructed the theory of gravitation; he failed, however, to develop it mathematically. Among his important inventions were the use of the balance spring for the regulation of watches, and many useful improvements in physical and astronomical instruments. His publications include: *Micrographics* (1666); the *Lectiones Cutlerianæ* (1678-79); and his *Posthumous Works* (1705).

HOOKE, William (1601-78). An English clergyman, domestic chaplain to Oliver Cromwell. He was born in Southampton, was educated at Oxford, and after one charge in Devonshire went to America, and took charge of a church at Taunton, Mass. (1637-44). His next congregation was in New Haven, but he returned to England in 1656, and as his wife was Cromwell's cousin, the Protector made him master of the Savoy Hospital in Westminster, also his own chaplain. Some of Hooke's sermons were published, as well as his *New England's Tears for Old England's Fears* (1640).

HOOK'ER, Mount. One of the loftiest peaks of the Rocky Mountains in Canada, situated near the boundary of British Columbia and Alberta (Map: Northwest Territories, F 4). It has an estimated elevation of 15,700 feet.

HOOKER, Joseph (1814-79). A distinguished American soldier. He was born at Hadley, Mass., November 13, 1814; graduated at West Point in

Braxton Bragg, and was assigned to the First Artillery. He served in Florida and on the Maine frontier in 1837-40, and was adjutant at West Point in 1841, and of his regiment from 1841 to 1846. During the Mexican War he served as aide to Gens. Persifer F. Smith, Thomas L. Harmar, William O. Butler, and Gideon I. Pillow; participated in the principal battles both of the northern and of the southern campaign, receiving the brevets of captain, major, and lieutenant-colonel for gallantry; became captain in 1848; was assistant adjutant-general to the Pacific Division in 1849-51, and resigned from the army February 21, 1853. From that date until the outbreak of the Civil War he was in turn farmer, civil engineer, and colonel of California militia. He was appointed brigadier-general of volunteers, May 17, 1861, and in March, 1862, was assigned to the command of the Second Division, Third Corps, Army of the Potomac. On May 5, 1862, he became major-general of volunteers, and at the battle of Williamsburg, Va., fought on that day, handled his division with skill and valor. He was active throughout the Peninsular campaign, and subsequently was conspicuous in the battles of Bristoe Station, the second battle of Bull Run, and Chantilly. In the Maryland campaign, as commander of the First Corps, he took part in the battles of South Mountain and Antietam, being wounded in the latter engagement. He was appointed brigadier-general in the Regular Army September 20, 1862.

In November, 1862, he was placed in command of the Fifth Corps, and at the battle of Fredericksburg (q.v.) commanded the centre grand division of the Army of the Potomac, comprising the Third and Fifth Corps. On January 26, 1863, he was assigned by President Lincoln to the command of the Army of the Potomac. His first act was to refit and reorganize the army. In a few months he had recruited depleted regiments, supplied them with new clothing and equipments, weeded out incompetent officers, armed, equipped, and organized the mounted troops in a single corps, and in other ways had infused new life into the army.

In his new command General Hooker failed, however, to show those qualities on the battlefield which had distinguished him as a corps and division commander. With the greater part of his army he advanced against General Lee, who then had a force half the size of his own, and who was stationed south of the Rappahannock, with the intention of attacking him in flank and rear and crushing him at one blow. His plans were somewhat deranged by high water and the failure of his cavalry under Stoneman to cut Lee's communications. While in position around Chancellorsville his right flank was surprised by the Confederate General Jackson, one corps was thrown into confusion, and after a protracted struggle, lasting from the 2d to the 4th of May, in which both armies suffered great losses, the Army of the Potomac was forced to recross the Rappahannock. While the fighting was hottest, on May 3d, Hooker was stunned, a pillar against which he was leaning having been struck by a cannon-ball. The disastrous result was largely due to his vacillation and his inability to cope with an emergency. (See CHANCELLORSVILLE, BATTLE OF.) After the battle Hooker and Lee stood for some time facing each other had started on his aggressive campaign which terminated in the battle of Gettysburg, Hooker broke up his camp and followed. The pressure of public opinion in the North, however, combined with friction between General Hooker and General Halleck, and growing lack of confidence in Hooker on the part of President Lincoln caused him to offer his resignation, and on June 28, 1863, General Meade succeeded him. The Government then gave him command of the Eleventh and Twelfth Corps, later combined to form the Twentieth Corps (Army of the Cumberland), and sent him (September 24, 1863) to reënforce Rosecrans at Chattanooga. On November 24th, in the so-called 'battle among the clouds,' at the head of his new command, he led a charge in the face of the Confederate artillery and infantry posted on Lookout Mountain. For his conduct on this occasion he was, on March 13, 1865, brevetted major-general in the Regular Army. He further distinguished himself under Sherman at Dalton and Resaca, and in the attack on Atlanta. At his own request (July 30, 1864), he was placed on waiting orders September 28th, when he was put in command of the Northern Department. On July 8, 1865, he was given charge of the Department of the East, and soon afterwards of the Department of the Lakes, with headquarters at Detroit, where he remained until 1867. A paralytic attack occasioned his retirement from active service (October 15, 1868), with the full rank of major-general in the Regular Army. General Hooker was a man of handsome physique and of great personal magnetism. He died at Garden City, L. I., October 31, 1879.

HOOKER, JOSEPH DALTON (1817—). A noted British botanist and traveler, second son of W. J. Hooker (q.v.). He was born at Glasgow, where he obtained the degree of M.D. in 1839. He immediately thereafter renounced the pursuit of medicine for that of botany, and joined the Antarctic expedition of the *Erebus* and *Terror*. When he returned, in 1843, he brought 5340 species of plants, which, with those discovered on the voyages of Captain Cook and other travelers, are discussed in six quarto volumes under the titles of *Flora Antarctica*, *Flora Novæ Zelandiæ*, and *Flora Tasmaniæ* (1844-60), works which won him an eminent position in science. In 1847 he undertook a three years' expedition to the Himalayas, upon which he made large collections, which, joined with those of his friend, Dr. Thomson, of the Botanical Gardens, Calcutta, aggregated nearly 7000 species. His *Himalayan Journals* (2 vols., 8vo, 1852 and 1854) contain the narrative of this expedition, and the *Rhododendrons of the Sikkim-Himalaya* (1849-51) illustrate the most remarkable additions which he made on this occasion to ornamental garden plants. With Dr. Thomson he undertook a *Flora Indica* (vol. i., 8vo, 1855), the first volume of which, containing only a few orders, remains a fragment. Half of the volume is occupied with a dissertation on botanical geography, a department of science to which he paid special attention in various works. He afterwards again undertook a *Flora of British India*, which was completed in 1874. In 1871 he made an expedition to Morocco, ascended the Great Atlas, the summit of which had never before been reached by a European, and brought back a valuable collection of plants. In 1855 he was appointed

death of his father in 1865, director. He was president of the British Association in 1868, was appointed Companion of the Bath in 1869, and served as president of the Royal Society from 1872 to 1877. In the latter year he was knighted Commander of the Star of India. In the list of scientific memoirs published by the Royal Society, he is recorded as the author of 58 independent numbers and the joint author of 18 others. His *Students' Flora of the British Islands* is chiefly characterized by the record of the geographical distribution of the species. His great work, *Genera Plantarum*, undertaken in conjunction with his friend, George Bentham, commenced to appear in 1862. Among his other voyages, accounts of which appear in various books and journals, may be mentioned one to Palestine and Syria in 1860, and another to the Rocky Mountains, California, in 1877.

HOOKER, RICHARD (c.1553-1600). An English clergyman, author of the most famous existing treatise on the constitution of the Church of England. He was born at Exeter, in the year 1553 or 1554, of poor parents. He was a grave, bashful, and quiet boy, diligent in his studies, and quick at learning. His early progress was so rapid that his uncle, John Hooker, was induced to aid him in pursuing his education further. With additional help from John Jewel, Bishop of Salisbury, who afterwards became his patron, he was enabled to go to Oxford, where he entered Corpus Christi College in 1567. He became a scholar of Corpus Christi in 1573, was admitted to the degree of Master of Arts in 1577, and the same year became a fellow. The range of his learning was wide, and by no means confined to theology. From the age of nineteen he served as tutor, and in 1579 he was summoned, in an emergency, to deliver the Hebrew lecture, which he did so much to the satisfaction of the authorities that he continued to perform this duty so long as he remained at Oxford. For some unknown reason—perhaps through Puritan influence—he was once temporarily suspended from college, but honorably restored within a month. In 1582 Hooker took holy orders, and not long after married, Walton says, to his own sorrow. This marriage put an end to Hooker's quiet and congenial Oxford life. He was now obliged to seek a parish. He received the modest living of Drayton-Beauchamp, in Buckinghamshire (1584), where he lived, rather uncomfortably, for about a year. At the end of that period his fortunes were bettered by his being made Master of the Temple, London, over the head of a Puritan, Walter Travers, who was already reader there.

Hooker's London life was troubled with ecclesiastical controversy, which he disliked, yet which he would not attempt to avoid when once it was forced upon him. His colleague, Travers, represented that party in the Church of England which desired the adoption of Genevan ideas and usages, whereas Hooker stood for the episcopal establishment. These opposite views were reflected in the preaching at the Temple. "The forenoon sermon spake Canterbury, and the afternoon Geneva," was the current saying. Presbyterianism was either more popular, or else it had the better presentation, for we hear that the congregation "ebbed in the morning" (when Hooker preached), vers). The Puritan champion was at last silenced by Archbishop Whitgift, but the discussion was continued in print. Hooker was so deeply stirred by the question at issue that he determined to give it exhaustive treatment in book form, and at once entered upon the preparation of what became the celebrated *Laws of Ecclesiastical Polity*. To carry out his design a change of scene was necessary, and Hooker sought once more the quiet of a country parish, and found it at Boscomb, in Kent (1591). At the same time he was made a minor prebend of Salisbury, which added to his income without increasing his labor. In Boscomb Hooker wrote the first four books of the *Laws*, and they were published in 1594. The following year he removed to Bishop's Bourne, in Kent, where he spent the remainder of his life. Book V. of the *Laws* appeared in 1597, and there is reason to believe that the other three books were written here, although they were not published. There were to be eight books in all, according to Hooker's original plan. The *Laws* were hailed as the best defense of the Anglican position ever written. Visitors sought the author out in his retreat, but he himself was all unconscious of the important position he had come to occupy. His days were passed in quiet labor, and he continued to fulfill every duty of his parish with conscientious fidelity until his death, November 2, 1600, at the comparatively early age of forty-seven.

Hooker's reputation rests upon his writings, not upon his preaching. In personal appearance he was not prepossessing, and his manner in the pulpit was not effective. But as the author of the *Ecclesiastical Polity* he stands in the front rank of English men of letters. This work is a monument of literary style, in the formative period of English prose, besides being the most important contribution to the subject of Church government in the language. We have the first five books precisely as Hooker wrote them. The fate of books vi. to viii. in their completed form is shrouded in mystery. Walton relates that the manuscript was destroyed by Puritan relatives of Mrs. Hooker, but that the earlier rough draughts were preserved. From these, long afterwards, the seventh and eighth books were printed. What claimed to be a sixth book appeared in 1648, along with the eighth, but most of this probably does not belong to the *Laws* at all. The whole eight books were republished, with a life of Hooker by Izaak Walton, in 1666, since which time they have passed through many editions. In substance the *Ecclesiastical Polity* is a treatise on Church and civil government. Hooker's conception of the origin of the State resembles the 'social compact' theory of more recent times. The Church he holds to be simply the English State, looked at from the religious point of view. He defends the Established Church system, with all its ceremonial; but he does this with singular moderation, and he invariably accords courteous treatment to his opponents. In discussing the theories of Presbyterians and Independents, he points out what he believes to be their fundamental defects, and he defends the episcopal theory on Scriptural and rational grounds, as well as because of its antiquity and practical success. All succeeding writers on the English Church have built upon the foundations which Hooker laid.

Hooker's Works (including the *Ecclesiastical Polity*, the controversy with Travers, a *Discourse of Justification*, and a few *Sermons*) were published by John Keble (4 vols., 1836). This edition superseded all previous ones. It was reissued, with improvements (7th ed.) by Dean Church and Canon Paget, in 1888. Consult Walton, *Life of Richard Hooker*, prefixed to most editions of his works (Oxford, 1836).

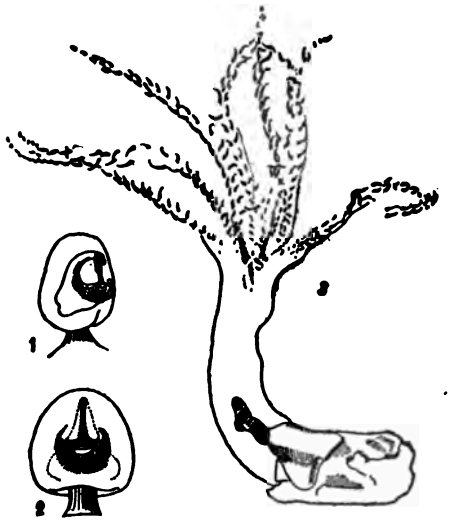
HOOKER, THOMAS (c.1586-1647). A New England clergyman, the real founder of the Colony of Connecticut. He was born at Markfield, Leicestershire, England, and was educated at Emmanuel College, Cambridge, where he took the degree of B.A. in 1608, and that of M.A. in 1611. After holding a fellowship for some time at Cambridge, he became, about 1620, rector of a little church at Esher, in Surrey. In 1626 he accepted a lectureship at Chelmsford, Essex, where he soon won renown as an eloquent preacher, but by this very prominence attracted the attention of Laud, then Bishop of London, to his Puritanism. In May, 1629, he appeared before Laud, and was threatened by him with action before the Court of High Commission, and in the following year, upon being cited to appear before that tribunal, he left England and settled in Holland. In Holland he remained for three years, preaching in the English churches at Amsterdam, Delft, and Rotterdam. In 1633 he sailed for New England, on the same ship with John Cotton (q.v.), settling in Newtowne (Cambridge) in October of that year, and being admitted a freeman in the following spring. He was chosen pastor of the first church at Newtowne on October 11, 1633, and soon afterwards became one of the most influential clergymen in the Colony. It was he who in October, 1635, argued with Roger Williams before the General Court. There was something of a spirit of rivalry, not only between the people of Newtowne and Boston, but between their principal pastors, Hooker and Cotton. As early as May, 1634, the people of Newtowne complained to the General Court that they did not have room enough, and sought either for permission to extend their boundaries or remove to a new location, and in July they sent a small party into the Connecticut Valley to find a suitable place. The matter was temporarily adjusted by the extension of the town limits, but the spirit of unrest remained, and in 1636 Mr. Hooker and his church, with large delegations from the churches at Dorchester and Watertown, removed into the Connecticut Valley. The Newtowne church members established themselves at Hartford, but the influence of Hooker extended also to the towns of Windsor and Wethersfield, which were settled by others who had followed his lead into the new country. But it is not only as the leader and moving spirit of the new settlements that Hooker deserves to be known, but as the inspirer, if not the actual author, of the Fundamental Laws which delegates from the several river towns adopted for their government in 1639. In January, 1639, Hooker accompanied John Haynes, the first Governor of Connecticut, to Boston to confer with Winthrop concerning a proposed confederation of the New England settlements to provide for their mutual defense against the Dutch, the Indians, and the French. The year 1643 saw the result of their labors in the successful organization of the 'United Colonies of New England,' the first attempt at federal government in America. Hooker published a great many sermons, and also: *The Soule's Preparation for Christ* (1632); *The Soule's Implantation* (1637); *The Soule's Ingrafting into Christ* (1637); *The Soule's Exaltation* (1638); *The Soule's Vocation* (1638); *An Exposition of the Principles of Religion* (1630); *The Saint's Guide* (1645); *A Survey of the Summe of Church Discipline* (1648), a defense of the New England churches which had great influence in the development of Congregationalism in America. Consult: Walker, *Thomas Hooker*, in the "Makers of America Series" (New York, 1891); Walker, *History of the First Church in Hartford* (Hartford, 1883); Johnston, *Connecticut*, in the "American Commonwealths Series" (Boston, 1878); *Johns Hopkins University Studies*, vol. vii. (Baltimore, 1889); Cotton Mather, *Magnalia Christi Americana* (London, 1702).

HOOKER, WILLIAM JACKSON (1785-1865). A celebrated English botanist. He was born at Norwich, and studied branches of natural history as a pastime during his youth. In 1811 he published his first work, *Journal of a Tour in Iceland*, of which a second edition was demanded in 1813. From that time forward he was constantly busy in the publication of botanical works. His investigation of the British Jungermanniæ and mosses led to his appointment to the chair of botany in Glasgow University, where he lectured with marked success until 1841, when he became director of the royal gardens at Kew. Here his pronounced executive ability wrought wonders. The garden, which at that time consisted of eleven acres, was extended to 45, in addition to which a park of 240 acres was added; the 10 old conservatories were replaced by 25 much larger ones of more modern construction; in conjunction with Henslow, he founded the most complete museum of botany in the world; and by his enormous correspondence with and ready aid to botanists throughout the realm, Kew Gardens became the distributing point of hundreds of useful plants, which were sent there in collections and then shipped to colonies for testing. Through his efforts Great Britain has largely extended her commerce in products of the soil. Accompanying his official duties he was collecting for his private herbarium, and writing books on botany which at the time of his death numbered about one hundred volumes. His herbarium was purchased by the nation after his death. His name was enrolled in the lists of all scientific societies at home and abroad, and on account of his scientific acquirements he was knighted in 1836. Among his works may be mentioned: *Monograph of the British Jungermanniæ* (1812-13); *Muscologia Britannica* (1818); *The British Flora* (1830), a work which has gone through seven editions; *A Century of Orchidaceous Plants* (1848); *Icones Plantarum*, in 10 volumes (1837-60); *British Ferns* (1862); *Garden Ferns* (1862).

HOOKER, WORTHINGTON (1806-67). An American physician, born in Springfield, Mass. He graduated at Yale in 1825, and in medicine at Harvard in 1829, and practiced in Connecticut until 1852, from which time until his death he was professor of the theory and practice of medicine in Yale. His principal works are: *Physician and Patient* (1849); *Homœopathy: an Examination of the Doctrines and Evidences* (1852); and

of Nature achieved a deserved reputation and is still widely used.

HOOK-SQUID. A squid of the family Onychoteuthidæ, allied to the common squids, but having the eyes destitute of any covering of skin. The two longer arms, or 'tentacles,' and sometimes the shorter arms, bear suckers, each inclosing a powerful hook, which is retractile, like



HOOKS OF A HOOK-SQUID.

1. Side view of a sucker, showing a half-concealed hook. 2. Front view of same. 3. A fossil hook-squid (*Acanthoteuthis speciosa*); impression of arms, traceable by the preserved hooks, in the lithographic slates of Eichstädt, Bavaria.

the claws of a cat. Hook-squids are found in the Sargasso Sea, in the Polynesian seas, etc., and are much dreaded by swimmers and divers, as they are sometimes six feet or more long.

HOOLE, JOHN (1727-1803). An English translator and dramatist, born in Moorfields, London. He had little education, was too near-sighted to become a watchmaker like his father, so entered the India House as a clerk (1744), was made auditor of Indian accounts, then principal auditor. He is known to letters because of his acquaintance with John Scott, and his biography of him, and for his acquaintance with Johnson, for whom he organized (1781) a city club, and whom he attended in his last illness. His poetical style was smooth and artificial. Hoole's works are: the translations, *Tasso's Jerusalem Delivered* (last edition, 1819), *Dramas of Metastasio* (1767), *Tasso's Orlando Furioso* (1791), and *Tasso's Rinaldo* (1792), which were all severely criticised by Scott, Southey, and Lamb; his own dramas, *Cyrus*, from Metastasio's *Ciro Riconoscinto* (1768); *Timanthes*, an imitation of Metastasio's *Demofonte* (1770); and *Cleonice*, said to have been corrected by Johnson (1775); the life of Scott, already mentioned, which was prefixed to Scott's *Critical Essays;* and a monody on *The Death of Mrs. Woffington* (1760).

HOOLOCK. The white-browed gibbon (*Hylobates hoolock*) of Northeastern India, where it leads an active life among the hill forests. It is frequently kept captive, and proves a docile, cleanly, and interesting pet. The name is a na-

frequently at sunrise. See GIBBON.

HOONOOMAN, hōō'nōō-măn. The sacred monkey of India. A better spelling of the word is Hanuman (q.v.).

HOOP-ASH. See HACKBERRY.

HOOPER, JOHN (c.1495-1555). An English prelate and martyr. He was born in Somersetshire about 1495, and educated at Oxford. He became a Cistercian monk, and when the monasteries were dissolved went to London to live. He was converted to Protestantism, and, advocating his new views, had to flee to the Continent (1540), and spent some time in Switzerland. Some time after the accession of Edward VI. he returned to England (1549), and became a preacher in London. In 1550 he was appointed Bishop of Gloucester, but his objections to wearing the episcopal vestments caused some delay in his consecration. In 1552 he received the bishopric of Worcester *in commendam*. On the commencement of Mary's reign in 1553 he was committed to the Fleet, where he remained for 18 months, being frequently examined before the Council, was condemned as a heretic, and burned at the stake at Gloucester, February 9, 1555. He was the author of numerous sermons and controversial treatises, of which a collected edition appeared at Oxford (1855).

HOOPER, JOHNSON J. (c.1815-1863). An American humorist. He was born in North Carolina, removed early to Alabama, edited a newspaper and practiced law there, and was secretary of the Provisional Confederate Congress. In 1845 he published the *Adventures of Captain Simon Suggs*, one of the raciest books of its time, descriptive of a gambling sharp of the Southwest in the 'flush times.' His *Widow Rugby's Husband and Other Tales of Alabama* (1851) is less successful.

HOOPER, WILLIAM (1742-90). An American jurist and signer of the Declaration of Independence, born in Boston and educated at Harvard. He studied law with James Otis, and practiced very successfully in North Carolina, where he ably assisted the Provincial Government in suppressing the disturbances of 1770, and was elected to the Legislature in 1773. There he became a leader, and, a year later, was elected to the Continental Congress, from which he resigned in 1777. He was one of the Federal judges appointed to adjudicate the territorial dispute between Massachusetts and New York.

HOOPESTON, hōōp'ston. A city in Vermilion County, Ill., 100 miles south of Chicago; on the Chicago and Eastern Illinois and the Lake Erie and Western railroads (Map: Illinois, E 3). It is the seat of Greer College, established in 1891, and has McFarren and other public parks. The city is in a fertile agricultural region, and manufactures horseshoe nails, cans and canning machinery, and canned goods, among its establishments being two of the largest sweet-corn canning factories in the United States. In 1877 Hoopeston received a city charter, still in operation, which provides for a mayor, elected biennially, and a council. The water-works are owned and operated by the municipality. Population, in 1890, 1911; in 1900, 3823.

HOOPING COUGH. See WHOOPING COUGH.

HOOPOE (obsolete *hoopoop*, reduplication of *hoop*, Fr. *huppe*, OF. *huppe*, hupe, from Lat.

group of birds of the warmer parts of the Old World, which take both their common and systematic names (genus Upupa, family Upupidæ) from their cry. In this family the bill is long and slender, the wings of moderate size or short, the legs short, the toes long, and the claws strong and curved. The common European

HOOPOE.

hoopoe (*Upupa epops*) is an African bird, visiting in summer most parts of Europe and Asia, but rare in Great Britain. It is about the size of a blue jay; its plumage exhibits a fine mixture of white, buff, and black, and it has a large crest of two parallel rows of feathers. Its strange appearance and habits have caused it to figure largely in European legend and folk-lore. It gets its food chiefly on the ground, and its peculiar notes are said to be made by striking the bill on the ground as the note is uttered. The nest is made in a hole in a tree or wall, and the eggs are white. The hoopoes were formerly thought to be related to the crows, but it is now generally admitted that their nearest relatives are the hornbills, although they are apparently so different. An extensive account of the curious and interesting traits of this bird is given in the *Royal Natural History*, vol. iv. (London, 1895). See BIRD for other authorities. See Plate of TROGONS, HOOPOE, ETC.

WOOD-HOOPOE. The birds of the family Irisoridæ, which are found in South Africa, are nearly related apparently to the Upupidæ, and are known as wood-hoopoes. They are arboreal, have a glossy blackish plumage, no crest, and a long graduated tail. They are said to be noisy and restless birds, and to climb about on trees like woodpeckers. Like the true hoopoes, they emit a strong, disagreeable smell.

HOOPS, HOOP-SKIRT. See CRINOLINE.

HOOPSNAKE. A small snake (*Abastor erythrogrammus*) of the South Atlantic States, foolishly feared by the negroes, who say it will put its tail in its mouth, stiffen its body, and roll along like a hoop, aiming to let go of its sting-tipped tail and dart it into the first person it meets. Similar stories are told of a closely related species, the wampum-snake (*Farancia abacura*), common in swampy ground in the South; and both are called 'horn-snakes.' In fact both species are perfectly harmless, and spend most of their time beneath the ground, burrowing deeply into the soil. The former is blue-black above, marked with three red lines, and flesh-colored below, with black spots; while the latter is uniform bluish black above and banded with red on the abdomen.

HOORN, hōrn. A seaport of the Netherlands, in the Province of North Holland, situated on the Hoornerhop, a bay of the Zuyder Zee, 25 miles northeast of Amsterdam (Map: Netherlands, D 2). It is a typical old Dutch town, and has several quaint buildings, among them the Harbor Tower, the town hall, and the court-house. Groote Kerk (great church), the latter with a monument to Admiral Floriszoon. Hoorn was formerly one of the richest towns in Holland, the great nets for the herring fishery being employed here as early as 1416. It has now a considerable trade in dairy products, and also some ship-building. Hoorn is the birthplace of the navigator Willem Schouten, who named Cape Horn after his native town. Population, in 1889, 11,033; in 1899, 10,714.

HOORNE, HOORN, HORN, or **HORNES,** PHILIPPE DE MONTMORENCY-NEVELE, Count of (c.1518-68). A Flemish statesman and soldier, born at Nevele. Trained to arms under Charles V., he distinguished himself in the war against the Schmalkaldic League and later accompanied Philip II. on his travels in Germany, Italy, Spain, and England. At the battle of Saint-Quentin (1557) Hoorne did brilliant service as commander of the artillery. Later he accompanied Philip to Spain, but in 1561 returned to Brussels, as councilor of State. In this capacity he sided with Egmont and the Prince of Orange in opposition to Cardinal Granvella and the Spanish party. He urged on Margaret of Parma to a policy of concession, and having been sent to Tournay to reëstablish order there, he showed a spirit of toleration which won for him the regard of the patriotic party, but increased the animosity of the Ultramontanes. The failure of Egmont (q.v.) and Hoorne to throw in their lot with the Spanish party was, however, fatal. When the Duke of Alva arrived the two noblemen were treacherously seized, and after an illegal trial before the Council of Blood, were executed in the great square of Brussels, June 5, 1568. Besides the contemporary chronicles, consult: Juste, *Le comte d'Egmont et le comte de Hornes* (Brussels, 1863); and the popular account by Schiller, "The Trial and Execution of Counts Egmont and Horn," in his *Historical Works* (London, 1847); also the histories by Motley and others, cited under NETHERLANDS.

HOOSAC MOUNTAINS. A spur of the Green Mountain Range in west Massachusetts, extending 16 miles north and south on the east side of the valley of the Upper Hoosac (Map: Massachusetts, A 2). The Hoosac railway tunnel (see TUNNEL), which pierces Hoosac Mountain, is the largest tunnel in America.

HOOSAC RIVER. A river of Vermont and New York States, rising in Berkshire County, Mass., and after a north and northwest course flowing into the Hudson, 15 miles north of Troy (Map: Vermont, A 10). In New York State it is known as the Hoosick.

HOOSE, hōōz *or* hōōs. A parasite of sheep. See LUNG-WORMS.

HOOSICK FALLS. A village in Rensselaer County, N. Y., 27 miles northeast of Troy; on the Hoosac (Hoosick) River, and on the Boston and Maine Railroad (Map: New York, G 3). It has extensive manufactures of agricultural implements, cotton and woolen goods, shirts, paper, and paper-making machinery. Settled in 1688, Hoosick Falls was incorporated first in 1827. Under a charter of 1884, revised in 1890, the village is governed by a president, chosen every three years, and a board of trustees, elected from their re-

in 1890, 7014; in 1900, 5671.

HOOSIER (hōō'zhĕr) **FROG.** See MINK-FROG.

HOOSIER SCHOOLMASTER, THE. A novel by Edward Eggleston (1875), one of the first successful attempts to picture the rude surroundings of the pioneers of the Middle West. The story became very popular and was the author's only successful novel.

HOOSIER STATE. Indiana. See STATES, POPULAR NAMES OF.

HOOVE, or HOVEN. See BLOAT.

HOP (from MDutch *hoppe*, Dutch *hop*, OHG. *hopfo*, Ger. *hopfen*, hop, of doubtful origin), *Humulus Lupulus*. A perennial plant which belongs to the Urticaceæ, or nettle family. The single species, a native of America and England, where it is often found growing wild upon trees and shrubs, has given rise under cultivation to many varieties. The hop is a diœcious climbing vine with rough stems and heart-shaped, three to seven lobed leaves. The pistillate flowers are the hop of commerce, used mainly in the manufacture of beer. Hop culture is not general like the culture of cereals, but is confined to certain areas, comparatively limited in extent, which on account of soil and climatic conditions are especially suited to the production of the crop. The principal hop-producing regions of the United States are New York and the Pacific Coast States. Wisconsin also produces a small quantity. In Europe hops are grown for the market in England, Bohemia, Germany, France, and Belgium. The hops from Kent in England and from Saaz and Auscha in Bohemia have long been considered of the finest quality throughout the world. In general, the hops are known in the European markets by the name of the locality in which they were grown. This serves as an indication of their comparative quality and value.

The hop may be grown on a variety of soils, but it always requires a well-drained subsoil. It succeeds best on a moist, sandy loam. Soil conditions are generally considered the most important factor in determining the quality of the crop. In preparing land for hops it is plowed deeply and brought to a fine tilth. The hop is propagated by cuttings made from the underground stems which the plant sends out near the surface of the ground. These cuttings are made and set out in the spring. In the United States the plants are usually placed about seven feet apart each way, but in European hop-fields the distance is about four feet. In this country one male plant is grown per hundred or so, but in Europe as a rule only female plants are grown, as the presence of seeds in the hops injures the flavor of certain beers made from them. The vines are either trained on poles or on wire trellises. The latter method is gradually displacing the system of training on poles. During the growing season the soil is cultivated to keep it mellow and retentive of moisture and for the purpose of killing the weeds. Harvesting is done by hand, and forms the hop-grower's busy season, as the hop deteriorates when exposed too long to the weather after it is ripe. The yield varies from 1000 to 3000 pounds per acre. When the hops are harvested they are immediately cured by air-drying under cover or by drying in kilns constructed for that purpose. The cured each and is shipped in this form to distant markets. In Europe hops are generally shipped in large sacks without being baled. By the *American Agriculturist*, the crop of 1900 was estimated at 208,000 bales; 1901, 210,000; 1902, 195,500. The largest crop recorded was that of 1894, which was estimated to be 320,000 bales.

The valuable principle of the hop is a yellowish aromatic, resinous substance called lupulin, which has been found to contain two preservative or soft resins (oleoresins), and a non-preservative or hard resin. The preservative resins are the most valuable, since they are particularly unfavorable to the growth of lactic ferments, but not to the true yeast of beer. The deterioration of hops caused by exposure when mature, or by excessive drying, consists in the waste of the lupulin. To fulfill the requirements of the brewer the product must be a well-ripened hop, properly dried and with the resin and other qualities unimpaired.

HOP.

HOP-APHIS. See HOP-LOUSE; HOP-INSECTS.

HOPAT'CONG, LAKE. A picturesque body of water in Sussex County, N. J., 50 miles northwest of Jersey City. Stages connect it with Hopatcong railway station, 4 miles distant. The lake is 8½ miles long, 3½ miles wide, and lies in a well-wooded fir and pine district, 725 feet above sea-level. The Musconetcong River drains it from the southwest into the Delaware. There are numerous hotels and boarding-houses on its shores, and it is a favorite summer resort.

HOPE, ALEXANDER JAMES BERESFORD- (1820-87). An English politician and author, son of Thomas Hope and stepson of William Carr, Viscount Beresford. He was educated at Harrow and at Trinity College, Cambridge; served in Parliament from 1841 to 1852; was reëlected in 1857; and from 1868 to his death represented Cambridge University. An independent Conservative, he opposed the abolition of Church rates, the legalization of marriage to one's deceased wife's sister, and, especially, the Reform Bill of 1867. In the debate on the last measure he broke lances with Disraeli, calling him the 'Asian mystery,' and getting recognition of his Dutch ancestry and poor delivery in Disraeli's allusion to 'Batavian graces.' A High Churchman and deeply devoted to the English Church and to its

Augustine's Abbey, Canterbury, as a missionary college, built All Saints' Church, in London, and wrote on religious liberty, at the time of the excitement over Roman aggression, in the *Chronicle*, and later in the *Saturday Review*, being closely associated in both with John Douglas Cook. Hope was president of the Royal Institute of British Architects (1865-67), of the Architectural Museum, and of the Ecclesiological Society. His works include: several works on Church politics; *A Popular View of the American Civil War* (3d ed. 1861); and a successful novel, *Strictly Tied Up* (4th ed. 1886).

HOPE, ANTHONY. See HAWKINS, ANTHONY HOPE.

HOPE, Sir JAMES (1808-81). A British admiral, born in Edinburgh. He was educated in the Royal Naval College, Portsmouth, and when fourteen years old went as midshipman on a frigate bound for the West Indies. In five years he was promoted lieutenant and by 1830 had reached the rank of commander, having by that time made voyages to the Mediterranean and the East Indies. He saw service in North and South America (1833-45), and after opposing the Russians in the Baltic for two years was created rear-admiral (1857), and commander of the Chinese squadron (1859-62). In 1859 he made a gallant attempt to enforce the ratification of a treaty the Pekin Government had entered into with France and England. He lost ships and men and was himself severely wounded, but returned to the attack the following year and was successful (1860). From 1863 to 1867 he commanded in North American waters and the West Indies, and for three years (1869-72) was in charge at Portsmouth. He was made an admiral in 1870, chief naval aide-de-camp to Queen Victoria in 1873, and was retired in 1878, but was created honorary admiral of the entire fleet a year later.

HOPE, THOMAS (c.1770-1831). An English author and virtuoso. He belonged to a rich family of merchants, Scotch by descent, who had settled in Amsterdam. While still a youth he traveled extensively in Southern Europe and in the East, and collected many drawings, chiefly of buildings and sculptures. After 1796 he made England his home. He first attracted attention by the decorations which he bestowed on the interior of his mansion in Duchess Street, Portland Place, London, a description of which appears in his book *Household Furniture* (1807). In 1809 he published *Costumes of the Ancients* and *Architecture of Theatres*. Three years afterwards appeared *Modern Costumes*, and in 1819 *Anastasius, or Memoirs of a Modern Greek at the Close of the Eighteenth Century*. Published anonymously, this last work was ascribed to Lord Byron, who said that he had wept because he did not write it. It is a brilliant romance describing adventures and manners in the East. After his death appeared *An Essay on the Origin and Prospects of Man* and *An Historical Essay on Architecture*.

HOPE, THOMAS CHARLES (1766-1844). A Scotch professor of chemistry, born in Edinburgh. He graduated at the University there in 1787 and for the following eight years was professor of chemistry and assistant in medicine at the University of Glasgow. He returned to his alma mater to be associated with Prof. Joseph Black as his successor in 1799, and retained the chair till a year before his death. He was specially skilled in experimental work, and the results of his two most important discoveries are contained in a paper read before the Royal Society of Edinburgh, *An Account of a Mineral from Strontian, and of a Peculiar Species of Earth which It Contains* (1793), and in *Experiments on the Contraction of Water by Heat*, published by the Edinburgh Royal Society (1805). Professor Hope instituted a prize in chemistry (1828), but he was averse to permitting his students to take a practical part in his experiments.

HOPE COLLEGE. An institution of learning, situated at Holland, Mich. It was organized by Dutch colonists in 1857 as an academy, and chartered as a college in 1866 under the auspices of the Reformed Church in America. The Western Theological Seminary was founded in 1869. The college is coeducational and had in 1902 121 preparatory, 65 collegiate, and 17 theological students, an endowment of $270,191 and an income of $20,424. At the same time the library contained 10,000 volumes. Besides the ancient languages, instruction is given in French, German, Dutch, Italian, and Spanish. The degree of Bachelor of Arts is conferred.

HOPE'DALE. A communistic settlement, founded in 1841 by a society under the leadership of Rev. Adin Ballou, in the town of Milford, Worcester Co., Mass. The chief aim of the founder was to restore the original ideals of Christian life, rather than to reorganize society economically. A farm of 238 acres with mill sites was purchased by the society, organized as a joint-stock company. The community consisted of twenty-eight persons, who observed strictly the rules of communism. As the community increased in numbers, these rules were somewhat relaxed. A board of trustees at first controlled the industries of the community; but later the several branches were farmed out to individuals. The community was not a success financially, nor was social harmony long maintained. In 1854 it had reached its highest point, embracing about two hundred members. Agriculture and several branches of manufacture were carried on. Two years later the community was found to be deeply in debt, and the joint-stock company was dissolved. As a purely religious organization it continued to exist for some years, but during the Civil War merged in the Hopedale parish, with Mr. Ballou as pastor, the industries founded by the society being carried on by private management. Consult Adin Ballou, *History of the Hopedale Community* (Lowell, 1897).

HOPE DIAMOND. A large blue diamond, in the possession of the family of H. T. Hope, weighing 44¼ carats. It is supposed to have been cut from a stone purchased from Tavernier by Louis XIV., which weighed uncut 112½ carats, and 67½ carats after cutting. The stone was lost in 1792, and the Hope diamond came into the market in 1830.

HOPEFUL. In Bunyan's *Pilgrim's Progress*, the companion of Christian on the journey from the City of Destruction to the Delectable Mountains and the Shining Gate.

HOPE THEATRE, THE. A sixteenth-century bear-garden, on the Bankside, Southwark, London, which was changed into a playhouse in

seventeenth century gradually lost its popularity.

HOPFEN, hôp'fen, HANS VON (1835—). A German novelist and poet, born and educated at Munich. In 1866 he moved to Berlin, where he devoted himself to literature, having already edited the *Münchener Dichterbuch* (1862) and written the novel *Peregretta* (1864). A book of essays, *Streitfragen und Erinnerungen* (1876); a volume entitled *Theater* (1889); the plays *Aschenbrödel in Böhmen, In der Mark; the Neues Theater* (1892-93); the tragedy *Göttin der Vernunft* (1892); the drama *Helga* (1892); and the comedy *Es hat so sollen sein* (1893), comprise his best dramatic and miscellaneous work. The remainder of his writings include a score of novels and collections of stories, of which the following may be mentioned: *Verdorben zu Paris* (2d ed. 1892); *Die Hierat des Herrn von Waldenberg* (2d ed. 1884); *Der alte Praktikant* (3d ed. 1891); *Die Geschichten des Majors* (3d ed. 1882); *Neue Geschichten des Majors* (1890); *Im Schlaf geschenkt* (4th ed. 1896); *Zehn oder elf* (1901); and *Gotthard Lingens Fahrt nach dem Glück* (1902).

HOP-HORNBEAM. See HORNBEAM.

HOPI, hō'pē, or **MOKI**, mō'kē. An interesting Pueblo tribe of Shoshonean stock, occupying seven villages upon three mesas in north central Arizona, and numbering about 1600, including those of Tewa or Hano. The principal villages are Walpi and Oraibi. In many respects the Hopi may be considered the most interesting of Pueblo tribes. They are all mesa-dwellers, their villages being situated hundreds of feet above the surrounding desert. They are only to be reached by steep, adventurous trails. They hold fast to their old aboriginal culture, which is of the typical Pueblo character, but better preserved than that along the Rio Grande. Their ceremonials are elaborately conducted, particularly those of the 'new fire' and the 'winter solstice,' also the celebrated snake dance, in which the performers carry living rattlesnakes in their mouths as they dance. They are industrious farmers and have always in their granaries abundant stores of corn, beans, and pumpkins. They also weave baskets and blankets, and are skillful potters and wood-carvers. (See Colored Plates in articles BASKET and BLANKET.) The clan system is rigid and highly developed among them. According to archæological evidence, the ancestors of these tribes were authors of many of the ancient ruins in the surrounding region. The people of the small village of Hano are of different language, originally being refugees of Tanoan stock, who fled from the Rio Grande at the time of the great Pueblo rebellion in 1680.

HOP-INSECTS. The most destructive insect enemy of the hop crop is the hop-aphis. Other species are of less importance, but they sometimes do considerable damage to the plant. The hop-grub or hop-plant borer (*Goryna immanis*) is the larva of a noctuid moth which lays its eggs in the early part of the season upon the young shoots of the plant. The young caterpillars, which are slender and greenish in color spotted with black, bore into the vine just below the tip and remain at this point for some time. The head turns downward and stops growing. Such vines are called 'muffled heads' or 'stag pillar at this time being called 'tip-worm.' A little later it drops to the ground and enters the stem at the surface of the ground. It is then called the 'collar-worm,' changing to a white color with black spots. About the end of July it becomes full-grown and transforms to pupa near the roots of the plant. The moth issues in the fall or in the spring.

A number of different caterpillars feed upon the foliage. The hop-vine snout-moth (*Hypena humuli*) is one of the principal forms. The larvæ of two butterflies (*Polygonia interrogationis* and *Polygonia comma*) feed quite abundantly upon this plant and are known to hop-growers as 'hop-merchants' from the gold and silver markings upon the chrysalids. The zebra caterpillar (larva of *Mamestra picta*), the common woolly-bear caterpillar (larva of *Spilosoma virginica*), and the saddle-back caterpillar (larva of *Empretia stimulea*) are the remaining principal species. One of the leaf-hoppers, *Tettigonia confluenta*, causes more or less damage to the foliage, and the striped flea-beetle (*Phyllotreta vittata*) also damages the leaves, while the so-called 'red spider' or 'spinning mite' (*Tetranychus telarius*) often causes the leaves to turn yellow. The best remedy for all of these insects consists in spraying at the proper time, using an arsenical spray for the caterpillars and the flea-beetle, a kerosene emulsion for the leaf-hoppers, and a sulphur wash for the spinning mite. Consult Howard, "Pests of the Hop Crop," in *The Hop Industry* (New York, 1898).

HOPKINS, EDWARD (1600-57). A Colonial Governor of Connecticut. He was a London trader who came to New York in 1637, and settled at Hartford. He was chosen Governor of the Colony of Connecticut every alternate year from 1640 to 1652. After that he lived in London. He assisted in forming the Union of the New England Colonies in 1643. He left £1000 to support grammar schools in Hartford and New Haven. With the sum of £500 left for 'public ends,' Harvard College, to which it was turned over, bought a township from the 'praying Indians,' and named it Hopkinton.

HOPKINS, EDWARD JEROME (1836-98). An American musician, born at Burlington, Vt. He was practically a self-taught musician, and remarkably precocious. He held many positions as organist in New York City, was the originator of the 'lecture-concerts,' and made many concert tours in the United States, and in 1890 in England. He founded the American Music Association (1856) for performing native works; the Orpheon Free Schools (1865), which had over 30,000 pupils; and the New York *Philharmonic Journal* (1868). His compositions embrace almost every department of music, but although many of them, as *Easter Festival Vespers* (for three choirs, echo choir, two organs and orchestra, harp and cantor priest), are of strikingly original form, they have not met with much favor. He died at Athenia, N. J.

HOPKINS, EDWARD WASHBURN (1857—). An American Sanskrit scholar and philologist, born at Northampton, Mass. He graduated at Columbia College, New York, in 1878, and after studying in Germany and teaching at Bryn Mawr College, Pa., he was called to Yale University in 1895, as professor of comparative philology

death of Whitney. Besides numerous contributions to the Oriental and philological journals of America, he is the author of several important books connected with India: *The Four Castes in Manu* (1884); *Religions of India* (1895); *The Great Epic of India* (1901); *India Old and New* (1901).

HOPKINS, Esek (1718-1802). An American naval officer, born in Scituate, R. I. In the Revolutionary War he was at first a brigadier-general in the army, but in 1775 Congress commissioned him commander-in-chief of the new American Navy. Washington officially addressed him as admiral. He went to sea in February, 1776, with four ships and three sloops, and took the forts at New Providence, with all the guns, ammunition, and stores. On his return he seized a British schooner and a bomb-brig. His later operations were less fortunate, and in January, 1777, he was dismissed from the service because he let the *Glasgow* get away from him and failed to appear before Congress when so ordered. He was afterwards prominent in Rhode Island political affairs. Consult Field, *Esek Hopkins, Commander-in-Chief of the Continental Navy During the American Revolution, 1775-78* (Providence, 1898).

HOPKINS, Ezekiel (1634-90). Bishop of Londonderry. He was born at Pinne, Devonshire, December 3, 1634. His early education was conducted under Presbyterian and independent influences. He graduated B.A. at Oxford (1653), and became chaplain of Magdalen College (1656). In 1662 he conformed, and was presented to the living of Saint Mary Woolnoth, in London. When the great plague broke out in the capital (1666), Hopkins withdrew to Exeter, where he obtained the living of Saint Mary's. When Lord Robartes was made Lord Lieutenant of Ireland (1669), Hopkins went with him to Dublin, and through his influence obtained the deanery of Raphoe (1670), and in 1671 the bishopric of Raphoe. In 1681 he was made Bishop of Londonderry. In the course of the siege of the town by the Irish adherents of James II., in 1689, Hopkins withdrew from the town, and retired first to Raphoe and afterwards to London, where he was made rector of Saint Mary Aldermanbury (1689). This charge he held until his death, June 19, 1690. His works, which have been frequently republished, comprise: *Sermons; Expositions of the Decalogue and the Lord's Prayer;* and elaborate discourses on *Regeneration* and *The Vanity of the World.* The best edition of his collected works is by Pratt (London, 1809).

HOPKINS, John Henry (1792-1868). A Protestant Episcopal bishop. He was born in Dublin, Ireland, January 30, 1792; came to the United States in 1801, and became an iron-manufacturer in Pennsylvania. Not succeeding in business, he studied law, and began practice in Pittsburg, but in 1823 he entered the ministry of the Protestant Episcopal Church. In 1831 he accepted the charge of Trinity Church, Boston, and the next year was chosen Bishop of Vermont, taking also the rectorship of a church in Burlington. He took great interest in education, and made heavy pecuniary sacrifices for its promotion. After 1856 he devoted his whole time to the supervision of the diocese. Hopkins was a prolific writer, leaving nearly twenty published works, (1833); *The Primitive Creed Examined and Explained* (1834); *The Novelties which Disturb Our Peace* (1844); *History of the Confessional* (1850); *The American Citizen, His Rights and Duties* (1857); *A Scriptural, Ecclesiastical, and Historical View of Slavery* (1864). He was prominent in the Lambeth Conference in London in 1867. He died at Rock Point, Vt., January 9, 1868. Consult his biography (New York, 1873), by his son John Henry (1820-91).

HOPKINS, Johns (1795-1873). An American financier and philanthropist. He was born of Quaker parentage in Anne Arundel County, Md., where he lived on a farm until he was seventeen, when he went to Baltimore, and worked for a time in his uncle's grocery. Afterwards he became a merchant, with wide connections in Maryland, Virginia, and North Carolina. His credit and counsel were highly valued in financial and mercantile affairs, and he became one of the leading financial men in Baltimore. His services to the Baltimore and Ohio Railroad were of great value. Toward the end of his life, having no children, he determined to devote his fortune to the service of the public. Accordingly, in addition to minor gifts to individuals and charities, he founded and endowed two great institutions which perpetuate his name—the Johns Hopkins University and Johns Hopkins Hospital, whose activities are united in the Johns Hopkins Medical School. The total gift for these two purposes was more than $7,000,000.

HOPKINS, Lemuel (1750-1801). An American political poet, born in Connecticut. He practiced medicine at Litchfield, and after 1784 in Hartford, where he became allied with the 'Hartford Wits,' Joel Barlow, John Trumbull, David Humphreys, Theodore Dwight, and others, and with them wrote: *The Political Greenhouse, The Echo,* and—advocating strong federal government—*The Anarchiad* (republished at Hartford, 1861). Hopkins also wrote *The Hypocrite's Hope* and *The Victim of a Cancer Quack.*

HOPKINS, Mark (1802-87). An American educator, grandnephew of the theologian Samuel Hopkins, and brother of the astronomer Albert Hopkins. He was born at Stockbridge, Mass., was educated at Williams College, was tutor there for two years, and, after studying medicine and practicing for a short time in New York, became professor of moral philosophy in Williams in 1830, and president of the institution in 1836. He resigned this position in 1872, but remained college preacher and incumbent of the chair of moral philosophy. In 1857 he had become president of the American Board of Foreign Missions. Undoubtedly one of the greatest of American educators of his day, Hopkins did much to build up the prestige of Williams College and much more to develop the individual student. He was a powerful preacher and a successful lecturer. He published: *The Influence of the Gospel in Liberalising the Mind* (1831); *The Connexion Between Taste and Morals* (1841); his Lowell Lectures, *The Evidences of Christianity* (3d ed. 1875); *Miscellaneous Essays and Reviews* (1847); a second series of Lowell Lectures, *Moral Science* (1862); *The Law of Love and Love as a Law* (last ed. 1881); *An Outline Study of Man* (last ed. 1893); *Strength and Beauty* (1874; in 1884 under the title *Teachings and Counsels*); and *The Scriptural Idea of Man* (1883).

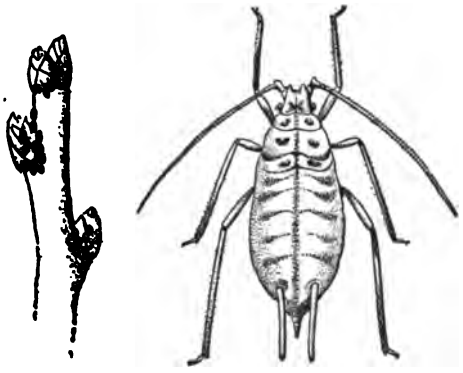
can clergyman and founder of the Hopkinsian theology. He was born at Waterbury, Conn., September 17, 1721. Having graduated at Yale College in 1741, he studied theology with Jonathan Edwards, and from 1743 to 1769 was pastor of Housatonic, now called Great Barrington, Mass. He then removed to Newport, where he died December 20, 1803. His writings consist of a life of Jonathan Edwards, sermons, addresses, a work on the millennium, and a system of theology, republished in Boston, 1852. He was remarkable for his simplicity, earnestness, and persevering industry. His peculiar theological doctrines have found numerous followers in America in certain of the Christian bodies of which the tenets are generally Calvinistic. They hold most of the Calvinistic doctrines, even in their most extreme form; but they entirely reject the doctrine of imputation, both the imputation of Adam's sin and of Christ's righteousness. The fundamental doctrine of the Hopkinsian system, however, is that all virtue and true holiness consists in disinterested benevolence, and that all sin is selfishness—the self-love which leads a man to give his first regard even to his own eternal interests being condemned as sinful. Consult his collected writings with memoir by E. A. Park (Boston, 1852).

HOPKINS, Stephen (1707-85). A Colonial Governor of Rhode Island, and one of the signers of the Declaration of Independence. He was born in Providence, R. I., and was descended from an old English family, his great-grandfather, Thomas Hopkins, having settled in Providence about 1638. Stephen's early life was spent on a farm, and he had little opportunity to gain an education, though under the tutelage of his grandfather and uncle he learned surveying, and later broadened his intellectual horizon by extensive reading. In 1732 he began his active participation in public affairs by becoming clerk of the newly constituted township of Scituate, a position which he continued to hold for ten years. From 1732 to 1738 (excepting the year 1734) he was a representative from Scituate to the General Assembly, and upon being returned in 1741 he was chosen Speaker. He became a justice of the Court of Common Pleas in 1736 and was appointed its clerk in 1741. Six years later he was made assistant justice of the Superior Court at Newport and in 1751 Chief Justice. He was one of the Rhode Island delegates to the intercolonial congresses which met in 1746, 1754, 1755, and 1757, and in the Albany convention of 1754 was a member of the committee which was appointed to draw up a 'plan of union.' (See Albany Convention.) In 1755 he was elected Governor of Rhode Island and was reëlected almost continuously until 1768, when he withdrew finally from the gubernatorial contest. Meanwhile he had acquired large shipping and commercial interests, and had begun to take an active interest in the question of England's right to tax the Colonies. In 1764 he sent to the Assembly a tract, *The Rights of Colonies Examined*, which the Assembly ordered to be published and which was widely read. After acting as chairman of several Colonial committees, he was a member of the General Assembly from 1770 to 1775. In 1774 he framed a bill to prohibit the importation of slaves, and from 1774 to 1780 was one of Rhode Island's representatives in the Continental Congress, being one of the signers of the Declaration of the Rhode Island Council of War and a delegate to numerous New England conventions. He died in Newport. He wrote: *A True Representation of the Plan Formed at Albany for Uniting All the British North American Colonies* (1755); and *An Historical Account of the Planting and Growth of Providence* (originally published in the Providence *Gazette* in 1762 and 1765), which, though a fragment, is of considerable value. It has been republished in the *Collections of the Massachusetts Historical Society*, 2d series, vol. ix. (Boston, 1822), and in the *Collections of the Rhode Island Historical Society*, vol. vii. (Providence, 1885). Consult Foster, *Stephen Hopkins, a Rhode Island Statesman* (Providence, 1884; forming Nos. 19 and 20 of the Rhode Island Historical Tracts).

HOP'KINSON, Francis (1737-91). An American politician, jurist, and miscellaneous writer, born in Philadelphia, Pa. He is best remembered for his *Battle of the Keys* (1778), a humorous ballad based on an incident in the Revolutionary War. He was educated at the College of Philadelphia, admitted to the bar in 1761, and a few years later he spent a year in England, where his cousin was then Bishop of Worcester. Returning to Philadelphia, he practiced law, was active in learned societies, declared his republican sympathies, and was made delegate to the Continental Congress (1776). He took part in drafting the Articles of Confederation, and signed the Declaration of Independence. He held various offices under the United States Government, was Judge of Admiralty for Pennsylvania, suffered an impeachment which failed (1779-89), and was district judge there (1790-91). Hopkinson was a man of exceptionally varied accomplishments. He composed music for his facile songs, painted, was a dilettante in popular science, a humorist, and a political pamphleteer. His works were collected in three volumes (Philadelphia, 1792). Besides the *Battle of the Keys*, his most popular production was a short prose allegory of the relations between the Colonies and the mother country, entitled *A Pretty Story* (1774). He was father of Joseph Hopkinson (q.v.).

HOPKINSON, John (1849-98). An English physicist and electrical engineer. He was born at Manchester, England, and received his education at Owens College, Manchester, and at Trinity College, Cambridge, where he graduated with honors in 1871 and was appointed fellow and tutor. Commencing practice as an engineer, he soon became interested in electrical engineering, and was led to many important investigations. He was made a fellow of the Royal Society of London in 1878, and in 1890 was awarded by it a royal medal for researches in electricity and magnetism. He was at the time of his death a member of the Councils of the Institutions of Civil and Mechanical Engineers and professor of electrical engineering in King's College, London. Among his most important researches are those in which he showed the effect of temperature upon the magnetic properties of various metals. He was an authority in the theory and practice of dynamo-electric machinery, and discovered the method of employing the so-called 'characteristic curve' in discussing such problems. This curve is obtained by taking the electro-motive forces as ordinates and the current as abscissas, and

indicative diagram in the case of the steam-engine. He was the author of: *Dynamic Electricity* (1884); *Original Papers in Dynamo Machinery and Allied Subjects* (1893); and many papers on various electrical and engineering subjects. He met his death with his children in an accident while mountain-climbing in the Alps.



HOP-LOUSE.

TWIG WITH WINTER EGGS; NATURAL SIZE. PARTHENOGENETIC FEMALE; SECOND GENERATION.

HOPKINSON, JOSEPH (1770-1842). An American jurist, born in Philadelphia, Pa. He graduated at the University of Pennsylvania in 1786, and in 1791 began the practice of law at Easton, Pa., but soon removed to Philadelphia, where he rose to the front rank in his profession. He was the leading counsel in the famous suit of Rush *vs.* Cobbett in 1799, and defended Judge Chase in his impeachment before the Senate in 1800. From 1815 to 1819 he served as a Federalist Representative in Congress, where he distinguished himself in the debates on the tariff and the Seminole War, and strongly opposed the rechartering of the United States Bank. In 1828 he was appointed by President Adams a district judge, an office which he held until his death. For several years he was president of the Philadelphia Academy of Fine Arts and Vice-President of the American Philosophical Society, to each of which he contributed many papers of interest. In 1837 he was a member of the Pennsylvania Constitutional Convention, and served as chairman of his Judiciary Committee. His legal essays and decisions were long accepted as authoritative; but he will be longest remembered for his national song, "Hail Columbia," written in 1798, which attained immediate popularity and did much to fortify wavering patriotism.

HOP'KINSVILLE. A city and the county-seat of Christian County, Ky., 75 miles northwest of Nashville, Tenn.; on the Louisville and Nashville and the Illinois Central railroads (Map: Kentucky, D 4). It is the seat of the South Kentucky College (Christian), established in 1849, Bethel Female College (Baptist), founded in 1854, and of the Western Kentucky Lunatic Asylum. The city is principally engaged in tobacco manufacture and trade, but has a considerable business also in flour, wheat, corn, hay, and live stock. Hopkinsville was settled in 1797 and incorporated in 1798. As provided by a charter of 1893, revised in 1896, the government is administered by a mayor, elected every four years, and a municipal Population, in 1890, 5833; in 1900, 7280.

HOP'LOPHO'NEUS (Neo-Lat., from Gk. *ὅπλα, hopla,* arms + *φόνος, phonios,* murderous). A Miocene fossil cat, found in the White River formation of Colorado, Wyoming, and Dakota. See SABRE-TOOTH TIGER.

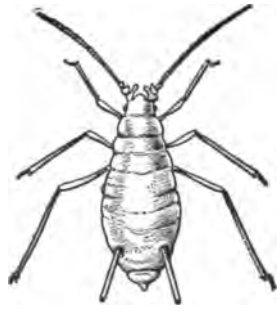
HOP-LOUSE. A very destructive aphid or plant-louse (*Phorodon humuli*), found commonly

WINGED MIGRANT, THIRD GENERATION.

on the hop-plant, and called in England 'hop-fly.' In certain years this insect causes an almost total loss of the hop crop in parts of England and

HOP-LEAF, WITH LICE; NATURAL SIZE.

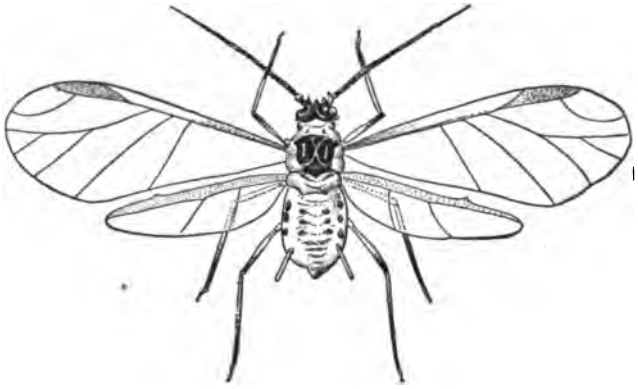
New York, and a number of years ago forced the abandonment of this industry in Wisconsin. About 1890 it made its first appearance in the States of



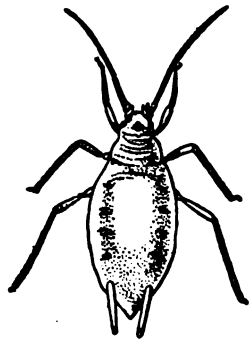
FOURTH GENERATION; FIRST ON THE HOP.

Oregon and Washington, and has since done great damage. The winter eggs are laid on plum-trees

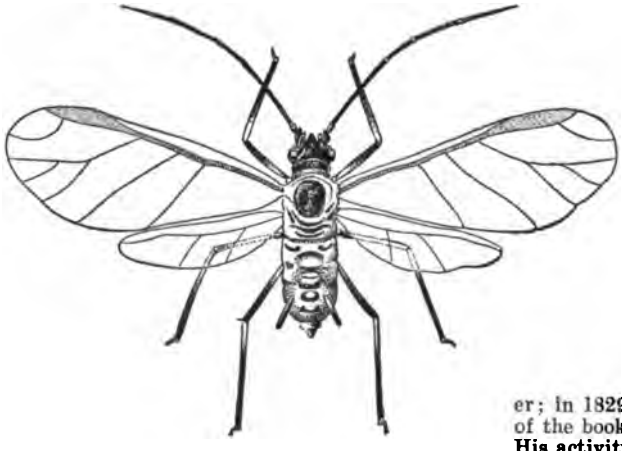
eggs hatch in the spring at the time when the buds are about to burst, and three generations of wingless, parthenogenetic females are born upon the plum-trees. Then a fourth generation, consisting of winged agamic females, makes its appearance. These females fly to the hop fields and establish themselves there, giving birth to living young which, agamic and wingless, give birth to individuals like themselves. The tenth or eleventh generation is winged, flies back to the plum, and gives birth to true sexual females which are wingless, but which mate with winged males which fly in from the fields. The winter egg is then laid once more upon the plum twigs. (See ALTERNATION OF GENERATIONS, and APHID.) The best remedy for this injurious creature is to cut down all but one or two of the plum-trees near the hop-yard, and then to destroy in May all of the lice on the one or two remaining trees by spraying with a dilute kerosene-soap emulsion or a fish-oil soap wash.



WINGED RETURN MIGRANT, OR PUPIFER.



NORMAL PARTHENOGENETIC FEMALE; SIXTH GENERATION.



WINGED MALE, AT END OF SUMMER.

SHRUNKEN FEMALE IN ACT OF DEPOSITING WINTER EGGS.

HOP O' MY THUMB. The diminutive hero of a popular fairy tale, taken from Perrault's *Comtes des Fées*, the popular sources of which are the classic stories of Ulysees and Polyphemus and of Theseus and Ariadne.

HOP'PER, ISAAC TATEM (1771-1852). An American philanthropist, prominent in the anti-slavery movement. He was born in Deptford township, Burlington County, N. J., in 1771. At sixteen years of age he was apprenticed to an uncle in Philadelphia to learn the trade of a tailor. In early manhood he became an active and leading member of the abolition society founded by Franklin, Rush, and others, and was also an overseer of a school for colored children, secretary of a society for the employment of the poor, inspector of a prison, guardian of abused apprentices, and a friend of the insane. He belonged to the Society of Friends, and in the division which occurred in 1827-28 he acted with those who were called 'Hicksites,' influenced much, no doubt, by his great regard and admiration for Elias Hicks as an earnest anti-slavery preacher; in 1829 he came to New York to take charge of the book-store opened by the Hicksite Friends. His activity in opposition to slavery exposed him to much abuse and even imperiled his life; but this did not in the least abate his zeal. In 1841 he gave up the charge of the book-store and was appointed treasurer and office agent of the American Anti-Slavery Society, and so continued until 1845, when he became the first agent of the New York Prison Association. Declining years and ill health compelled his resignation in February, 1852. He died in New York, May 7, 1852. Consult his life by Child (New York, 1881).

HOPPE-SEYLER, hŏp'pe-zī'lĕr, FELIX (1825-95). A German physiologist and chemist, born at Freyburg-on-the-Unstrut, and educated at Halle, Leipzig, Berlin, Prague, and Vienna. After five years as assistant to Virchow and director of the chemical laboratory of the Berlin Pathological Institute, he became professor of applied chemistry at Tübingen (1861), and (1872) of physiological chemistry at Strassburg. He wrote: *Handbuch der physiologisch- und pathologisch-chemischen Analyse* (6th ed. 1893); *Medizinisch-chemische Untersuchungen* (1866-70); and *Physiologische Chemie* (1877-81). Consult Baumann and Kossel, *Zur*

1895).

HOPPIN, Augustus (1828-96). An American book illustrator, born in Providence, R. I. He graduated at Brown University in 1848, and was admitted to the bar, but soon gave up the law and went abroad to study art. Upon his return, he devoted himself to drawing on wood and to the illustration of books, in which he was successful. His pictures in *Nothing to Wear*, *Potiphar Papers*, and *The Autocrat of the Breakfast Table* are widely known. He published several volumes of sketches and novels, among the latter *Recollections of Auton House* (1881), and *Married for Fun* (1885).

HOPPIN, James Mason (1820—). An American educator and writer. He was born at Providence, R. I., graduated at Yale in 1840, at the Harvard Law School in 1842, and at the Andover Theological Seminary in 1845; studied for some time abroad and was pastor of a Congregational church at Salem, Mass., from 1850 to 1859. From 1861 to 1879 he was professor of homiletics at Yale, where he was also professor of the history of art from 1879 to 1899, when he became professor emeritus. Among his publications are: *Old England, Its Art, Scenery, and People* (1867); *The Office and Work of the Christian Ministry* (1869); *Life of Rear-Admiral Andrew Hull Foote* (1874); *The Early Renaissance and Other Essays on Art Subjects* (1892); and *Greek Art on Greek Soil* (1897).

HOPP'NER, John (1758-1810). An English painter, of German parentage, born in London. He was a choir-boy in the Royal Chapel, and afterwards, by the assistance of the Prince of Wales (afterwards George III.), studied at the Royal Academy. He became a popular portrait painter, and was acknowledged by Lawrence to be his only rival. His works include portraits of the Prince, the Duke of York, Lord Nelson, Pitt, Wellington, Canning, and Grenville. He wrote a book entitled *Select Series of Portraits of Ladies of Rank and Fashion* (1803), the illustrations of which were from paintings by himself, engraved by Wilkins. One of his best works is "Lady Culling Smith and Her Children." He is more successful in his portraits of women and children than of men, as his art has an altogether feminine quality and lacks the robustness of Reynolds, whom he sometimes imitated.

HOP-TREE (*Ptelea trifoliata*). An American shrub of the rue family, called also shrubby trefoil, wafer-ash, and wingspeed, which grows in rocky places from Pennsylvania to Minnesota and southward. It usually grows from 6 to 10 feet in height, but when well trimmed and cultivated sometimes attains a height of 30 feet or more. The leaves are trifoliate, the leaflets obovate and pointed, and downy when young; the flowers, which grow in terminal cymes, are greenish white, and have a disagreeable odor. The fruit has a broad wing which resembles that of the elm, and is very bitter, but does not possess the aromatic principle of the hop; nevertheless, it is said to have been used as a substitute for hops in making beer. The bark and root are of some repute in medicine. When dried the bark has a peculiar, somewhat aromatic smell, and a bitter, pungent, acrid taste. The bark contains an acrid, bitter oleo-resin, starch, albumin, a yellow coloring substance, and salts of lime, probably the tonic principle.

HOR, hôr (Heb., mountain). (1) A mountain of Arabia Petræa, between the Gulf of Akabah and the Red Sea, and forming part of the mountain range of Edom or Seir. It was here that Aaron (q.v.) is said to have died during the journey of the Israelites into Palestine (Num. xx. 22-29; xxxiii. 38, 39; Deut. xxxii. 50). The modern name of the place is Jebel Haroun ('Mount of Aaron'), and the Mohammedans point to a structure on the top of the mountain as the tomb of the brother of Moses. (2) A mountain which was to be the northern border of the inheritance of the Hebrew tribes (Num. xxxiv. 7). If the Hebrew text is correct (which is doubtful), the name refers to the Lebanon range, and probably to Mount Hermon. Some scholars, however, give the preference to Jebel Akkar, in the northeast of the Lebanon.

HORA, hō'rȧ, Juon (c.1740-85). A Ruman patriot and national hero of Transylvania, sometimes called *Nikla Urss*, Nicholas the Bear. With Juon Kloska and George Kriszán, he roused the people to rebellion against the Imperial order for general conscription (1784). The uprising spread until thirty thousand men had joined. But Imperial troops were hurried in in such numbers that the revolt failed, the three leaders were captured, and Hora was killed. Hora's exploits form the theme of popular Ruman songs.

HORACE, ō'rās'. A five-act tragedy in verse, by Pierre Corneille, produced in 1640. It is founded on the old Roman legend of the Horatii and Curiatii. In it patriotism and affection are contrasted in the characters of Horace and Curiace, the latter being the lover of the former's sister. One of Lope de Vega's plays, *El honrado hermano*, is founded on the same myth.

HORACE (Quintus Horatius Flaccus) (B.C. 65-8). A Latin poet, born at Venusia, on the borders of Lucania and Apulia. His early years were thus passed amid a picturesque environment of mountain, forest, and stream, which made a deep impression upon his mind, and strengthened that love of nature which so often finds expression in his verse. The older Flaccus was a *coactor*, a collector of taxes or of money due for goods sold at public auctions, and by his thrift was successful not only in buying his own freedom, but also in acquiring a small estate and an income which enabled him to give to his son the best education the capital itself could offer. Thither, about the age of twelve, Horace went with his father, who, in his affection and devotion to his son's interests, made himself the boy's comrade in the daily round of study and play, and at Rome, as at Venusia, helped to form his son's standards by his own shrewd comments upon men and manners. It was naturally the *mos maiorum* rather than any abstract ideal of which the freedman pointed out the advantages, but the familiar talks had their desired effect in the rise in Horace's mind of an instinctive aversion to excess of every sort, and trained him, besides, in similar habits of keen observation and pointed, though kindly, criticism. It was then customary among young Romans of birth and means to complete their education by what may be called a university course in the schools of philosophy at Athens or in those of oratory at Rhodes, and so, between eighteen and twenty,

Horace took up his residence at Athens, listened to the exposition of conflicting philosophical theories, and entered into the social life of his fellow students. Purely speculative problems attracted him as little as they did the average Roman, nor had he, in fact, much relish for the technicalities of any philosophical system. The paradoxes and social eccentricities of the Stoic thinkers, for instance, long made it difficult for him to do justice to the real elevation of their essential principles. But he had already become profoundly interested in the practical problem of how to order one's life aright, and his stay at Athens confirmed this taste for ethical inquiry. At this time, too, he must have come to know more intimately the work of Alcæus, Sappho, Archilochus, and the other Greek lyric poets who were to be his models in the *Epodes* and the *Odes*.

But these peaceful and congenial pursuits were suddenly interrupted by the news of the assassination of Cæsar in March, 44, and the subsequent arrival of Brutus in Athens to secure recruits for the republican cause. The liberator, himself a lover of letters and an eager student of philosophy, was received with enthusiasm, and was so much taken with Horace's promise that the latter, despite his youth and lack both of family connection and of military experience, was made a staff officer, and ultimately served in the campaign of Philippi as *tribunus militum*. That decisive defeat and the suicide of his chief seem to have convinced him of the futility of further effort, and he made his way back to Rome, where, finding that his father's estate had been confiscated, he obtained employment as a clerk in the quæstor's office. It was the darkest period of his life, and, as the earliest of the *Epodes* show, the bitterness of his feeling found unrestrained expression in the verses which, in his own words, poverty drove him to write. But he was so fortunate as to win the regard of Vergil and Varius, who, three years after his return to Italy, introduced him to Mæcenas. That discerning but cautious statesman waited nine months after the first interview before he again sent for the young writer. He then bestowed the friendship that saved Horace for poetry.

But it was in metrical prose rather than imaginative poetry, as he himself viewed his work, that Horace first tried to gain an audience. Early training and the mood of the moment combined to make the choice of satire almost inevitable. Lucilius, a member of the Scipionic circle, had for the first time in Latin literature used the old *mélange* form of Ennius as a vehicle for witty and often stinging criticism of the political and social life of his time. The range of topics was naturally exceedingly wide, the treatment often dramatic, and cast in the dialogue form, the metres varied, though in the end the hexameter decidedly predominated. The new *satura* was marked by a feature quite as original and as noteworthy as itself. This was the establishment of a personal and intimate relation between Lucilius and his reader, so that the frankest revelation of the poet's inmost feelings seemed yet free from egotism and consistent with self-respect. It was thus natural that Horace should be strongly attracted by Lucilius, though, with a mind already much occupied with the niceties of phrase and cadence, he could not but feel that, despite all its vigor and charm, the work of the older poet was sadly lacking in artistic finish. To write in the manner of Lucilius, but with a more perfect art—this was the end proposed and achieved in the *Satires* (*Sermones*, '*causeries*,' as he calls them), of which the first volume appeared about B.C. 35. The second, published about B.C. 29, is far superior in execution to the first, and shows Horace at his best in this kind. We are listening to an accomplished man of the world, intimately acquainted with human nature, whose whims and weaknesses he probes with delightful humor. He is exceedingly fond of the weapon of irony, which he uses against himself quite as often as against others, and every page reflects his sunny nature, genuinely tolerant and charitable. These 'talks,' however light in their touch, have yet a definite and serious purpose. It is the art of living that is ever under discussion, and, as he studied others, so also Horace studied most minutely the nature best known to him, so that one of the special charms of the *Satires* is the presence of this constant self-analysis. One may say of Horace what Mr. Sidney Colvin says of Stevenson in his introduction to the *Vailima Letters*, that he "belonged to the race of Montaigne and the literary egotists." The word seems out of place, since of egotism in the sense of vanity or selfishness he was of all men the most devoid; but he was nevertheless a watchful and ever interested observer of the motions of his own mind. He saw himself as he saw everything else (to borrow the words of Mr. Andrew Lang) with the lucidity of genius, and loved to put himself on terms of confidence with his readers.

One notices already in the *Satires* an attitude of mind that became characteristic and was later both to limit his range and to widen his appeal as a lyric poet. He takes counsel of his head rather than of his heart, and distrusts enthusiasm, especially about ideas, as if warmth of feeling, not held carefully in check by the reason, rendered impossible that equipoise through which alone one may hope to see things as they really are. This is true of even his friendships, where he is tenderness and loyalty itself. But this studied moderation of thought and utterance is the fruit of experience and self-discipline. His earliest attempts in lyric verse show all the ardent temper of youth, and are marked by an exuberance of phrase in striking contrast with the wonderful compression of his later work. In these *iambi*, as he called them, published about B.C. 30, Archilochus is his model, though not more than half of the seventeen poems that Horace deemed worthy of preservation show the personal animosity associated with the name of the Greek poet. With one exception, the seventeenth, they are written in couplets, the second verse of which forms a refrain (*epodus*, ἐπῳδός) to the first, and thus they came in time to be known as *Epodes*. Immature as they are as a whole, and interesting chiefly as the first essays of the Horace of the *Odes*, three certainly reveal poetical power of no mean order—the idyllic second, with its sudden turn to satire at the close, the fifth, with its extraordinary picture of the sorceress Canidia, and the passionate appeal to his countrymen in the sixteenth.

Shortly after the appearance of the first book of the *Satires*, Mæcenas presented Horace with a small farm among the Sabine hills, in the valley through which the cool Digentia flows south to

the modern Vico-Varo. Perhaps no gift ever exercised a more important influence upon a man's career. It was not merely that he was thus enabled to devote himself wholly to his art without thought of pecuniary return. The farm was his "*area*," his sure retreat from the fatigues and distractions of the great world. The peace of nature, loved since the days at Venusia, entered into and possessed his soul, and the pure air—it was about two thousand feet above the sea—renewed his physical strength, of which, as the years passed, he had to take increasing care. He has immortalized the farm, and, indeed, the whole valley, in his affectionate praise. One may doubt whether he could have been happy without active participation in the brilliant life of the capital, but much of what is truest and best in the inspiration of the *Odes* and the *Epistles* is due to the many quiet days spent with his books *in Sabinis*.

The eighty-eight lyrics that are comprised in the first three books of the *Odes* were undoubtedly privately circulated among his friends previous to their final collection and publication in one little volume in the year 23. Their composition extended over about seven years, for the earliest that can be dated with certainty (i., 37) was written upon the receipt at Rome of the news of Cleopatra's suicide, and few, if any, could have preceded this. They were the outcome of long and loving study of the great Greek lyric poets, especially Alcæus and Sappho, belonging to the early classical period rather than to the Alexandrian age. But, while their form is similar, their content is vitally different in its effect, and it is difficult to define precisely the nature of that unfailing charm which almost from the moment of their appearance they have been universally felt to possess. Shelley in his *Defence of Poetry*, following a famous passage in Plato's *Phædrus*, and Sidney in his *Apologie for Poetry*, both maintained that "poets are so beloved of the gods that whatsoever they write proceeds of a divine fury." But nothing could be more alien to Horace's temper than this. He has neither the passion of Burns or Catullus in the expression or feeling, nor the absorbed and ecstatic earnestness of Lucretius in urging the claims of the true philosophy of life, nor yet the imaginative and mystical power of Vergil. Gray, however, a poet whose method of composition resembled Horace's in its critical deliberateness—in the second poem of the fourth book of *Odes*, Horace compares himself to a bee that with infinite labor gathers its sweets from many a flower—says in one of his letters: "Extreme conciseness of expression, yet pure, perspicuous, and musical, is one of the grand beauties of lyric poetry." The three adjectives here used are peculiarly appropriate to Horace's work; indeed, no other lyric poet in Latin literature has so exquisite a verbal technique. The *Odes* abound in phrases of such perfect finish that no change save for the worse seems possible, phrases which have been the common property of educated men for centuries: *Persicos odi, puer apparatus; carpe diem; dulce et decorum est pro patria mori; vivere fortes ante Agamemnona; matra pulchra filia pulchrior; nil desperandum; splendide mendax; dulce est desipere in loco; post equitem sedet atra cura*—to give a complete list would be almost to quote the *Odes* entire. Yet it is all a *curiosa* carefully and minutely wrought out by a mind trained in the nicest apprehension of the color values of words and an ear attuned to all the subtleties of cadence. And no artist was ever more alive to the delicate shades of meaning that words gain from their context. Partly, no doubt, from the difficulties inherent in the use of foreign metres, but more especially because of his own liking for moderation and simplicity, the vocabulary which he has chosen to employ is notably limited. Yet the oft-recurring words produce so different an effect in their ever-changing settings that one does not notice the repetition. The themes themselves are even more limited in their range than the vocabulary, but upon the few that he selects he plays variations of surpassing beauty. There is nothing transcendental, nothing of what Poe held to be the essence of poetry, "no mere appreciation of the beauty before us, but a wild effort to reach the beauty above." The *Odes* are rather the expression of idealized common sense, and just for this reason Horace has been in all ages the favorite poet of minds the most diverse, for none makes a surer appeal to the finer sensibilities of humanity in its every-day moods.

In the *envoi* to the first three books of the *Odes*, Horace expresses his entire confidence in their abiding fame, and with this achievement his lyrical impulse seems to have satisfied itself. A new series of 'talks' engaged his attention, cast, however, in a different literary form, that of the letter. These *Epistles*, of which the first book appeared toward the end of 20, or, at the latest, in 19, do not differ much from the *Satires* in the subjects discussed. Conduct is more than ever 'three-fourths of life.' But the years of reading and reflection have brought truer insight and greater breadth of view. He is still a searcher after the philosophy of life (his mind was far too independent to accept any creed formulated by others), but he urges with tactful insistence the elementary principles of whose truth he has become convinced. The humor is kindlier and more subtle; in fact, one is often in doubt whether he is speaking in jest or earnest, so that he has the inexhaustible charm of one whose secret is never wholly surprised. He is no idealist; it is rather the doctrine of the mean, the *aurea mediocritas*, that he so winningly inculcates. Not even virtue itself is to be sought beyond the bounds of reason, as indeed Aristotle had claimed long before him. Both the language and the metre of the *Epistles* show the effects of the seven years devoted to lyric composition. There is the same wealth of terse and happy phrase, and the hexameter, which even in the *Satires* was an immense advance upon the rhythm of Lucilius, is always smooth and often musical.

The death of Vergil in 19 left Horace by general consent the greatest living poet; and it was as such that in 17 Augustus commissioned him to write the hymn for the religious festival of the Secular Games. The result to modern ears may seem rather stiff and unimaginative in spite of the technical excellence of the verse, but to the great Roman audience—we must remember that the *Carmen Sæculare* was chanted in the open air—there must have been something peculiarly impressive in the linking of the old liturgical formulas with the new faith in the city's imperial

destiny. Two years later, at the personal request of the Emperor, he composed two odes in celebration of the victories of Drusus and Tiberius, the step-sons of Augustus, over the Rhæti and Vindelici, and, about the same time, two others in praise of the beneficent results of the reign for Italy. But Horace, though he had long been a sincere supporter of the new régime, was ill fitted for work of this kind, and these poems, especially the first two, show the laboriousness that not infrequently attaches to the official odes of a poet laureate. To give them permanence, he added eleven fugitive pieces (one of which, however, the seventh, is a perfect gem), and published this fourth book of the *Odes* in 13.

According to Suetonius, the charming bit of literary criticism which opens the second book of the *Epistles* was written to meet a complaint of Augustus that to him alone Horace had dedicated nothing. It is in substance an attempt to show that no true parallel could be drawn between the development of poetry in Greece and that at Rome, and that the work of the modern school, of which he regarded Vergil, Varius, and himself as the best representatives, marked the highest level yet reached of artistic achievement. In the second of the two epistles of this book he sets forth at length with characteristic irony and indirection the reasons why henceforth lyric poetry must give place to the "rhythms and harmonies of real life." The latest of his letters and the one which is most nearly a formal essay is that addressed to the Pisos. It is generally known as the *Art of Poetry* (*Liber de Arte Poetica*), though this title seems not to have been given to it by Horace himself, and is, indeed, scarcely appropriate, for only one branch, that of the drama, receives any systematic treatment. The discussion has all the sanity and breadth of judgment that mark the moral epistles, and is, in effect, another defense of the poetic ideals of the Augustan school.

Of the details of the closing years of his life we have no record. The death of Mæcenas, who in his last words commended his life-long friend to Augustus, was a severe shock. Horace, who had once (C. ii., 17) prayed that they might not be separated in death, did not long survive him, dying on the 27th of November, B.C. 8, when he had nearly completed his fifty-seventh year. He was buried on the Esquiline, close to the tomb of Mæcenas.

Mr. Mackail has admirably summed up the significance of his work: "Among the many amazing achievements of the Greek genius in the field of human thought were a lyrical poetry of unexampled beauty, a refined critical faculty, and, later than the great thinkers and outside the strict schools, a temperate philosophy such as we see afterwards in the beautiful personality of Plutarch. In all these three Horace interpreted Greece to the world, while adding that peculiarly Roman urbanity—the spirit at once of the grown man as distinguished from children, of the man of the world, and of the gentleman—which up till now has been a dominant ideal over the thought and life of Europe."

BIBLIOGRAPHY. The *editio princeps* was published at Venice in 1470. The most important editions before Bentley were those of Lambinus (last edition, Coblenz, 1829), Cruquius (Antwerp, 1578), and Heinsius (Leyden, 1612). Richard Bentley's edition, first published at Cambridge in 1711 (3d ed., Berlin, 1869), made a new era in Horatian criticism. The best critical edition of the text is that of Keller and Holder (2 vols., Leipzig, 1864-70). Keller issued a second edition of the first volume (*Odes, Epodes,* and *Carmen Sæculare*) in 1899, and also a supplementary volume of text discussion, *Epilegomena zu Horaz* (Leipzig, 1879-80). The best general editions are those of Orelli revised by Hirschfelder and Mewes (4th ed., 2 vols., Berlin, 1886-92, with Latin notes and complete word index); Kiessling (2d ed., 3 vols., Berlin, 1890-97; vol. i. in 3d ed., 1898); Müller, *Odes and Epodes* (Leipzig, 1900), *Satires and Epistles* (1891-93); Wickham, *Odes and Epodes* (3d ed., Oxford, 1896), *Satires and Epistles* (1891); Schütz (Berlin, 1880-83; vol. i. containing *Odes and Epodes*, 3d ed., 1889). The *Odes* have been edited separately by Nauck (13th ed., Leipzig, 1889), Page (4th ed., London, 1890), Smith (Boston, 1895), Shorey (Boston, 1898); the *Satires* by Krüger (14th ed., Leipzig, 1897), Palmer (London, 1883); the *Epistles* by Wilkins (3d ed., London, 1889). Porphyrion's *Scholia* have been edited by Holder (Innsbruck, 1894).

The translations of Horace are all inferior to the original. Among the best are those of Francis, entire (London, 1778); Lord Ravensworth, *Odes* (London, 1858); Martin, entire (Edinburgh, 1888, with an interesting memoir and good illustrative notes); Conington, *Odes and Epodes* (3d ed., London, 1865), *Satires and Epistles* (1892); Lord Lytton, *Odes and Epodes* (London, 1869); Gladstone, *Odes* (New York, 1894); Cooper, *Odes* by various hands (London, 1880); Sargent, *Odes* (Boston, 1893); De Vere, *Selected Odes and Epodes* (London, 1893). A sumptuous edition of the *Odes and Epodes* is that of the Bibliophile Society (6 vols., Boston, 1901-02), with introduction, life, and Latin text, translated and annotated by 'eminent scholars, statesmen, and poets.' Pope's *Satires and Epistles of Horace Imitated* is very brilliant (best edition by Pattison).

The most valuable literary treatment of Horace is Sellar's *Horace and the Elegiac Poets* (Oxford, 1892). Good also are Boissier's *The Country of Horace and Vergil* (translated from the French, London, 1896), and Plüss, *Horazstudien* (Leipzig, 1882). There are good chapters on Horace in Nettleship, *Lectures and Essays*, first series (Oxford, 1885); Patin, *Etudes sur la poésie latine* (3d ed., Paris, 1883); Mackail, *Latin Literature* (New York, 1900); Tyrrell, *Latin Poetry* (Boston, 1895).

HO'RÆ (Lat., from Gk Ὧραι, *Hōrai*, hours, seasons; connected with ὥρος, *hōros*, year, Av. *yārə*, year, OChurch Slav. *jarŭ*, spring, OHG. *jār*, Ger. *Jahr*, Goth. *jēr*, AS. *gēar*, Eng. *year*). In ancient Greece, goddesses of the seasons of the year, at first with special reference to the farmer. At Athens they seem to have been originally two, Thallo and Carpo, the goddesses of the blossoming and ripening fruit. In general they were at first three, Eunomia, Dike, Eirene, whose names show that the ethical side of their nature, as guardians of the due order and peaceful succession of natural processes, has become prominent. In the legend they are daughters of Zeus and Themis, guardians of the gates of Olympus, attendants upon the gods. They bring flowers and fruits to mortals, and are closely connected with the Charites or Graces (q.v.). In the

is increased to four, each of whom is given attributes appropriate to a special season. These four Horæ, however, rarely appear in literature, until the late epic of Quintus Smyrnæus and Nonnus. The fiction of twelve Horæ for the hours of the day is also very late, and cannot be found in art with any certainty. Consult: Preller-Robert, *Griechische Mythologie*, vol. i. (Berlin, 1894), and Rapp, in Roscher, *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1886 et seq.).

HOR'APOL'LO (Lat., from Gk. Ὡραπόλλων, *Horapollōn*). An Egyptian who wrote on Greek grammar, probably in the fourth century A.D. He lived in Alexandria and at Constantinople, and wrote commentaries on the Greek poets. Another Horapollo lived at the close of the next century. It is uncertain whether we should ascribe to the former or to the latter the work on hieroglyphics, apparently a Greek translation of the work in Egyptian of one Horapollo, or possibly Horus, which gives this name importance, and which has some value to the Egyptologist. The best edition of the work on hieroglyphics is by Leemans (Amsterdam, 1835).

HORATII, hō-rā'shĭ-ĭ. Three Roman brothers, born at one birth, cousins to the Curiatii, of Alba, also three brothers born at one time. Their mothers were twins, who had been married on the same day, and given birth to their sons at the same time. During the Roman wars, when Cluilius, the Alban King, and Tullus Hostilius, the Roman King, were in conflict, it was decided to leave the issue to a personal combat between these brothers. Two of the Horatii were soon slain, and the third brother, feigning flight, was pursued by the Curiatii, all wounded, whom he slew one by one. The sister of the Horatii was betrothed to one of the Curiatii, and had made for him a beautiful mantle. As the victor entered the gate of Rome bearing his spoils, he was met by his sister, who, upon recognizing the cloak in her brother's hands, broke out in lamentations. Enraged that she should prefer her lover to her country, her brother slew her on the spot, and her body remained unburied until passers-by covered it with stones. He was condemned to be scourged to death, but was afterwards pardoned. The story is given by Livy (I. 24); behind the pure myth lies the fact of the close union in early times between Rome and Alba Longa, and the later subjection of the latter.

The famous Horatius (Cocles) who, with Titus Herminius and Spurius Lartius in B.C. 507, so gallantly defended the bridge against the army of Lars Porsena, King of Clusium, while their companions broke down the Sublician bridge behind them, was a worthy descendant of the survivor of the three Horatii.

HORATIO, hō-rā'shĭ-ō. (1) In Shakespeare's *Hamlet*, a character who in his philosophical attitude toward varying fortunes forms an admirable foil to his morbid and introspective friend Hamlet. (2) The friend of Lord Altamont in Rowe's *Fair Penitent*. He informs Altamont of Calista's seduction by Lothario, and the latter is killed in the duel which ensues.

HÖRDE, hēr'de. A town of the Prussian Province of Westphalia, situated on the Emsche, two miles by rail from Dortmund (Map: Prussia, tries connected with the working of iron. Population, in 1890, 16,346; in 1900, 25,126.

HORDEIN, hôr'dē-ĭn (from Lat. *hordeum*, barley). A substance that can be extracted from barley. It is merely a mixture of starch, cellulose, and a little nitrogenous matter.

HORDE'OLUM. See Stye.

HOR'DEUM. See Barley.

HOREB, hō'rĕb. See Sinai.

HORE'HOUND (AS. *hārhūne*, from *hār*, hoar + *hūne*, hoarhound), *Marrubium*. A genus of plants of the natural order Labiatæ. The species are mostly herbaceous perennials, natives of the south of Europe and the East. One species, the common or white horehound (*Marrubium vulgare*), is found generally throughout Europe, except in the more northern regions, and in the United States, growing in waste places, waysides, etc. It is about 1 to 1½ feet high, bushy, with roundish, ovate, crenate, wrinkled leaves, and almost globose whorls of white flowers. The whole plant has a whitish appearance, from the down with which its leaves are covered. It has an aromatic but not very agreeable smell. It is tonic, stimulant, and laxative, and is popularly and efficaciously used for coughs, as an infusion, as a syrup with sugar, or as a candy. In England the name horehound is applied also to another plant, *Ballota nigra*, sometimes called black or fetid horehound, a fetid plant, also of the order Labiatæ, and of a genus very closely allied to Marrubium. It closely resembles the white horehound in taste, and possesses similar medical properties. A third British plant, *Lycopus Europæus*, a diandrous plant of the same natural order, is sometimes called water-horehound, and is also known as gypsywort. All these species have been introduced in the United States, and, in addition, six or eight species of Lycopus, or water-horehound, are rather abundant.

HOREHOUND.

HORGEN, hôr'gen. A town in Switzerland, on Lake Zürich, 10 miles south of Zürich (Map: Switzerland, C 1). It is a thriving industrial centre, with manufactures of cotton and silk goods, and chemicals. Population, in 1888, 5519; in 1900, 6883.

HOR'ICON. The Indian name of Lake George, N. Y.

HO'RITES. An ancient people who dwelt in and around Mount Seir before the Edomites came there (I. Chron. i. 38-42). Biblical tradition preserves a recollection that the Horites formed a group of seven tribes (Gen. xxxvi. 20-

30). They were smitten by Chedorlaomer and the kings of the East when they attacked Sodom in the days of Abraham (Gen. xiv. 6; Deut. ii. 12-22). They were overcome, and perhaps absorbed, by the Edomites. The name Horite has usually been explained to mean 'cave-dwellers,' but this is doubtful. See EDOM.

HORIZON (Lat. *horizon*, from Gk. ὁρίζων, pres. part. of ὁρίζειν, *horizein*, to bound, from ὅρος, *horos*, boundary). (1) In popular language, the circular line formed by the apparent meeting of earth and sky. Astronomers call this the *sensible horizon*, distinguishing it from the *rational horizon*, i.e. the circle formed by a plane passing through the centre of the earth, perpendicular to the plumb-line, and produced to meet the heavens. (2) A term in geology, referring to a bed or beds which are characterized by some special forms of fossils found in them.

HORLA, ôr'lä', LE. A story dealing with madness, by Guy de Maupassant (1887), who himself became insane in 1892.

HORMAYR, hôr'mîr, JOSEPH, Baron (1782-1848). An Austrian historian, born at Innsbruck. He studied law at the University of Innsbruck, and afterwards entered the Ministry of Foreign Affairs at Vienna. In collaboration with Archduke John, he published a number of pamphlets against Napoleon, and in 1809, as intendant in the army commanded by John, he incited the popular uprisings in the Tyrol, Vorarlberg, and Salzburg. After the truce of Znaim he returned to Vienna and devoted himself to historical work until his unauthorized attempt to stir up another revolt among the Tyrolese led to his being arrested at Metternich's command. On his release the Emperor made him Court historiographer, but his imprisonment had so imbittered him against Metternich that in 1828 he accepted the position of Councilor in the Bavarian Ministry of Foreign Affairs. Four years afterwards he was sent to Hanover to represent the Bavarian Government, and in 1830 was transferred to Bremen, and then was given charge of the Government archives at Munich. His intimate connection with public men and events during one of the most interesting periods of European history give a peculiar value to his writings, many of which deal with subjects of which he had a first-hand knowledge. His publications include: *Allgemeine Geschichte der neuesten Zeit, vom Tode Friedrichs des Grossen bis zum zweiten Pariser Frieden* (1817-19; 2d ed. 1831); the much criticised but highly entertaining *Lebensbilder aus dem Befreiungskriege* (1841-44); and *Das Land Tirol und der Tirolerkrieg von 1809* (1845).

HORMIZD, hôr'mîst, or **HORMIZDAS**. The name of several kings of Persia. See SASSANIDÆ.

HORMOGONIA (Neo-Lat. nom. pl., from Gk. ὅρμος, *hormos*, chain + γόνιμος, *gonimos*, productive, from γόνος, *gonos*, seed). Portions of the filaments of blue-green algæ that separate to form a new plant. See CYANOPHYCEÆ.

HORMOS (Gk. ὅρμος, chain). A Greek war dance supposed to have been invented by Lycurgus. Like most of the other Greek dances, it was danced in a long line which wound in and out. The performers were youths and maidens, and the leader of the line played on a lyre to which the steps were timed. The figures which the men danced were wild and warlike, and they were followed by the girls, who danced gracefully and quietly, in contrast to the exaggerated steps of the men. The name was also applied to an ancient Scotch dance.

HORN (AS., Icel., OHG. *horn*, Ger. *Horn*, Goth. *haúrn*, Runic *horna*, horn; connected with Ir., Welsh *corn*, Galatian κάρνον, *karnon*, Lat. *cornu*, horn, and ultimately with Gk. κέρας, *keras*, Skt. *śṛṅga*, horn, as well as with Lat. *cervus*, AS. *heorot*, Eng. *hart*). (1) A modification of the cuticle observable in man and most other vertebrated animals; and (2) a special adaptation of this substance to form appendages of the head in certain mammals. The word has many other applications, more or less remote from this, in zoölogy as elsewhere. Thus the chitinous material of the harder parts of insects is frequently termed 'horn,' whereas the tortoise-shell, which is truly of this nature, is rarely so designated. The projections from the prothorax of 'stag' and other beetles, the feelers or ovipositors of other insects, the eye-stalks of snails, frontal feathers (plumicorns) of owls, the projecting front teeth of the narwhal, etc., are frequently called 'horns,' though all are different in both substance and function from the true horns to which this article is restricted.

NATURE AND SERVICE OF HORN. Horn is the connective tissue of the epidermis hardened and thickened, and in some cases mixed with, or composed of, agglutinated hairs. Its purpose is to form a resisting or protective surface, or a tough tool or weapon. The whole, or principal part, of the epidermis may become of this nature, as is the case in the hide of armadillos and the scaly ant-eaters, ancient and modern, in serpents and lizards (whose scales are horny), and in the turtles which supply tortoise-shell (q.v.). In the higher ranks it constitutes the 'whalebone' developed from the palate of the baleen-bearing whales; becomes the protective sheath of the mandibles forming the serviceable beaks of birds and turtles; and, by more or less completely ensheathing and extending the outermost bone of each digit, forms nails, claws, and hoofs (see NAIL), strengthening and arming the fingers and toes of such reptiles as have feet, of all birds, and of all the mammals except whales. Horn enters also into spurs on the legs and other parts of certain animals, forms one or more shields, or weapons, or both, on the head; and callosities elsewhere, such as on the heel of man (and the 'corns' on his toes), the knees of camels, etc., as use and habit call for a hardening of the cuticle to resist wear and relieve pressure. Further particulars as to these structures will be found in the article BIRD (the beak); INTEGUMENT; NAIL (nails, claws, hoofs, spurs, etc.); SKELETON; SNAKE (scales, rattle, etc.); TORTOISE-SHELL; TURTLE; and under HORNS below. The chemical composition of the various horny tissues is exhibited in the table following.

These tissues differ slightly in the quantity of inorganic matter which they contain, but the difference does not vary much beyond 1 per cent. Hair yields from 0.54 to 1.85 per cent. of ash, containing among other ingredients, peroxide of iron and a little silica. In feathers, the quantity of silica is very considerable, and it is doubtless to this constituent that the shaft in a great measure owes its strength and hardness.

HORNY TISSUE appears as a variety of tumor upon different regions of the human skin, but especially upon the face, and occasionally in dermoid cysts. These manifestations are considered as warts, of which the epidermal cells are intimately united in the same manner as in the nails; and they are classed with warts, corns, and some nævi, under the term corneous papillomata. The tendency to horny excrescences on the skin is rare, and belongs to advanced age. There is a disease of the skin called 'hystricismus,' which is a peculiar variety of papillary hypertrophy, with hornifying of the epidermis of such a nature that it resembles short porcupine-quills. Horny excrescences occasionally break and fall off spontaneously; but they grow again if not cured radically by the excision of the portion of skin upon which they are located.

	Hair	Horse's hoof	Cow's horn	Nails	Epidermis	Whalebone	Tortoise-shell
Carbon	50.65	51.41	51.03	51.09	50.28	51.86	54.89
Hydrogen	6.36	6.96	6.30	6.82	6.76	6.87	6.56
Nitrogen	17.14	17.46	16.24	16.90	17.21	15.70	16.77
Oxygen	20.85	19.94	22.51	22.39	25.01	21.97	19.56
Sulphur	5.00	4.23	3.42	2.80	0.74	3.60	2.22

ECONOMIC USES OF HORN. The horns of animals enter largely into the manufacture of many useful and ornamental articles, and are employed for useful and ornamental purposes. The principal horns employed are those of the ox, buffalo, sheep, and goat. These are quite different in structure from the antlers of various deer, which are really bone and resemble ivory in structure. More like true horns are hoofs, claws, nails, and quills. Horns have but 2 or 3 per cent. of earthy matter, while bones have over 50 per cent. Horn can be softened and split into thin layers or laminæ, or pressed into molds. As it recovers its peculiar character of flexibility, toughness, and transparency when cold, it is particularly adapted for a great variety of purposes. It can also be dyed various colors. A solution of gold in aqua regia dyes it red; a solution of nitrate of silver in nitric acid, black; a paste of red lead, made with a solution of potash, colors it brown; so that with a proper arrangement and application of these materials, the most admirable imitations of the much more costly tortoise-shell can be produced, which, indeed, it resembles in structure. The more common vegetable dyestuffs, as logwood, Brazilwood, barwood, saffron, indigo, etc., will also color horn, but neither so permanently nor so brightly as the metallic materials.

By long-continued soaking, the horns of all the animals above mentioned can be softened, and those of the sheep and goat can easily be split into several layers after they have been soaked and boiled. These layers can not only be flattened out by putting them between smooth iron plates heated and placed in a press, but can be welded together firmly by pressing their edges together between polished copper plates, and then plunging them for some time into boiling water and then into cold water. This property enables the horn-worker to use up the smallest cuttings with profit. Another valuable property of horn is that when heated it can be pressed into a die, and not only takes a beautiful sharp impression, but if left in the die until cold it retains it. In this way it is employed in making handles for umbrellas, knives, forks, and a variety of other articles. Combs are made out of the flattened sheets, and beautiful carvings are made out of the solid parts of buffalo-horns. Ox-horns, too, are sometimes of fine quality and color, and are fashioned into drinking-cups and other articles, often highly ornamental. Before the horn is softened for manufacture, the solid tip is usually sawed off, to be treated separately. This is usually sawed into blanks to be used for buttons and other purposes. These blanks are heated, pared, heated again in water and pressed between dies, after which they are buffed and polished. The value of the horns and hoofs imported into the United States to be consumed in domestic manufactures in recent years has been as follows: 1893, $554,902; 1894, $235,232; 1895, $268,800; 1896, $568,445; 1897, $150,134.

HORN. A musical instrument, belonging to the family of brass wind instruments and distinguished by a cupped mouthpiece, a flaring bell, and a narrow, conical tube which is between nine and eighteen feet long, and is twisted back on itself. The natural or French horn (q.v.), although having an exceedingly tender, sonorous tone, was a very imperfect instrument, and is now entirely superseded by the valve horns. The horn is built in almost any key; there are horns in A, B♭, C, D, E♭, E, F, G. Its range is from C—c³. As the horns (except the one in C) are transposing instruments, lower tones than C can be obtained by using different horns. For instance, on the low B♭ horn the note C sounds B♭, on the E♭ horn E♭, etc. The music for horns is always written in the G clef, except the very low tones. Strange to say, the tones written in the bass clef are always written an octave *lower* than the actual sound. In the smallest orchestra there are always two horns. The ordinary symphony orchestra has four, and Wagner employs as many as eight. When four horns are used the first and third are written on the same staff in the score, and the second and fourth together on another staff. What kind of horns are employed depends upon the tonality of the composition and also to some extent upon the modulation within the tonality. Thus a composer writing in C major might employ two horns in C and two in F, or two in C and two in G. Some modern masters use the F horns for all keys. A peculiarity in writing music for horns is that no key signatures are used. All music is written in C and every chromatic alteration is specially marked. Muted tones can also be produced upon the valve horns. They have a peculiar ominous sound, and are sometimes employed in dramatic works to express situations of fear, horror, mystery, etc. In the *Nibelungen* Wagner has an effective phrase on muted horns whenever Wotan's ravens are mentioned. Unfortunately, these muted tones have been abused and are used without sufficient reasons in the works of the Neo-German school. Of the early composers, Weber

1742). A Swedish statesman, born at Vuorentaka, Finland. He served in the Swedish Army, and was rapidly promoted to be general of brigade (1700). He assisted in the deposition of King Augustus of Poland (1704), and under Stanislaus Leszczynski, his successor, he remained as Ambassador. In 1705 he was made counselor to the King. After the death of Charles XII. he forced his sister, Ulrica Elinore, to submit to an election before she could ascend the throne, and later imposed on her the Constitution of 1719. The years when he was marshal of the Kingdom were spoken of afterwards as the 'time of Arvid Horn,' so successful had the country been under his leadership. He retired from active life in 1738.

HORN, Cape. See Cape Horn.

HORN, Charles Edward (1786-1849). An English composer and conductor, born in London. He was the pupil of his father, Karl Horn, a music-teacher, and received singing lessons from Rauzzini. He first appeared at the English Opera House in 1809. The following year he composed *The Magic Bride*, his first opera. From 1814 to 1832 he was connected with the English Opera House as singer, composer, and conductor. He made a prolonged visit to America in 1832, and conducted English opera in New York City. During this time the Handel and Haydn Society produced two of his works, an *Ode to Washington* (1832), and an oratorio, *The Remission of Sin* (1836). This latter, renamed *Satan*, was given in London in 1845. He was elected conductor of the Handel and Haydn Society in 1847, and reëlected in 1848. Among his works are: *Daniel's Prediction* (1848); several operettas, such as *Tricks upon Travelers* (1810) and *The Devil's Bridge* (1812); of his songs, "Cherry Ripe" and the duet "I Know a Bank" have remained popular.

HORN, Gustaf (1592-1657). A Swedish soldier, born at Oerbyhus. He studied at the universities of Rostock, Jena, and Tübingen, entered the army in 1612, and served against the Poles. In 1630 he commanded half the army of Gustavus Adolphus in the advance of that monarch upon Frankfort-on-the-Oder. He directed the Swedish left in the battle of Breitenfeld, in 1631, and participated in the defeat of Tilly's army on the Lech. In 1634 he was completely defeated, together with his ally, Bernhard of Weimar, at Nördlingen, and made a prisoner by the Imperialists. He was not released until 1642. He later distinguished himself in the war against Denmark.

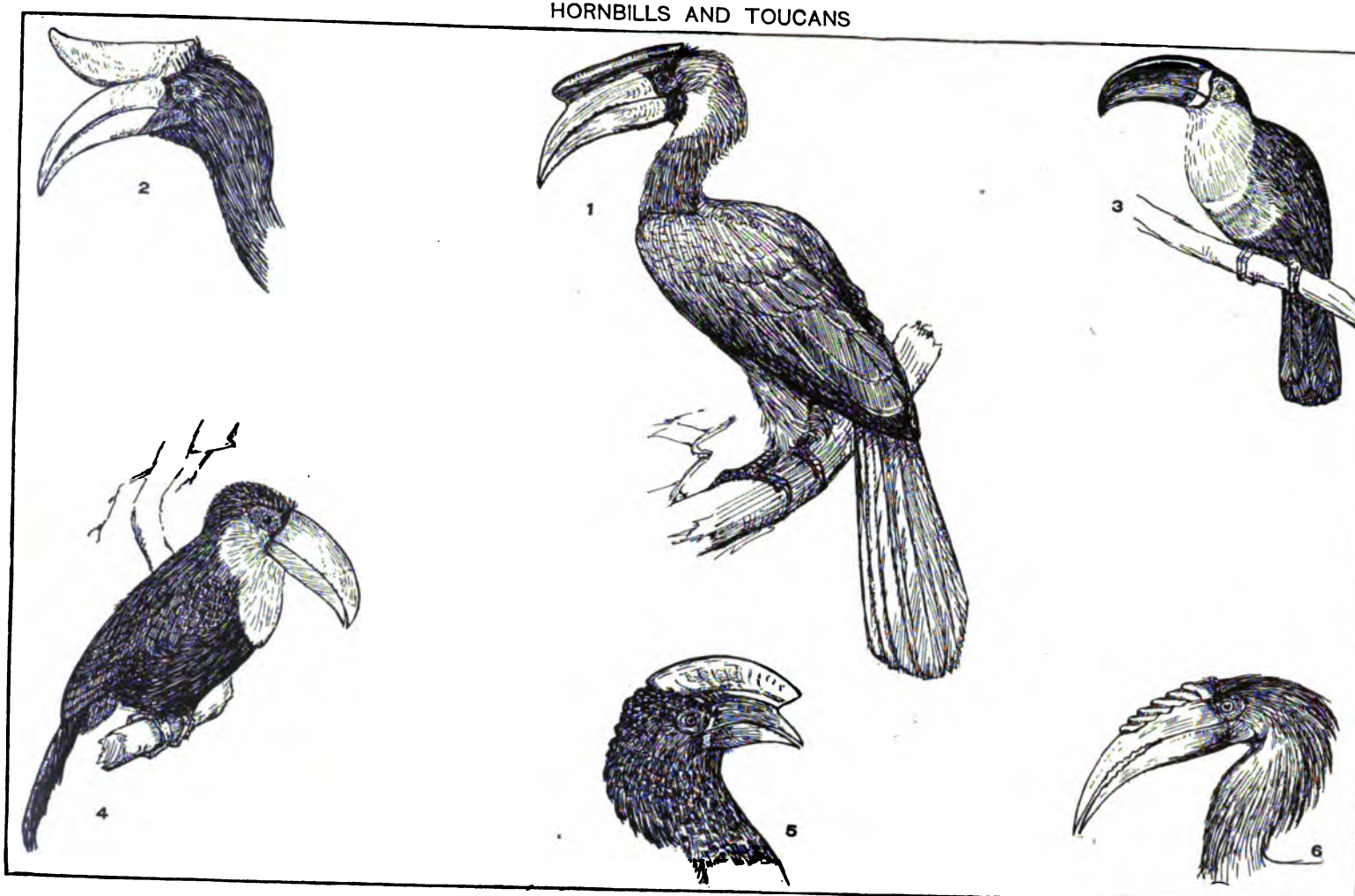
HORN, Paul (1863—). A German specialist in modern Persian philology, born at Halle. His education was at the university in that city, where he devoted himself chiefly to Oriental and linguistic studies, and received the degree of doctor of philosophy in 1885. Four years later he became privat-docent at the University of Strassburg, and he has held a professorship there since 1900. Among his writings may be mentioned: *Die Nomenalflexion im Avesta und den altpersischen Keilinschriften* (Halle, 1885); *Sassanidische Siegelsteine* (Berlin, 1891); *Die Denkwürdigkeiten Schah Tahmâsp's* (Strassburg, 1891); *Neupersische Schriftsprache* (Strassburg, 1896);

HORN, Van de, or van (1635-83). A Dutch buccaneer. After studying seamanship on board of merchant vessels, at the age of twenty-four he bought one of his own, set up as a pirate, and preyed upon the shipping of his native land. Next he became a sailor of fortune, serving whichever European power would pay him most highly, and it was chiefly France that engaged him to wage war upon Spanish ships by fair means or foul, generally the latter. He was with De Graff in the despoiling of Vera Cruz (1683), but fought a duel with him over the division of plunder and died from the results of the wound thus received.

HORNBEAM (*horn* + *beam*, AS. *beam*, OHG. *boum*, Ger. *Baum*, tree; connected ultimately with Gk. *φύειν*, *phyein*, to grow, Skt. *bhū*, to become), *Carpinus*. A genus of the natural order Cupuliferæ, which consists of trees with compact, rough, hard wood, almost smooth whitish-gray bark, deciduous leaves, and monœcious flowers. The common hornbeam (*Carpinus betulus*), very frequent in moderately moist, shady woods of many parts of Europe, is a beautiful tree which attains a height of 60 to 100 feet. It has ovate, acuminate, almost triply serrate leaves, and the fruit has very large, deeply three-partite bracts. Its root descends deep into the ground. The wood, which is much used by carpenters and wheelwrights, is white, very hard, uncommonly strong and tough, and therefore suitable for bearing heavy strains. It takes a very fine polish, and, when well stained, might readily be mistaken for ebony. In the earth, or where exposed to the changes of the weather, it is not very durable. It burns readily, and is one of the best kinds of firewood; it affords an excellent charcoal, and the ashes yield much potash. The young stems, by reason of the dense growth of their twigs, are very suitable for forming live fences and bowers; and as it bears clipping well, the hornbeam was often employed to form live walls formerly fashionable. The genus is represented in North America by *Carpinus Americana*, a small tree 25 to 40 feet high, which occurs from Quebec to Florida and west to Minnesota and Texas. Its wood is very hard, dense, and heavy, and is one of the toughest woods of the Northern States. It is known as hornbeam, blue beech, water-beech, and ironwood. The hop-hornbeam (*Ostrya Virginiana*) is of much the same habit, range, and properties. It is of slow growth and is seldom planted, although a very ornamental tree. This tree is also known as ironwood and leverwood.

HORNBILL. The name of an African and East Indian family of large birds, forming the family Bucerotidæ, and remarkable for the enormous size of the bill, and for a large bony protuberance (epithema, or casque) with which it is usually surmounted. The bill is curved, broad at the base, compressed toward the tip, the bony protuberance on the upper mandible assuming different forms in different species. Two subfamilies are recognized—the Bucoracinæ (or Bucorvinæ) and the Bucerotinæ. The former are African, have the casque hollow, and are of terrestrial habits. They are described under Ground Hornbill. The latter contain the 'true'

HORNBILLS AND TOUCANS



1. FLAT-CASQUED HORNBILL (Hydrocorax planicornis); male.
2. RHINOCEROS HORNBILL (Buceros rhinoceros).
3. ARIEL TOUCAN (Rhamphastos ariel).
4. MEXICAN TOUCAN (Rhamphastos carinatus).
5. CRESTED TRUMPETER HORNBILL (Bycanistes cristatus).
6. PAPUAN WREATHED HORNBILL (Phyildoceros plicatus); male.

Africa, India, and the Oriental region. All are rather large birds, the biggest five feet in length from the tip of the beak to the end of the tail; have long, full tails, and strong feet, fitted for arboreal habits. Their colors are mainly black and white; the great bills are yellow, often strongly marked with red and black. They are omnivorous, and in captivity show an ostrich-like voracity, swallowing anything offered, bones and all. The food is always caught in the tip of the bill, then tossed into the air and recaught. In nature they feed largely upon flowers and fruit, cut from their fastenings by the saw-edged beak. Their flight is slow and heavy, but it may be long sustained. It is said to be very noisy, the sound of the wings of a large hornbill being audible for a mile, and when two or three are flying together the noise is said to resemble a steam-engine.

BREEDING HABITS. Some, if not all of the species, have the remarkable habit of imprisoning the female during incubation. This is done by stopping up the entrance to the nest, which is in a hollow tree, with mud or excrement. There seems to be some doubt whether it is done from the outside by the male, using mud, or from the inside by the female, using her own excrement. Perhaps the method differs in different species. In any case, a small opening is left through which the female can extend her bill and secure the food which the male brings. Such nests are an excellent protection against enemies, and are said to be used repeatedly. The young are born naked.

This remarkable method of nidification is connected with a strange feature of bird economy first noticed and studied by Bartlett, who shows (*Proceedings Zoölogical Society of London*, 1869) that hornbills, at intervals, cast the epithelial layer of their gizzards—a layer formed by the secretions of certain glands. This is ejected entire in the form of a bag, the mouth of which is closely folded, and which is filled with the fruit the bird has been eating. Whether these castings form a nutritious and partly digested supply of food for the sitting female is not known. Consult Newton, *Dictionary of Birds*, London, 1896.

SPECIES. The bird ordinarily presented as 'the' hornbill is *Buceros rhinoceros*, from the East Indies, which was known and quaintly described, from preserved heads alone, by Pliny and the naturalists of the Middle Ages. A closely allied species of Java (*Buceros sylvestris*) is shown on the accompanying plate. Another style of casque, the flat table, is shown in Figure 1 of the plate (*Hydrocorax planicornis*, of the Philippines), which illustrates almost equally well the 'homurai' of India (*Dichoceros bicornis*), whose plate-casque is bent into a trough, and terminates in two horns in front. This familiar species is found eastward to Sumatra, where also, among other kinds, lives that solid-casqued one (*Rhinoplax galeatus*), out of whose 'helmet' ivory-like ornaments are carved. This seems to be a remarkable species in several ways. Another curious form of beak is that of the Papuan *Phylidoceros plicatus*, in which the top of the bill has numerous curving transverse folds. Prominent among African genera are the trumpeter hornbills, one species of which is the 'crested' (*Bycanistes cristatus*). Here the beak is com-

or no casque. A history of the family, with colored plates, by D. G. Elliot, entitled *Monograph of the Bucerotidæ*, was published in London in 1882. An excellent popular account is given in the *Royal Natural History* (London, 1895). See Plate of HORNBILLS AND TOUCANS.

HORNBILL CUCKOO. A channelbill (q.v.).

HORNBLENDE (*horn* + *blende*, Ger. *Blende*, from *blenden*, to blind). A greenish-black or black variety of amphibole that crystallizes in the monoclinic system, and is a ferrous magnesium-calcium-aluminum silicate. It is found both in crystals and granular masses. Hornblende is a common constituent of various igneous rocks, such as granite, syenite, diorite, and those of more basic composition. Hornblende schist and hornblende slate are varieties of rocks that contain hornblende with more or less feldspar, quartz, or mica. The black crystallized varieties of hornblende are sometimes called *schorl*, and may be cut into ornaments.

HORN'BLENDITE. An igneous rock of granitic texture very largely composed of hornblende. Hornblendite occurs in the so-called Cortland series of eruptives in the Highlands of the Hudson River, near Peekskill, N. Y.

HORNBLOWER, or HORN-WORM. A local name in the Southern United States for the tobacco-worm (*Protoparce Carolina*). See TOBACCO-WORM.

HORNBOOK. The primer for learning the elements of reading, used in England before the days of printing, and common down to the time of George II. It consisted of a single leaf, containing on one side the alphabet large and small, in black letter or in Roman, often followed by a number of monosyllables. Then came a form of exorcism and the Lord's Prayer, and the Roman numerals. The leaf was usually set in a frame of wood, with a slice of transparent horn in front; hence the name. There was a handle usually with a hole for a string, whereby the apparatus was slung to the girdle of the scholar. Sometimes the leaf was simply pasted against a slice of horn. At first the leaf was of vellum, with the characters in writing; later, of paper, and printed. The hornbook was prefaced and ornamented with figures of the cross, and hence came to be often called Christcross-row, or Crisscross-row. Common as hornbooks at one time were, copies of them are now exceedingly rare. Consult Tues, *History of the Hornbook*, with illustrations and facsimiles (London, 1897).

HORN'BY, Sir GEOFFREY THOMAS PHIPPS (1825-95). An English admiral, son of Admiral Sir Phipps Hornby (1785-1867), born at Winwick, Lancashire. He entered the navy when he was twelve; was present at the bombardment of Acre; served under Wyvill hunting slavers (1844-46) and under his father in the Pacific (1846-50); and was sent to Hong Kong (1858) and took the *Tribune* to Vancouver's Island, then disputed property, and to all appearances the probable source of open war. He became vice-admiral and Lord of Admiralty in 1875, and two years afterwards was put in command of operations in the Mediterranean. In February, 1878, he 'proceeded to Constantinople,' in spite of the protests of the Turkish Government, and prepared to meet any

College (1881-82), and Admiral of the Fleet (1888). Consult the life by his daughter, Mrs. Edgerton (London, 1896).

HORNE, GEORGE (1730-92). An English bishop, born at Otham. He was educated at Oxford, and spent the greater part of his life there, becoming principal of Magdalen College in 1768, and in 1776 vice-chancellor of the university. He was made Dean of Canterbury in 1781, and in 1790 Bishop of Norwich. His only important work, *A Commentary on the Psalms* (1771), exhibits a deep acquaintance with Hebrew and biblical lore, and is marked by a spirit of earnest piety. He wrote many pamphlets against such antagonists as Sir Isaac Newton, Hume, Adam Smith, and David Law, all of whom he ludicrously underrated. He adopted the views of John Hutchinson (q.v.), and wrote in his defense.

HORNE, RICHARD HENGIST (1803-84). An English author. He was born in London; received a military education, and served as a midshipman in the Mexican Navy during the war of that country with Spain. After a few years spent in adventurous wanderings, he returned to England, and from 1828 devoted himself to literature. In 1837 he published two tragedies, *Cosmo de Medici* and *The Death of Marlowe*. But he is best known as the author of *Orion: An Epic Poem* (1843). During the period 1839-46, he carried on a correspondence with Elizabeth Barrett (afterwards Mrs. Browning), and her letters to him were afterwards published in two volumes in 1877. A report prepared by him on the employment of children in mines and factories inspired Mrs. Browning's *Cry of the Children*. Going to Australia in 1852, he served as a gold-fields commissioner and a magistrate, and published *Australian Facts and Figures* (1859). Returning in 1869, he wrote thereafter a number of books, few of which were of any special note.

HORNE, THOMAS HARTWELL (1780-1862). An English Bible scholar. He was born in London, October 20, 1780, was educated at Christ's Hospital, and became clerk to a barrister. His leisure hours were devoted to study and to miscellaneous literary labors. In 1818 he published his *Introduction to the Critical Study and Knowledge of the Holy Scriptures* (11th ed. 1860), a work which procured for him admission into orders without the usual preliminaries. In it he presented the results of seventeen years of hard work. In 1824 he became senior assistant librarian in the department of printed books in the British Museum. In 1831 he became a prebendary of Saint Paul's Cathedral; in 1833 rector of the united parishes of Saint Edward the King and Martyr and Saint Nicolas Acons, London. He resigned his assistant librarianship in 1860. He died in London, January 27, 1862. Consult his life by his daughter, Mrs. S. A. Cheyne (London, 1862).

HORNED DACE. A fish. See DACE.

HORNED FROG. One of the large toad-like South American frogs of the genus Ceratophrys, especially *Ceratophrys cornuta*, which has horn-like protuberances on the head. It is one of the most beautiful frogs known. The ground colors are black, brown, and green, with an orange stripe over the head and back; and these interesting species are known in the American tropics. See Colored Plate of FROGS AND TOADS, under TOAD.

HORNED GREBE. See GREBE.

HORNED LARK. See SHORE-LARK.

HORNED OWL. Any owl with plumicorns, that is, tufts of upright feathers on the top of the head which simulate horns. The eagle owls (q.v.) are thus distinguished, and their American representative is commonly called the 'great horned owl.' Other horned species are mentioned and illustrated under OWL.

HORNED PHEASANT. A sportsman's name in India for the tragopans (Ceriornis), especially the black-headed species (*Ceriornis Satyrus*), common in the Eastern Himalayas.

HORNED POUT. See BULLHEAD; CATFISH.

HORNED RATTLESNAKE, or **SIDEWINDER.** See RATTLESNAKE.

HORNED SCREAMER. A bird. See SCREAMER.

HORNED TOAD, or HORNED FROG. The common name of several short-legged, depressed, toad-like horny lizards, all of which occur in North America. According to Cope and others there are two genera, Phrynosoma and Anota, containing eleven species, eight of which occur in the United States. Anota differs from Phrynosoma only in the fact that the tympanic drum is concealed by a scaly integument. Horned toads range from British America into Mexico. They feed mainly on insects, which they capture with a rapid thrusting out of their mucilaginous tongues. They are sluggish, harmless lizards, with little power of self-defense save their pointed scales, which, when bristled up, are a disagreeable mouthful for snakes, their most formidable foes. They will, however, fight and even kill a snake small enough to be an even match. Some of the species are said to squirt blood from the eyes when much irritated. The majority of the species are desert inhabitants, and escape pursuit by hiding beneath the prickly agaves, yuccas, and cacti of the plains. Other species live in cedar and pine belts. Both those forms that live on the bare stones or sand of the plains and those that occur in the pine belt are remarkably well protected by resemblance to their background. The young, a dozen or more at a time, are born from eggs, which are laid by the mother only an hour or so before they are ready to hatch. When the little ones emerge they are able to begin at once to catch and eat minute insects. Both young and old make interesting pets, largely because of their amusing irascibility, and can be taught to take flies from the hand, and do other simple things. See LIZARD; and Plate of IGUANA AND OTHER AMERICAN LIZARDS.

HORNED VIPER. See VIPER.

HORNELLSVILLE. A city in Steuben County, N. Y., 91 miles southeast of Buffalo, on the Canisteo River, and on the Erie and other railroads (Map: New York, C 3). It has a free academy, a public library of 10,000 volumes, and public parks; and manufactures brick, silks, white goods, railway supplies, furniture, leather, sash, doors, and blinds. The government is administered under a revised charter of 1890, which

provides for a mayor, elected biennially, in whose power, subject to the consent of the council, rest the appointments to subordinate offices; and a unicameral council. Settled in 1790, Hornellsville was part of Canisteo, and was called Upper Canisteo until 1820, when it was incorporated as a separate town under its present name, given in honor of Judge George Hornell, who was prominent in the town's early history. Population, in 1890, 10,996; in 1900, 11,918.

HORNER, FRANCIS (1778-1817). A British statesman and political economist. He entered Edinburgh University in 1792, but left before finishing his course to take up the study of law, and was called to the Scotch bar in 1800. Later, in 1807, after a course at Lincoln's Inn, London, he started practice in the western circuit of England. Elected to Parliament in 1806, he sided with the Whigs, gaining special prominence in the debates on questions of finance and political economy. Horner was very much interested in the 'bullion' question which arose in 1810, and was chairman of the committee which drew up the first report on the subject. The recommendations embodied therein failed of adoption, but as a result of his influence, restrictions were placed upon the issue of paper money, thus paving the way for the success of Peel's Currency Reform Bill in 1841. Horner was one of the three original founders of the *Edinburgh Review*, to which he was a frequent contributor. Consult Horner, *Memoirs and Correspondence of Francis Horner* (Boston, 1853).

HORNER, WILLIAM EDMONDS (1793-1853). An American physician, born in Warrenton, Va. He graduated at the University of Pennsylvania in 1814, was surgeon for a time in the United States Navy, and from 1831 until his death was professor of anatomy in the University of Pennsylvania. In 1847 he founded Saint Joseph's Hospital. In 1824 he announced the discovery of the muscle (tensor tarsi) known as 'Horner's muscle.' He published a number of medical works, including: *Pathological Anatomy; Practical Anatomist* (1856); *Special Anatomy and Histology* (8th ed. 1851); *The United States Dissector* (5th ed. 1856); and superintended the preparation of an *Anatomical Atlas* by Henry H. Smith (1844).

HORNER, WILLIAM GEORGE (1786-1837). An English algebraist. He was educated at Kingswood School, near Bristol, and afterwards became master there. He also established a school at Bath (1809), where he remained until his death. He had no university training, and was not a profound mathematician. He is known solely for his discovery of the ingenious algorism for approximating the roots of higher numerical equations, which was made known in a paper read before the Royal Society in 1819, and published in the *Philosophical Transactions*. The process is commonly known in England and America as *Horner's method*, and may be found in any higher algebra. Related to it is a process of synthetic division which also bears his name.

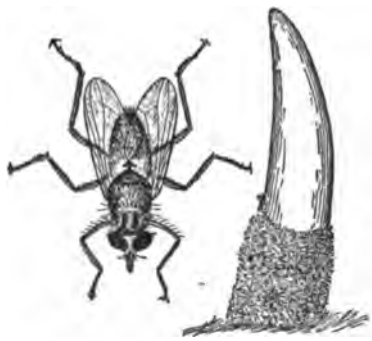
HORNES, PHILIP, Count of. See HOORNE.

HORNET (AS. *hyrnet, hurnitu*, OHG. *hornuz, hornaz*, Ger. *Horniss;* connected with Lat. *crabro*, OChurch Slav. *sršhenĭ*, Lith. *szirszone*, hornet, OChurch Slav. *sršha*, Lith. *szirszŭ*, wasp; less plausibly connected with *horn*, either from its antennæ or from its buzzing sound). A name applied to several large stinging insects belonging to the family Vespidæ and genus Vespa. They differ from Polistro, the other common genus of this family, in having larger, thicker bodies, and always inclosing their nests with a grayish paper covering. In color, they are usually black or dark brown, conspicuously ornamented with white or yellow. The hornet builds its nest, which is in the form of a number of combs placed one above another, in a hole in the ground, or in the open, attached to the branches of a tree, or under the eaves of buildings. Its manner of constructing the nest and caring for the young is the same as that described elsewhere under the title WASP. It is among the most voracious of insects, eagerly laps up all sorts of sweets, and seizes and devours other insects of various kinds. One of the most common species in the United States is *Vespa maculata*, which builds its great nest in the branches of trees. It is very vigilant, and especially irritable when attending to the duties of its nest, but it may often be found hibernating in the autumn and winter in decaying wood, when it may be handled with impunity.

The European hornet (*Vespa crabio*) has been accidentally introduced into the United States, and has established itself in the vicinity of New York City. Its spread has been very slow, and although its original introduction and establishment must have taken place many years ago, it is still apparently restricted to an area of little over 100 miles square. See WASP; and consult the authorities there referred to.

HORNE-TOOKE, JOHN. See TOOKE.

HORN-FLY. A European fly (*Hæmatobia serrata*), which was imported into the United States about 1888, multiplied with excessive rapidity, and soon spread over the entire country. It breeds in cow-dung, and with very great rapidity and prolificacy. It is a biting fly, and greatly annoys cattle. The name 'horn-fly' is derived from a habit which the flies have of clustering in great numbers so as to form black bands around the bases of the horns of cattle. They do not damage the horns, as has been supposed, but simply rest in this location, where they cannot easily be reached by the cow. Consult: Lintner, "The Cow-Horn Fly," in *The Country Gentleman* (London, 1897); Parrot, "Horn-Fly Remedy," in the *Kansas Farmer* (Topeka, 1899); Osborn, *Insects Affecting Domestic Animals* (Department of Agriculture, Washington, 1896).



HORN-FLY.

The adult horn-fly; and a cow's horn about the base of which is clustered a swarm of the flies.

HORNING, Letters of. In Scotch law, a writ which issues to compel a party to execute or carry out a judgment or decree of the court. The writ was formerly the only form of enforcing civil decrees by imprisonment, except in the case of small debt decrees. The process has been shortened, and other forms of execution are now more commonly employed. The title of the writ is derived from the ancient custom of denouncing a person disobeying the writ with three blasts of a horn. This was technically called 'putting him to the horn.'

HORNITOS, hôr-nē'tōz, or **HORNOS** (Sp., little ovens). The name given to the low oven-shaped hillocks which emit smoke and vapors, and which occur in great numbers on the sides and in the neighborhood of the large volcanoes of South America.

HORNPIPE. See Black Gum.

HORNPIPE. A lively English dance, originally in $\frac{3}{4}$, later in $\frac{4}{4}$ time. The universal peculiarity of the music was the length of the final note in each phrase. Its history can be traced back to the sixteenth century in England, and to about 1740 in Scotland. During the eighteenth century it was widely popular, but since then it has been distinctively a sailor's dance.

HORNS. Under this term are commonly confused two very distinct structures forming outgrowths on the head of ungulate animals, to which order they are confined. The word ought not, strictly, to include the bony antlers of deer or the giraffe, since these, although to a certain extent epidermal outgrowths, consist of true bone built up from blood deposits, and are not at all transformed cuticle or 'horn.' Nevertheless, as Beddard points out (in *Mammalia*, London, 1902), the difference is one of degree rather than of kind. The simplest condition is seen in the giraffe, each of whose paired horns is a straight, bony outgrowth, the os cornu, originally separate from the skull, but becoming permanently fused with it early in life, and is covered with wholly unmodified furry skin. In deer there is the same os cornu, which may here be branched, and never becomes fused with the skull, but, on the contrary, is shed and renewed annually, and is covered with a skin modified into 'velvet' (see Deer) which decays and drops off as soon as the horn-core (antler) is perfected. Between these two falls possibly the extinct Sivatherium (q.v.), and certainly the modern pronghorn (q.v.). Here the bony core (os cornu) is fixed as in the giraffe, but begins to be branched as in the deer; and it is covered by a sheath formed of agglutinated hairs, the hairy skin beginning from the tip of the horn and proceeding downward, gradually transforming into perfect horn, which is shed and renewed annually. This is an isolated case, but connects the giraffe and deer with the Bovidæ, or proper 'hollow-horned' ruminants (Cavicornia). In this family the males of every species, and in most cases the females also, possess upon the top of the skull protuberances of bone into which air-cells often extend from the frontal sinuses. These are called 'horn-cores,' and form the support of the cornubus sheaths that cover and often extend far beyond them. They are not present at birth, for obvious reasons, but begin to grow immediately afterwards. The horn-sheaths grow with them, and continue even after they have reached normal size to push out at the base as fast as they wear away at the tip. Their form and position on the head is characteristic of each group: round and lateral in the oxen; slender, retrocurved or twisted, and somewhat compressed or sharply keeled in most antelopes; heavy, cross-ridged, triangular in section, and often spiral in the sheep and goats, and so on.

Evolutionists regard horns as, in most cases, a secondary sexual character. An examination of the fossil history of the tribe shows that these appendages have been gradually acquired, and it is only recently that the females of many forms, now provided with small horns, have acquired them by heredity. Moreover, castration or injury to the reproductive organs is likely to affect the growth and size of the horns. Lastly, among the deer, where the does (except in the reindeer) are hornless, these appendages are acquired just previous to the mating season and are dropped when the breeding season is over. Their service as weapons of defense and offense is, therefore, largely, if not primarily, in contests with each other for the supremacy of the herd—that is, in the combative process of sexual selection. They are, nevertheless, in many instances, powerful weapons in resisting and attacking outside enemies. The spear-like thrusts of the lowered horns of an enraged sable, or other large, long-horned antelope, are feared even by lions and leopards, which more than once have been killed by them. The goring power of a bull is irresistible. A heavy sheep, armed with its great horn-coils, is a 'battering-ram,' indeed, not to be despised. Many, however, seem to be ornaments rather than weapons of value; or tools helpful in various ways, as snow-shovels, for one pertinent example, among the reindeer. Some of the great extinct ungulates of Tertiary time had very powerful horns, especially Coryphodon and the group of great Dinocerata, where in some cases a pair upon the forehead was supplemented by one or a pair on the snout. At present, a ruling distinction between the artiodactyls and perissodactyls is, that in the former the horns are always paired (in one modern case, Tetraceros, two pairs) and on the forehead; while in the latter they are set on the nose, and are single or two in number, one behind the other. This is the case with the rhinoceroses (of which one very early form only had a paired arrangement), where the horn is a growth from the skin of the nose, composed of a solid mass of agglutinated hairs, based upon a knob of the underlying nasal bones.

HORN'SEY. A suburban municipality of London, England, six miles north of Saint Paul's (Map: London, C 7). It is a favorite holiday resort of Londoners, contains several parks, a public library and branches, museum, and public baths. The administration is progressive and provides artisans' dwellings, cottage allotments, etc. Population, in 1891, 44,523; in 1901, 72,000.

HORN-SNAKE. See Hoop-Snake.

HORNSTONE. A variety of quartz, resembling flint, but more brittle, and having a structure that is more splintery. See Quartz.

HORNTAIL. One of a group of hymenopterous insects forming the superfamily Siricoidea, ranked by early writers as a series—Xylophaga, the wood-eaters. They are distinguished from the saw-flies by the fact that the fore shanks have only one spur at the tip instead of two. They are called 'horntails' because the end of the body

with the adults usually bears a spine or horn. The ovipositor is fitted for boring, and the eggs are usually laid in the woody tissue of trees and plants. The larvæ feed beneath the outer bark. The group is not a large one, but contains a number of common and interesting species in the United States. The large 'pigeon tremex,' for example, is often a rather serious enemy to certain shade-trees, such as the elm, sycamore, oak, and maple. The holes of this borer may be recognized by their regular, evenly cut shape, about the diameter of a lead pencil. Another species is known as 'the willow-shoot horntail' (*Phyllæcus integer*) and does much damage by ruining the terminal shoots of osier willow plantations in parts of the United States. The families included in this group are the Orysside, Siricidæ, Xyphydridæ, and Cephidæ. Consult: Howard, *The Insect Book* (New York, 1901); Comstock, *Manual for the Study of Insects* (Ithaca, 1895).

HORNUNG, Ernest William (1866—). An English novelist, born in Middlesborough, Yorkshire. He passed two years (1884-86) in Australia. In 1893 he married a sister of Conan Doyle. After returning to England he began a series of adventure novels dealing mostly with criminal life in Australia. Among his novels are: *A Bride from the Bush* (1890); *Under Two Skies* (1892); *Tiny Luttrell* (1893); *Irralie's Bushranger* (1896); *The Rogue's March* (1896); *The Amateur Cracksman* (1899); *Dead Men Tell No Tales* (1899); *The Belle of Toorak* (1900); *The Fate of Faustina* (1901); *The Shadow of a Man* (1901); and *The Shadow of the Rope* (1902).

HORNYHEAD. One of the most widespread and numerous of American minnows (*Hybopsis Kentuckiensis*). It is a graceful, highly colored fish, six to nine inches long, the fins all pale orange without a black spot; and the males in spring marked with a crimson spot on each side of the head. The distinguishing feature, however, is the tubercle-covered crest on the top of the head of the adults, and especially of the males in nuptial dress. It is a congener of the silver chub, and is known as 'river chub,' or 'jerker,' in some places.

HORODENKA, hō'rō-dĕn'kȧ. A town in the Austrian Crownland of Galicia, on an affluent of the Dniester, 33 miles north-northwest of Czernowitz (Map: Austria, J 2). It has an agricultural school, linen-weaving factory, potash and soap works, and considerable trade in cereals. Population, in 1890, 11,162; in 1900, 11,615.

HOROLOGY (from Lat. *horologium*, Gk. *ὡρολόγιον*, from *ὡρολόγος*, *hōrologos*, telling the hour, from *ὥρα*, *hōra*, hour + *λόγος*, *logos*, word, from *λέγειν*, *legein*, to say). That branch of applied science that has for its object the measurement of time. Although it is easy to look back on a period when time, according to the modern conception of it, as measured by hours, and minutes, and seconds, was unknown, yet we find progress early made in the measurement of larger periods of time, by observations of the heavenly bodies; and although, in the later progress of astronomy, it is found that the movements of the more conspicuous heavenly bodies do not afford accurate marks for the equable measurement of time, they were, for practical objects, sufficient, and afforded at least a better measure of time than any other phenomena which came under the observation of mankind. Thus, time was early divided into years, according to the motion of the sun among the constellations; into months, according to the motion of the moon relatively to the sun's place in the heavens; and into days, by the alternate light and darkness caused by the rising and setting of the sun. It was long, however, before any accurate measure was found for a division of the day itself. The earliest measure employed for this purpose that we can trace is the shadow of an upright object, which gave a rough measure of time by the variations in its length and position. This suggested the invention of sun-dials (q.v.). Another means early adopted for the measurement of short periods of time was by the quantity of water discharged by dropping from one vessel into another. Instruments for the measurement of time on this principle were called clepsydræ (q.v.). The running of fine sand from one vessel into another was found to afford a still more certain measure, and hence the invention of the hour-glass (q.v.). King Alfred is said to have observed the lapse of time by noting the gradual shortening of a lighted candle. It is not very easy to trace to its source the history of the invention to which the modern clock owes its parentage; the earliest clock, however, of which we have a complete description, and perhaps the earliest which attained any distinct superiority over the rude contrivances already mentioned, was the clock of Henry Vic (De Vick or De Wyck), a German, erected in the tower of the palace of Charles V., King of France, in 1379.

For the description of this first mechanical timekeeper, and for the subsequent history of clock and watch making, see Clock; Watch; Pendulum; Escapement. The history of the science of horology and of the mechanical art of the clock, watch, and chronometer maker are so intermingled that they cannot be considered separately. They may, therefore, be found under these heads. See also Time; Standard Time; Transit.

HOROSCOPE (Fr. *horoscope*, from Lat. *horocopium*, from Gk. *ὡροσκοπεῖον*, *hōroskopeion*, *ὡροσκόπιον*, *hōroskopion*, horoscope, from *ὡροσκόπος*, *hōroskopos*, one who observes the hour of a birth, from *ὥρα*, *hōra*, hour + *σκοπεῖν*, *skopein*, to view). In astrology, strictly speaking, that part of the ecliptic which is ascendant or rising in the east at the moment of an occurrence whose outcome is to be calculated, such as the birth of a child; thence, more generally, the figure of the heavens, constructed with this as starting-point, on which the subsequent predictions are to be based. See Astrology.

HORR, Roswell G. (1830-96). An American journalist and campaign speaker, born in Waitsfield, Vt. He graduated at Antioch College (Ohio) in 1857, served as clerk of the Court of Common Pleas of Lorain County, Ohio, from 1857 to 1863, and was subsequently admitted to the bar. He spent some years in mining in Missouri, and in 1872 resumed his law practice at Saginaw, Mich., where, in 1878, he was elected to Congress as a Republican. He was reëlected in 1880 and 1882, and after 1884 became one of the best known campaign speakers in the Republican Party, touring the country from Maine to California in the Presidential campaigns of 1884, 1888, 1892, and 1896, and attracting particular attention by his joint debates with Senator Stewart, of Nevada, in 1893, and with 'Coin'

currency questions.

HORROCKS, JEREMIAH (c.1617-41). An English astronomer, born at Toxteth Park, near Liverpool. He entered Emmanuel College, Cambridge, in 1632, and remained there until 1635, devoting himself principally to the study of astronomy. In the latter year he returned to Toxteth and commenced, under extremely unfavorable circumstances, his original observations. In 1639 he was appointed to the curacy of Hoole, Lancashire, and in that village, on November 24, 1639 (O.S.), he made his famous observation of the transit of Venus—the first observation of this phenomenon ever made. Hearne, in his memoranda, tells us how Horrocks was called away, during his observation of the transit, "to his devotions and duty at church," the day being Sunday. Newton, in the *Principia*, bears honorable testimony to the value of Horrocks's astronomical work, especially commending his lunar theory as the most ingenious yet brought forward; adding, "and if I mistake not, the most accurate of all." Horrocks is frequently mentioned by the scientific men of the seventeenth century; the observation of the transit is by no means regarded as the most important of his astronomical achievements. He died suddenly at the age of about twenty-three, on January 3, 1641. Hevelius printed Horrocks's Latin treatise entitled *Venus in Sole visa* in 1662. In 1672 Horrocks's fragmentary works were published under the auspices of the Royal Society, being edited by Wallis, with the title *Jeremiæ Horroccii Opera Posthuma, etc.* Other works of Horrocks's perished in manuscript.

HORSA. See HENGEST AND HORSA.

HORSCHELT, hôr'shĕlt, THEODOR (1829-71). A German painter, born in Munich. He was a pupil of the Munich Academy and of Albrecht Adam. He began with studies of horses, and afterwards painted military pictures. Among these first is "The Poacher" (1850). He then went to Spain and Algiers, and afterwards took part in the Caucasian campaign of 1858-59, and made some of its episodes the subjects of his pictures, such as: "The Seizure of Shamyl," "Taking of the Citadel on Mount Gunib," and "Cossacks Returning from a Razzia." His many water-colors of Spanish and Algerian scenes show the same vigor and spirit.

HORSE (AS. *hors*, OS., Icel. *hross*, OHG. *ros*, Ger. *Ross;* possibly connected with Lat. *currere*, to run, less probably with Skt. *kūrd*, to spring, Gk. *κόρδαξ*, *kordax*, wanton dance, or with AS. *hrēodan*, OHG. *rusten*, Ger. *rüsten*, to adorn). One of a genus of pachydermatous quadrupeds of the family Equidæ (q.v.). Since the domestication of the horse it has become next to man himself the most important factor in the business and pleasures of the world, and in fact all the practical details of every-day human life. According to the monuments, the horse was introduced into Egypt at the time of the shepherd kings. His use, however, was very limited, both the Egyptians and Assyrians confining the use of the horse to warfare. Subsequently, however, his services to man increased, and he became an emblem of rank and an object of luxury or sport, as well as an aid in war.

factor in the evolution of the horse, an animal especially plastic in the hands of the breeder. His size, form, action, and instincts are subject to modification to a degree unknown in that of any of the other larger species. During his early history modifications of type were due to the changing conditions of warfare; but to-day the principal variations of type are, to a far greater extent, due to the exigencies of commerce, or the demands of sport. It has been suggested that the different breeds of the modern domestic horse have been developed out of the interbreeding of several original wild species; this, however, is only conjecture. What is known is that domestic breeds have existed in Europe from prehistoric times, and also that they have been improved continually by blending with Oriental horses.

Arabian horses are divided into three classes, which have been recognized as sub-breeds since the fifteenth century. The genuine Arabian is found in the region from Damascus to the Euphrates, as well as in Arabia proper. The breed is found in its greatest purity and excellence in the stables of the Sultan of Turkey. The Turk, or Turkish horse, found in portions of European Turkey, but principally in Asia Minor, was of considerable importance in the seventeenth century, but it has deteriorated very much since then. The Barb is a native of the Barbary States, whence its name. It is found in greater perfection among the Moors, who introduced the Barb blood into Spain during their rule in that country, and so improved the Spanish horse that for several centuries it occupied the first place throughout Europe. Spanish horses of this stock brought to America by the Spaniards are regarded as the progenitors of the mustangs and the other wild breeds common to Mexico and California. (See below, *The Horse in America.*) About the middle of the sixteenth century Italian and Spanish horses (the former heavy types, and the latter, owing to their Barb blood, very much lighter and fleeter) were in the greatest demand. It is during this period that horsemanship (q.v.) began to be studied as a science, the first book concerning which was published by Grisoni in Italy in 1552. The Italians were also the first to take up the teaching of horsemanship as an accomplishment, after which riding came into vogue throughout Western Europe. The English thoroughbred is spread over a larger portion of the earth to-day than is that of any other breed, and the literature bearing upon it equals that of all the other animals combined. It is used more than any other to improve the blood of horses of general utility throughout the world, and, according to statistics, more capital is influenced by it than by any other two or three breeds combined.

The history of English horse-breeding has been divided into three periods: the first extending from the earliest records to the end of the sixteenth century; the second from the accession of James I. to the first year of the *Stud Book* (q.v.), 1791 (in which period the thoroughbred came into existence); and the third period extending to the present time, in which the thoroughbred has become a clearly defined as well as a pure breed. The original British horse was a small pony, shaggy and hardy, and rarely more

HORSES

JULIUS BIEN & CO. LITH. N.Y.

1 WILD ASS - EQUUS ASINUS 1/25
2 BURCHELL'S ZEBRA - EQUUS BURCHELLI 1/25
3 HORSE (THOROUGHBRED)
4 DOMESTIC DONKEY 1/25

than 14 hands high, but the importation of stallions from Spain, Italy, and France improved the breed from time to time. During the Crusades and the consequent general use of heavy armor, which continued up to about the year 1600, large horses came into vogue. A knight in armor, together with his horse-accoutrements, weighed from 350 to 425 pounds, so that during the age of chivalry all breeding was directed toward improvements in the size of the horse. Stallions under a certain size were condemned by law, and in 1217 one hundred stallions were imported from Normandy, and for nearly five hundred years subsequently size was sought for rather than speed; thus laying the foundation of the different modern breeds of British draught-horses. What was the case in England was equally so with the nations of Western Europe and their horses; so that the horse of this period is particularly remarkable for its broad chest, heavy neck, and round buttocks. With the appearance of gunpowder and firearms, and the disappearance of armor, these breeds became useless for the purpose of warfare, which now demanded fleetness as a first essential. They passed, however, to a greater sphere of usefulness, and to-day constitute the heavy draught breeds known as the Dutch and Flemish, the Percherons (q.v.) of France, the Clydesdale (see SHIRE HORSE) of Scotland, and the cart and shire horse of England.

Before the days of the tournaments in England large horses were scarcely known, but the needs of the knights compelled the keeping of a sufficient number, so that by intermixture with smaller native animals the size of the British horse gradually increased; but the result proved that, although they were bigger, they did not nearly possess the qualities of the smaller horse. During the Crusades the excellence of the Saracen horses deeply impressed the British Crusaders, who brought many Asiatic horses with them on their return to England. The Eastern horses were Barbs, Turks, Arabs, and Persians, not more than 14½ hands high, and it is to them that the English horse owes in part its present conspicuous qualities. Laws were passed to promote the breeding of large horses by improving the type of British ponies. During the reign of Henry VIII. it was ordained by law that no stallion less than 15 hands and no mare less than 13 hands should run wild in the country. Colts two years of age and under 11½ hands high were not permitted to run on any moors, forests, or commons where mares were pastured, and to guard against any mishaps it was further ordered that at Michaelmastide the magistrates of the neighborhood were to search the countryside, the forests, and the commons, for the purpose of destroying all stallions under the required height, as well as "all unlikely tits, whether mares or foals." Prelates and nobles, and every one whose wife wore a velvet bonnet, were compelled to do their "leaping and riding upon stallions not less than 15 hands high." There were two classes of horses throughout the country; the first a "very indifferent, strong, slow, heavy draught-horse," and the second "light and weak." Private matches were often arranged, showing that speed was becoming a greater factor than size and weight.

Although there had been public horse-racing in Elizabeth's time, it was not until James I. ascended the throne that horse-racing was legally established. He introduced into England the Markham Arab, which was known to be a pure-bred animal, and in many other ways did much to improve the breed of horses. A distinction was drawn between race-horses and common horses; the race-horses were trained for their competitions, and 140 pounds was the average weight of a professional jockey. During the reign of Charles I. a memorial was presented to the King bewailing the gradual disappearance of stout horses fit for the defense of the country, by stating that the breed of strong horses was likely to disappear unless measures were taken for their propagation. The tournament was no more, the pack-horse had practically disappeared, the introduction of the coach had removed a large part of the pack from the horse's back, and everything was done to encourage cross-breeding with foreign importations. From such ancestors the modern thoroughbred has descended. After the civil wars and during the reign of Charles II. the race-courses at Newmarket and at Datchet Mead, near Windsor, were laid out, and the King himself became the first great supporter of the turf. The most conspicuous English horseman of this time was the Duke of Newcastle, who in 1667 published his celebrated work on horsemanship, the reading of which is said to have so interested Charles that he became the largest individual importer of foreign blood in the country. The Stuart kings maintained magnificent studs and constantly employed purchasing agents to secure the best Oriental blood; but, unfortunately, the pedigree of many of these animals is largely a matter of tradition, owing to the fact that the *Stud Book* had not been issued. In spite of the infusion of foreign blood, however, the English race-horse in the time of the Stuarts was a clumsy-looking animal in comparison with the pure Oriental type, or with the race-horse of to-day. He was strong and of large build, but neither as elegant nor as swift on the race-course as was the Barb. The combination of native English stock and such horses as the Helmsley Turk, Byerly Turk, Pace's White Turk, D'Arcy's White Turk, Selaby Turk (see STUD BOOK), and by such Barbary stallions as Dodsworth, Carwen, Bay Barb, Greyhound, Compton Barb, and Toulouse Barb, produced a horse remarkable for its well-proportioned locomotive parts, legs, shoulders, etc., strong carcass and deep chest, the typical animal of speed and endurance.

Since the middle of the eighteenth century the practice of interbreeding with Oriental blood has been discontinued, and although half-bred horses were raced until the first part of the nineteenth century, the thoroughbred has ever since the foundation of the 'racing calendar' been the recognized race-horse, and his pedigree has been strictly and authentically kept. During the seventeenth century speed was not the sole qualification of a race-horse; it was required to have strength and endurance. From racing matured horses at long distances, it was an easy transition to shorten the length of the course and increase the speed of the horse, besides which, the element of gambling entered into the sport, and it soon happened that three-year-old horses were used in the races. It was found, however, that they could not 'stay' the old four-mile course, so that of necessity the distances had to be reduced to accommodate the horses. The result of this policy is seen in modern horse-racing (q.v.), in which two-year-old horses developed for speed

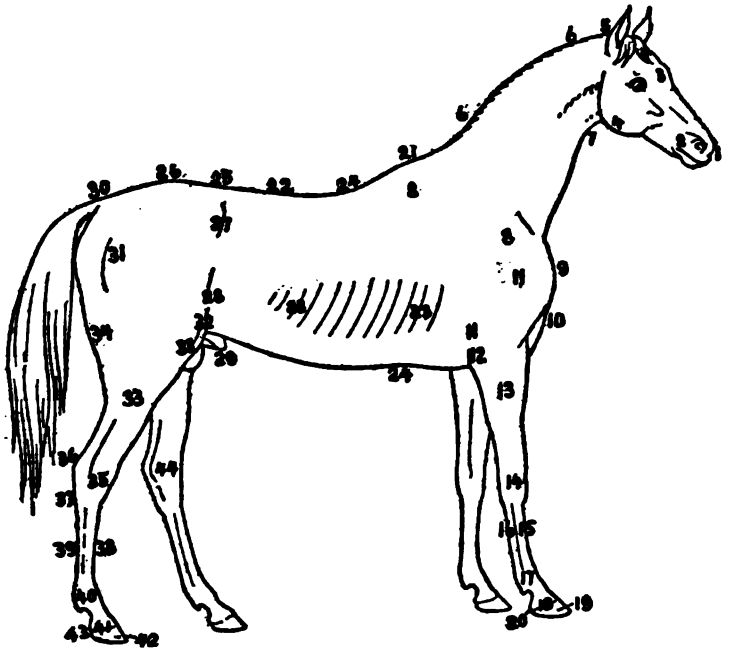
tology, the horse is indigenous to the American Continent, but it is certain that the American horse of to-day is the descendant of animals brought here by Europeans and the first settlers. Cortez used but few horses in his Mexican conquest, but undoubtedly some of them became progenitors of the American wild horse; and similarly, the horses abandoned by the unfortunate Ferdinand De Soto near the Texas border became the progenitors of all the wild horses of North America. (See HORSE, FOSSIL.) The character and action of the American horse will be found fully described under TROTTER and PACER.

THE COLONIAL PERIOD. The earliest colonists of Virginia were not remarkable for the qualities that make the ideal pioneer, so that it is not surprising to learn that their first supply of domestic animals (including horses) was consumed as food. Although there had been several shipments of horses from London down to about 1640, in 1646 there were only between 200 and 300 horses of both sexes in the colony. In 1656 the exportation of mares was prohibited by law, but in 1667 the restriction was removed. The horses of the period are described as having been of hardy and strong quality, but undersized, and, like the horses in other colonies, they were branded and turned loose to find their own subsistence. Owing to the rapidity of their increase, they were soon very numerous and became practically wild; so much so that at the close of the seventeenth century it was a common as well as profitable sport to hunt wild horses, for an animal without a brand became the property of its captor. On the island of Chintoteague, off the coast of Virginia, there are still in existence bands of wild horses, and only within recent decades has there been any attempt to domesticate any of their number. They are of all colors, and uniform in size, not averaging over 13 hands, and are accounted for in their present location as being the descendants of a band of Virginian wild horses which located there when it was a peninsula, and had their retreat cut off when time converted what had been a peninsula into an island. Notwithstanding occasional efforts to increase its size, the Virginian horse retained the characteristics of its English ancestor.

The settlers of New Netherlands brought their horses from Utrecht. They were larger, better, and more valuable, so far as prices were concerned, than the English horses of the other colonies, but were not regarded as being as good for saddle work. The two breeds soon intermixed, and a larger breed resulted, for at the time of the Revolution the average height was 14 hands and 1 inch. Horse-racing was introduced by Governor Nicholls, of New York, in 1665. He established a race-course on Hempstead Plains, Long Island, which was the first official and properly organized race-course on the Continent. It is supposed that the horses were of the Dutch breeds, because the people attending were largely of that nationality. The English race-horse was not at that time thoroughly developed, and in any case was not imported into New York until nearly one hundred years afterwards. The New England colonies played a very important part in the development of the modern American horse. In 1629 the first horses were sold in Salem; and five years later conditions were such that the colonists were enabled to export a shipment of 80 animals to the Barbadoes. It has been ascertained from an investigation covering the period 1756-59 that the average height of horses was 14 hands 1 inch, and that three-fourths of the total number were pacers and one-fourth trotters. The founders of Hartford, Conn., brought horses with them (1636), and in 1653 the General Court at New Haven ordered all horses to be branded, and instituted a system of public saddle-horses for hire. The average size was 13 hands and 3 inches. Roger Williams and the settlers of Rhode Island Colony (1636) obtained their horses from Massachusetts, and succeeded so well in the breeding of them that in 1690 horses were their principal export, and they shipped them to all the colonies of the coast. Pacers were raised in Rhode Island, and were widely known as Narragansett pacers. Trade with Canada was not permitted, but there is no reason to doubt that an occasional trade was made, whereby a Narragansett pacer changed owners for the consideration of a bale of peltry, such as only the French Canadian could offer. Racing was especially encouraged in Rhode Island, and thus was developed the speed that made their horses famous. In 1768 the average size of a Narragansett was 14 hands and 1 inch. The horses of Pennsylvania were not handsome, but good. In the early part of the seventeenth century the Pennsylvania horse was the largest and heaviest horse in the country; but one hundred years later they seem to have ranked in both respects below the horses of all the other colonies. Up to 1750 the average size in eastern Pennsylvania was about 13 hands and 1¼ inches. Philadelphia boasted the speediest and finest horses, and pacers were the most fashionable and popular. New Jersey supplied itself from New York and Pennsylvania, and by the beginning of the eighteenth century racing had become so common as to be a nuisance; so much so that in 1748 there was enacted a law for the suppression of 'running, pacing, and trotting races.' The year before the Colony of Maryland, which had in all probability received its supply of horses from Rhode Island, Pennsylvania, and Virginia, passed a similar law. North and South Carolina secured their horses from Virginia. In Canada horses were received from Picardy, France, in 1665, and it is assumed they were largely of the English type. Many of them are supposed to have been pacers; but whether they were, or whether, as is sometimes argued, the Canadian pacer is derived from the illicit trading with Rhode Islanders for their Narragansetts, is a question much discussed.

The American horse was for two hundred years the sole means of travel, and the great essential to all business in and between the various colonies of the country. Improved roads have made him a driving horse, and none of the inventions of modern times, from the introduction of railroads to bicycles and horseless vehicles generally, has affected his popularity or his value. To the superficial observer it would appear as if improved means of vehicular transport would diminish the breeding of horses, as well as decrease their value, but thus far such has not been the

case. Good horses have a higher value than ever, and as the demand for cheap or poorly bred horses diminishes, the better bred ones survive, and what is lost in number is more than balanced in breed and consequent value. *Bashaws, Clays, Black Hawks, Hambletonians, Mambrino Chiefs, Pilots, American Stars, Blue Bulls*, etc., are all discussed under TROTTER and PACER. Under PONY a discussion will be found of the Shetland, Galloway, and other breeds; Palfrey, Percheron, and Roadster are discussed under TROTTER; under SHIRE HORSE will be found the Suffolk Punch, Clydesdale, and other heavy and draught breeds.



HEAD—1, muzzle; 2, nostril; 3, forehead; 4, jaw; 5, poll.
NECK—6, 6, crest; 7, thropple or windpipe.
FORE QUARTER—8, 8, shoulder-blade; 9, point of shoulder; 10, bosom or breast; 11, true arm; 12, elbow; 13, fore-arm (arm); 14, knee; 15, cannon-bone; 16, back sinew; 17, fetlock or pastern joint; 18, coronet; 19, hoof or foot; 20, heel.
BODY OR MIDDLE PIECES—21, withers; 22, back; 23, 23, ribs (together forming the barrel or chest); 24, 24, circumference of chest—called the girth: 25, the loins; 26, the croup; 27, the hip; 28, the flank; 29, the sheath; 30, the root of the dock or tail.
HIND QUARTER—31, hip-joint or whirl-bone; 32, stifle-joint; 33, lower-thigh or gaskin; 34, the quarters; 35, the hock; 36, point of the hock; 37, the curb place; 38, the cannon-bone; 39, the back sinew; 40, pastern or fetlock-point; 41, coronet; 42, foot or hoof; 43, heel; 44, spavin-place.

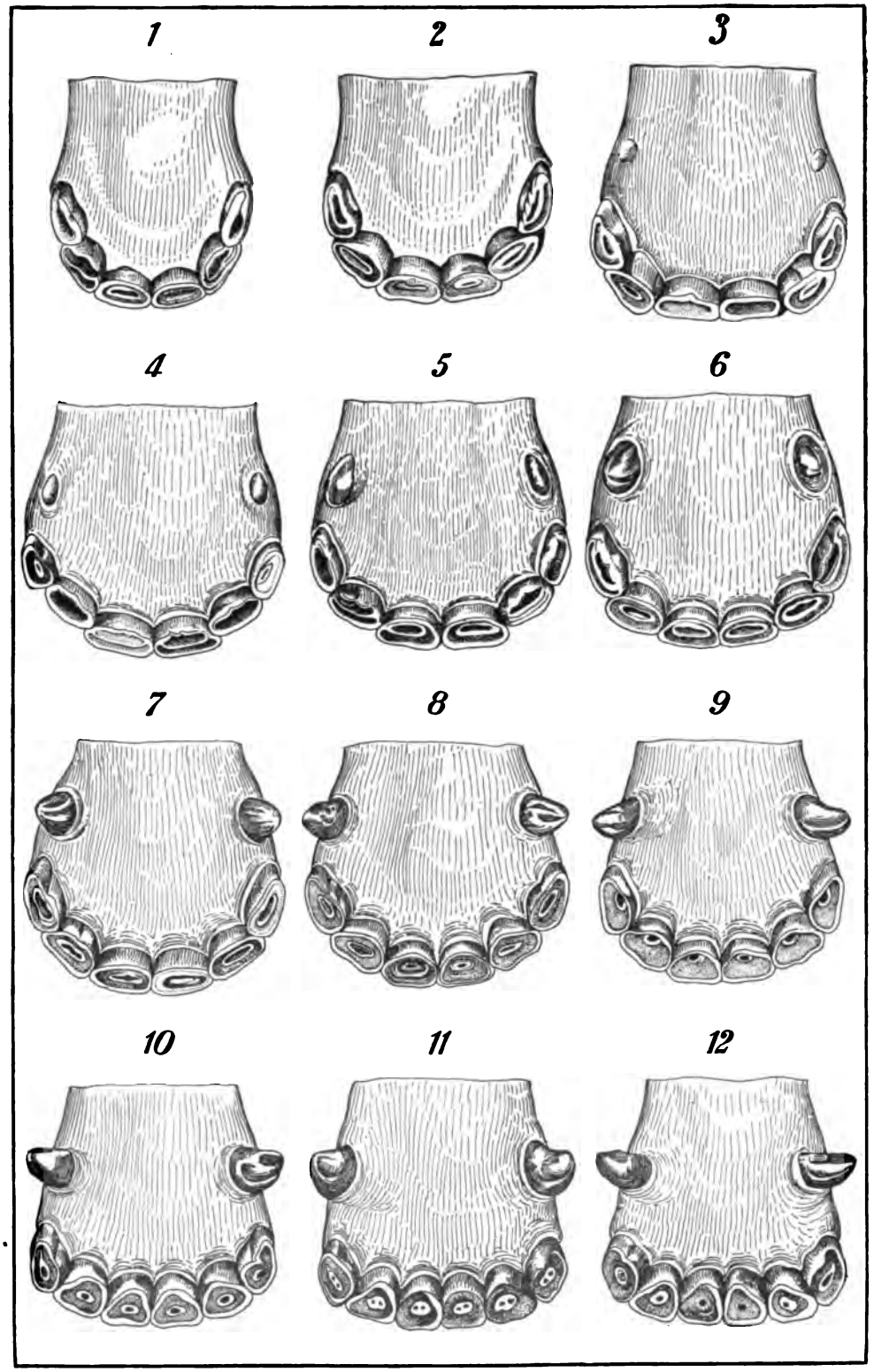
The *hackney* is bred chiefly for carriage purposes, and is a type indigenous to the eastern counties of England. It is of excellent symmetry of proportion, and is capable of a very true rhythm in action; although it is slower and heavier than the roadster, it is faster and much lighter than the middle-weight draught-horse. A well-bred hackney should be properly balanced in fore and hind quarters and middle piece. Since 1890 there have been large importations of this breed to America, although the hackney has been known here by occasional single importations since 1822. It has been especially valuable in the breeding and development of the American trotter. The *cob* is a native of Norfolk and Lincolnshire, in England, and is a stoutly built, short-legged animal of from 13.3 to 14.3 hands high. It is smaller than the hack and larger than the pony. The *Galloway* is a horse common to Wales and North Britain. It seldom ranges above 14 or 14½ hands in height, and is not a particularly valuable animal. Specimens below 13 hands are called ponies (q.v.). The *hunter* is not required to be a thoroughbred animal, although where the hunting warrants it he is frequently thoroughbred, or half-bred at least. He is chosen to suit the country over which he is hunted, as well as to carry the weight of his rider. In any case he should have the following characteristics: A lean head and neck, firmly set on good oblique shoulders; a strong back and loin, deep body, wide hips, good quarters, and firm legs and feet. Among horsemen the following terms are in use: A *stallion* is a male horse, and when gelded is termed a *gelding*. A *mare* is the female. Animals of both sexes when young are termed *foals*; the male foal is a *colt*, and the female a *filly*. Young animals become 'of age' when the outer incisors (corner nippers) are developed. A horse is *'aged'* when in its eighth or ninth year, a fact determined by the front teeth. The period of gestation is eleven months, the foal usually being dropped in the spring.

EXTERIOR PARTS OF THE HORSE. Many excellent works on the anatomy of the horse are published, several of which will be found included in the bibliography of this article. Below will be found described the more important external parts, together with their position and boundaries. *The Head.*—The point of demarkation between the head and the neck may be described as follows: Observing the animal in profile, the head is divided from the neck by an imaginary line drawn from the back of the ear, along the rear edge of the lower jaw to its angle. The upper part of the face is called the forehead, and the forelock is a tuft of hair which, although a part of the mane, lies between the ears. The temples lie on each side of the forehead, between the ear and the eye; the nose is a continuation of the forehead, ending opposite the nostrils. The lower end of the head is called the muzzle; it includes the nostrils, lips, and the bones and teeth covered by them. The bars of the mouth are those portions of the gums of the lower jaw situated between the back teeth and the tushes (or the place usually occupied by the tushes). Just under the bars of the mouth is the chin-groove, in which rests the curb chain of the curb bit, when such is used. The neck lies between the head and the shoulders, from which latter it is separated by an imaginary line drawn from

ears, is the poll; and extending from the withers to the ears, along the upper part of the neck, is the crest. The groove on each side of the neck just above the windpipe is known as the *jugular groove*. The *chest* is divided from the belly or abdomen by the diaphragm, and includes the cavity in which are situated the lungs and heart, and which occupies nearly the front third of the trunk. The term *breast* is frequently used to describe the part herein treated under chest. The upper boundary of the shoulders is formed by the withers, and the rear border may be taken from behind the 'swell' of the muscle, situated just below the withers to the elbow. A little below the junction of the neck and shoulder, on each side of the chest, is a prominent bony angle, known as the point of the shoulder. The withers are the bony ridges which constitute the forward continuation of the back and end abruptly in the crest. The elbow is the bony projection at the upper posterior part of the forearm, which latter is found between the shoulder and the knee. The upper boundary of the knee may be decided by a line drawn at right angles to the direction of the leg above the knee-joint, and the lower boundary by a line joining the point where the line of the cannon-bone meets that of the knee, with that where the line of the back tendon is terminated by the trapezium, at the back of the knee. The cannon-bone is situated between the knee and the fetlock. At its back are two small bones, known as the outside and inside splint-bone. The cannon is the very confusing name applied to that part of the leg situated between the knee and the fetlock (i.e. footlock, a tuft of hair growing behind the fetlock joint). The joint which the cannon-bone makes with the pastern is called the fetlock joint. Between the fetlock and the hoof is a short column of bones called the pastern, the lower portion of which, called the coronet, is immediately above the hoof. The hoof is a horny box inclosing the lower part of the limb. The lowest front part of the hoof is the toe; the sides are quarters; and the lowest rear part the heels. The exterior or outer part of the hoof is termed the wall, which in turn is divided into an outer covering or crust, and a soft inner layer of non-fibrous horn. In the centre of the ground surface of the hoof is a triangular buffer called the frog, in the middle of which is a division termed the cleft of the frog; turned inward at the heels, and running more or less parallel to the sides of the frog, are the portions of the wall called the bars of the hoof. The ground surface of the foot between the wall, bars, and frog, is called the sole. The back includes the withers, but not the loins; which parts, together with the ribs on each side, constitute the boundaries of what may properly be termed the back. It has been described as an ill-defined region, owing to the many different opinions on the subject. The loins are found between the back and croup, with the flanks on each side. The ribs lie between the shoulders, flanks, belly, and brisket or sternum. The flank is that part of the horse's side between the loins, ribs, thigh and hip-joint, and the belly. The hollow of the flank is the upper portion of the flank. The belly is the cavity which contains the stomach, liver, spleen, intestines, kidneys, bladder, etc. The brisket is extends down on each side to the point of the buttock. The thigh has been cleverly defined as separated from the stifle, flank, croup, buttock, and gaskin by a horizontal line drawn from the upper end of a straight line made by the hamstring, which proceeds toward the thigh from the point of the back. While not anatomically correct, it is the general acceptation of the term. The gaskin lies between the thigh and the back, which latter is found between the gaskin and the hind cannon-bone. The dock is the solid part of the tail.

INDICATIONS OF AGE. It is very difficult, if not impossible, to formulate any rules by which the age of a horse may be accurately determined. To an expert horseman the lightness and elasticity of step of the animal under examination will afford a general clew; or better still, the contour of the lower jaw, which grows more and more angular with increasing age. It is to some structure of the animal little liable to change, however, that we must look for any very accurate gauge, and the only structure answering that requirement is that of the teeth, which must be examined according to the following rules: The six teeth or nippers, situated in the front of the lower jaw, are the ones examined to determine the question, although the tushes are a partial indication, and are sometimes used in arriving at a decision. In this article, the two middle nippers will be referred to as the central nippers; the ones on each side of these, as the middle nippers, and the ones at each end of the group as the corner nippers. At two and a half years of age, the permanent central nippers are just through the gum, the temporary middle and corner nippers still remaining; one year later the permanent middle nippers are in evidence, and between the fourth and fifth year the corner nippers will be through. About this time changes will be noticed in the condition of the earlier teeth; for instance, the middle pair look as the central pair did at two and one-half years, and the central nippers are showing signs of wear. Between the ages of five and nine, considerably more experience is necessary for an accurate judgment than has been required before. At nine years of age the previous oval shape of the teeth becomes more triangular; at ten the central nippers take a pronounced triangular shape, and the middle pair give evidence of a like tendency, followed at eleven years by the growth of the corner nippers in the same direction. The tushes become rounded at the points, and the nippers are longer and project more, the central nippers being completely triangular. The signs of wear and tear, and the growth of the evidences already described, continue with increasing age, so that at twenty years the nippers are all exceedingly triangular, projecting forward to a great degree, and are very long.

The character or temperament of a horse cannot be discerned short of actual experience, by any known formula or given rules; for while the experienced horseman may judge approximately by noting the shape of the face and head, and the expression of the eyes, he will, as a rule, be unable to explain the method or rules upon which his conclusions are based. Like men, horses are of different dispositions, and exhibit such varied



AGE-MARKS ON THE TEETH OF THE HORSE

1. One Year Old.
2. Two Years Old.
3. Three Years Old.
4. Four Years Old.
5. Five Years Old.
6. Six Years Old.
7. Seven Years Old.
8. Nine Years Old.
9. Eleven Years Old.
10. Thirteen Years Old.
11. Fifteen Years Old.
12. Seventeen Years Old.

characteristics as pride, dignity, intelligence, stupidity, courage, cowardice, etc. Generally stated, an intelligent horse shows considerable width between the eyes, which latter are very prominent. The width between the ears is taken to indicate courage and strength of character; and roundness and elevation between the eyes, as denoting a mildness of disposition. A timid horse is usually narrow between the ears, and a stupid one, narrow between the eyes.

Diseases of the Horse. No other domestic animal is so large a sharer with humanity in the accidents and dangers incident to modern civilized life as the horse. It is practically a co-partner with man in every detail of his life and work, and yet no other animal suffers so much from ignorance, abuse, maltreatment, and quackery. Modern civilization is doing much to alleviate the condition of the less fortunate of his kind, notably the various societies for the prevention of cruelty to animals. (See Cruelty to Animals, Prevention of.) The practice of veterinary surgery has become one of the most exacting and advanced of professions, and diseases long considered incurable are now amenable to treatment. In European countries the horse is an object of governmental solicitude, as much for his value as a factor in warfare as for purely humanitarian reasons; and a careful census record is kept (particularly in Germany) of the number, pedigree, and value of the horses throughout each country. The Government of the United States, through its Department of Agriculture, alone of all the nations of the world has compiled a special *Report on the Diseases of the Horse*, which is published as a guide and aid in the cultivation of a proper knowledge of the care and treatment of the animal. Below are described some of the more prevalent diseases, which will be found more fully treated in the above-named publication.

The Teeth. Dentition covers the period during which the young horse is cutting his teeth, usually from birth up to the age of five years. As a rule the horse has more difficulty in cutting the second or permanent teeth than he has with his first or milk teeth. With regard to the latter the mouths of young horses should be frequently examined in order that the milk-teeth may not remain too long and thus cause the permanent teeth to grow in crookedly. Toothache is rare with the average horse, and then only where a tooth is allowed to decay. Usually it is only observed in the molar teeth, and may be discovered by the evidences of pain given by the horse when feeding or drinking cold water.

Diseases of the Mouth. (1) Lampas (q.v.): A swelling of the mucous membrane of the hard palate, projecting in a more or less noticeable ridge immediately behind the upper incisors. (2) Stomatitis (q.v.): An inflammation of the mucous membrane of the mouth, generally produced by irritating medicines, foods, or other substances such as often follows in the case of city horses from eating out of ash-barrels. (3) Glossitis: An inflammation of the tongue very similar to stomatitis, both in origin and in symptoms. (4) Ptyalism, or salivation, is an abnormal and excessive secretion of saliva, often caused by irregular teeth, inflammation of the mouth or tongue, or the use of medicines, and occasionally by the eating of second-crop clover. (5) Pharyngitis (q.v.): An inflammation of the mucous membrane lining of the back part of the mouth, or pharynx. (6) Paralysis of the pharynx, or as it is more generally called, paralysis of the throat, is a disease first discovered from the fact that the animal is unable to eat, and the manger is found to contain much saliva and frothy food that has been returned through the nose.

Diseases of the Œsophagus or Gullet. It will be found in the vast majority of instances exhibiting these diseases that the cause is the introduction into the organ of foreign bodies too large to pass, or else that there are present erosions and ulcerations of the throat (followed by constriction or narrowing of the gullet) caused by the administration of caustic medicines not thoroughly diluted. The designations pharyngeal, cervical, and thoracic choke are used to denote where the obstruction is located, the symptoms varying according to the position of the agent responsible for the choke.

Diseases of the Stomach. (1) Stomach staggers (see Staggers), or gorged stomach (*Impaction*): Distension of the stomach caused by food, in which the stomach loses the power of contracting upon its contents. (2) Tympanites of the stomach: A disease corresponding to that of 'hoven' or 'blown' in cattle, and frequently due to the overloading of the stomach with young, succulent herbage, which, after its arrival in the stomach, liberates quantities of fermentation gas sufficient to distend the stomach seriously. Overfeeding is a very frequent cause of stomach-bloat, particularly if the overfeeding is followed immediately by hard work. The symptoms are very much the same as for stomach staggers, and the treatment must be at once vigorous and immediate. As a rule, cases of this trouble occur away from the stable. From two to four ounces of common baking-soda should be given as quickly as possible, an additional half-ounce of cayenne pepper being given to aid the stomach to contract and expel the gas. Charcoal may be given in any amount, and any medicine that will check fermentation or absorb the gases will be found useful. Cold water dashed with force over the stomach is frequently an aid. (3) Rupture of the stomach: If convinced that the diagnosis is correct it is better to destroy the animal at once. If, however, there is a possibility of mistake, powdered opium in one-dram doses may be given every two or three hours, thus keeping the stomach as quiet as possible. The case should be kept under the observation of a skilled veterinary. (4) Bots: There are so many opinions extant concerning this disease, many of which are erroneous, that it will repay any owner of stock to make a careful study of it. With regard to the insect itself, see Bot and Gadfly. Of the numerous insect parasites or solipeds, the gad-flies (Œstridæ) are the most important. The species responsible for the above-named disease infest chiefly the stomach and duodenum—a small gut leading from the stomach. Nearly all country horses, as well as those experiencing their first year in the city, have the bots, but the common opinion that bots frequently cause colic pains is erroneous. If in large enough numbers they may sadly interfere with digestion. The animal may not thrive and emaciation may follow, but beyond this they are harmless. It is fortunate that such is the case, for there are no medicines that affect them: neither acids, alkalies, nor anodynes are capable of securing

their ejection from the stomach. The best that can be done is to watch for their eggs on the legs and body of the horse during the late summer and autumn, and carefully scrape them off and burn them. (5) *Indigestion:* Indigestion is imperfectly performed digestion, which in the horse causes symptoms closely resembling those of dyspepsia in man. A great cause of indigestion with the horse is found in the food itself. (See *Care of the Horse*, below.) The teeth are in many instances to blame, their sharp, irregular, or decayed condition preventing any perfect mastication, and causing the animal to swallow his food before it receives the requisite admixture of saliva. The principal seat of indigestion is in the stomach or small intestine. It is characterized by an irregular appetite, refusal of food or gorging, and a disposition to eat unusual substances, as wood, salt, bedding, and frequently his own fæces. The animal loses flesh, and the skin becomes hard and dry and hide-bound. The treatment usually consists of a careful regulation of food as regards quality, quantity, and time of feeding, and an exercise of similar care as regards the water-supply. The condition of the mouth and teeth must also be attended to, and the teeth if sharp or irregular must be rasped down, or extracted if decayed. If the indigestion is caused by ravenous eating, the animal should be fed from a manger sufficiently wide to allow the spreading of the grain, which will usually compel the horse to eat slowly. Frequently a cathartic is given at the outset.

Intestinal Worms. Worms are very frequently found in young horses, as well as in those that are weak or debilitated. They almost invariably exist in horses pastured on low, wet, or marshy ground, as well as in those that drink stagnant water. The most common form of intestinal worm is the lumbricoid worm, which closely resembles the common earthworm. It is white or reddish in color, measuring from four to twelve inches in length, and varying in thickness from the size of a rye straw to that of a cigar, being thickest at the middle and tapering toward each end. At first, slight colicky pains are noticed, or a vigorous switching of the tail, and frequent passages of manure; the animal does not shed its coat, and is hide-bound and pot-bellied. He will be particularly fond of salt, and will bite at the woodwork of his stall; the bowels are irregular, either constipation or diarrhœa being present. Among the best medicines for worms are santonin, turpentine, tartar emetic, infusion of tobacco, and bitter tonics. Whatever remedy is given, it will be found much more effective if administered after a long fast, and then the worm medicine must be supplemented by physic to force out the worms. There are many varieties of worms, the treatment for which is usually along the lines above described.

Spasmodic or Cramp Colic is the name given to colic which is produced by contraction or spasm of a portion of the small intestines. It is usually caused by indigestible food; foreign bodies; excessive drinking of cold water when overheated; draughts of cold air, etc. To insure correct treatment, it is very necessary to keep in mind the type of horse, the force of the attack, the intervals of ease or violent pain, the temperature and pulse, and a frequent attempt to urinate, which will prevent the confounding of this with any other form of colic. The treatment indicated is any antispasmodic medicine, of which probably there is none better than chloral hydrate given in a dose of one ounce in a half-pint of water as a drench. *Flatulent colic, tympanites, wind colic, bloat*, are common among animals subject to sudden changes of food, careless feeding or treatment; too much green food, or any other food that has become stale and sour.

Hernia: There are several kinds of hernia, not all of which, however, are to be regarded as serious or dangerous. Abdominal hernia, or ruptures, are divided into reducible, irreducible, and strangulated, according to their condition; and into inguinal, scrotal, ventral, umbilical, and diaphragmatic, according to their situation. In many instances treatment is not necessary; or, where the hernial sac is extensive, treatment is ineffective. A good deal will depend on whether any one is present when the hernia happens, as to the possibilities of a perfect cure. Umbilical hernia, or diaphragmatic hernia, calls for the most skilled treatment, and even then little or nothing can be done.

Acute Inflammation of the Kidneys. The causes of this disease are many and varied. Congestion occurs from retained products passed through the kidneys during recovery from inflammation of other parts, or fevers. Detained urine, and the possible production of ammonia and other irritants, are also frequent causes. The symptoms consist of fever, stiffness of the back, straddling gait, difficulty in lying down, rising, or walking in a circle. The recognized treatment is as follows: Removal of any cause that can be discovered; then, if suffering from high fever, the removal of from two to four quarts of blood, which should be followed as much as possible by throwing the work of the kidneys on the bowels and skin. *Catarrh*, or *Cold in the Head:* A fluid discharge from the mucous membrane. Inflammation, as a rule, extends to the membrane of the sinuses of the head, and of the larynx and pharynx, causing the added complication of sore throat. Frequently the eyes are also affected. At the first stage of the attack the membrane is dry and irritable, followed by a watery discharge from the nostrils. Fever, more or less, makes its appearance, which is usually detected by placing a finger in the animal's mouth. In itself the disease is not very serious, but if neglected, or treated wrongly, may become complicated and dangerous. A few days of cessation from work, together with pure air and good food, is regarded as the best treatment. *Roaring* (q.v.): A chronic disease, evidenced by a loud, unnatural noise in breathing, and caused by an obstruction to the free passage of the air in some part of the respiratory tract. External causes are nasal polypi, thickening of the membrane, the pharyngeal polypi; deformed bones; paralysis of the wing of the nostril; and more than anything else, paralysis of the muscles of the larynx.

Grunting: A horse is usually first tested by veterinarians for grunting, when if the fault is discovered he will be further tested for roaring. Grunting is a sound emitted during exhalation, when the animal is suddenly moved or struck at.

High Blowing is distinctly a nasal sound, but it must not be confounded with roaring; it is a habit, and does not constitute unsoundness. In the same class should be placed whistling and thick wind. *Bronchitis*, or *Inflammation of the Bronchial Tubes:* While the causes of this disease

inhalation of irritating gas or smoke, and fluids or solids gaining access to the parts. It is also occasionally associated with influenza, or fever, and frequently supervenes a common cold or sore throat. The animal appears dull, the appetite is partially or wholly lost, the head hangs, and the cough, at first light, is succeeded by a high rasping cough. He prefers to stand with his head to a door or window to secure fresh air, and persists in standing. He has more or less thirst, and frequently the mouth will be found full of saliva. The first step in the treatment of the disease is to secure a pure atmosphere and comfortable quarters whenever possible; a well-ventilated box-stall will be found the best. The body should be covered with a blanket according to the season of the year; the legs should be hand-rubbed until they are warm, then flannel bandages applied to the knees and hocks. If the legs cannot be made warm after hand-rubbing, take any liniment used for sore throat and thoroughly rub in, after which the legs should be covered with bandages. It will be well to rub the same liniment over the chest, the elbow, and shoulder-blade; and from the elbow below, to within about six inches of the ridge of the backbone above. *Pneumonia*, or *Lung Fever* (q.v.), may attack both lungs, but as a rule one lung only is affected.

Diseases of the Eye. It is impossible to overestimate the value of sound eyes in a horse, for not only does disease or injury depreciate the selling price of the animal, but it is a great source of danger at all times. Some diseases, like recurring inflammation or moon-blindness, as it is called, are congenital. The structure of the eye is that of a spheroidal body, flattened behind. The posterior four-fifths is inclosed by an opaque, strong, fibrous membrane, which has on its inner side a more delicate membrane consisting principally of blood-vessels and pigment-cells, which in its turn is lined by the extremely delicate and sensitive expansion of the retina. The anterior fifth of the globe of the eye bulges forward from what would have been the direct line of the sclerotic, forming a segment of a much smaller sphere than is inclosed by the sclerotic. There are four straight muscles of the eye, and two oblique and one retractor, enabling the eye to turn inward, outward, upward, and downward, and when all act together the eyeball is drawn deeply into its socket. One of the most common diseases is inflammation of the eyelids, which is caused usually by exposure, bites, or stings of insects, pricks with thorns, or by a whip or club, or as a result of infecting inoculations. All the known causes may ordinarily be divided under the following heads: (a) Inflammations due to constitutional causes; (b) those due to direct injury, mechanical or chemical; and (c) those due to inoculation with infecting material. The local treatments ordinarily advised consist of astringent, soothing lotions (sugar of lead, 30 grains; laudanum, 2 teaspoonfuls; rain-water —boiled and cooled—one pint) applied with a soft cloth kept wet with the lotion and hung over the eye by tying it to the headstall of the bridle on the two sides. The horse should be fed from a high manger, so as to help the return of the blood from the head; and his diet should be laxative and non-stimulating. For a stye or boil of

drops of carbolic acid. The poultice should be applied in a very thin muslin bag. Wounds such as torn eyelids, caused by the horns of cattle, or with the teeth, or by nails, or the barbs of wire fences, are also frequent. In such cases the edges should be brought together as promptly as possible, so as to secure union without any unsightly distortions. It is an operation that requires experience and skill.

Lameness. By this is meant any irregularities or derangements of the functions of locomotion. There are innumerable forms of lameness, the sources of many of which are so obscure as to defy location until the resulting disease has gained sufficient headway to be serious. In veterinary nomenclature each two of the legs, as referred to in pairs, are denominated a biped, the two fore legs being the anterior biped, and the two hinder the posterior; the two on one side are designated the lateral; and either the front or the hind biped, with the opposite leg of the hind or the front biped, forms the diagonal biped. In health, each biped as well as each individual leg has to perform an equal and uniform duty and carry an equal share of the total weight of the body, so that the result ought to be a regular, evenly balanced, and smooth displacement of the body. According to the rapidity of the motion of the animal in different gaits, each single leg is required at certain moments to bear the weight which had the moment before rested on its congener; or again the legs of one biped may be required to carry the weight of its opposite biped. Beginning with diseases of the bones as a common source of lameness, the 'splint' (q.v.) will be found to be of the commonest occurrence. Indeed, a horse which does not possess one or more belongs to a very small minority. The splint is a bony enlargement on the cannon-bone, between the knee or hock and the fetlock joint. *Ringbones* (q.v.) usually result from heavy labor before the animal was of sufficient age, and consequently before the bones were sufficiently ossified; or else from bruises, sprains, or other forms of violence. *Spavin* (q.v.), or exostosis of the hock-joint, is a disease of the most serious kind for many reasons, not the least of which is the slowness of its development and the insidiousness of it growth. *Fractures* are of less serious consequence in the horse than in man, but nevertheless they are always a matter of grave import and demand at once a most skillful treatment. *Wind-galls* (q.v.) is a name given to the dilated bursæ found at the posterior part of the fetlock joint. *Sprains* are diseases of the muscles and tendons. Ordinarily the cause of a sprain may be attributed to a fall or overstrain, and subsequent soreness, swelling, and suspension of functions. Rest is the prime essential, the treatment consisting of local applications, stimulating liniments, counter-irritation, and occasionally firing. Lameness of the shoulder from sprain is the most frequent, and is popularly described as slip of the shoulder. With draught-horses it frequently is caused by the effort necessary to move off a heavily loaded vehicle. In the great majority of cases a rest is all that is necessary to effect a cure. Under the general classification of diseases of the fetlock, ankle, and foot are to be found many of the most common as well as most fatal (so far as the value

of the animal is concerned) diseases known to veterinary science. Many horses are predisposed to injuries and diseases because of imperfectly formed feet, in consequence of which they are peculiarly liable to diseases of this character. Flat-footed horses are liable to corns, pumiced sole, bruises of the sole, and kindred troubles, owing to the fact that the soles of their feet have little, if any, convexity. The flat foot has no arch, so that the weight of the animal falls on the entire plantar surface instead of on the wall, which allows of little, if any, elasticity in the sole. In *clubfoot* the feet have the wall set nearly perpendicular, and consequently the heels stand high and the fetlock joint is either thrown forward or knuckled, and the weight of the animal is thrown onto the toes. In *crooked foot* one side of the wall is higher than the other, causing the animal to be pigeon-toed as well as making it 'interfere.' *Interfering* is when one foot in action strikes the opposite leg. *Knuckling* is another fault, which causes stumbling, and while not always an unsoundness in itself, yet frequently leads to fracture of the pastern. It is a partial dislocation of the fetlock joint, and is caused more often by heavy work in hilly districts or fast work on race-tracks or hard roads than anything else. The principal remedy for all faults of conformation will be found in suitable horseshoeing; which subject is discussed at some length under HORSESHOEING (q.v.). *Sprains of the fetlock* are the invariable result of knuckling or any diseases which interfere with proper locomotion, as, *navicular disease, chronic laminitis, contracted heels, side bones;* or such external causes as a rut or hole in the road, or any accident which causes the animal to fall. For slight injuries cold-water bandages and a few days' rest will be found sufficient. Should there be severe lameness or much swelling, a stream of cold water playing upon the leg will be found very beneficial. On the subsidence of the inflammation a blister should be applied to the joint. When the shoe of the hind foot strikes the heel or quarter of the fore foot the animal is said to *overreach* (q.v.), a trouble common to trotting and running horses. When the hind foot catches well back on the heel of the fore foot the horse will frequently be thrown on his knees or the shoe torn from the fore foot, an accident known colloquially as *grabbing*. The art of the shoeing smith is demanded, if future injuries are to be avoided. Wounds should be dressed with tincture of aloes, oakum, and a roller bandage; and in any case the animal should never be driven at a very fast gait unless his heels and quarters are protected with quarter-boots. Heavy or draught horses are liable to calk wounds, caused from tramping either on themselves or each other. Good shoeing and the use of boots will be found the best remedy. *Quittors* (q.v.) have been authoritatively divided into four classes: (a) Cutaneous quittor; (b) tendinous quittor; (c) subhorny quittor; and (d) cartilaginous quittor. *Thrush* (q.v.) is more common with draught-horses than any other breed, and is usually caused by a filthy, ill-kept stable. *Corns* are injuries to the living horn of the foot, appearing in that part of the sole which is included in the angle between the bar and the outside wall of the hoof. They are described, according to the character of the conditions which follow the primary injury, as the dry, the moist, and the suppurative. The disease is confined almost exclusively to the fore feet, because of the greater weight which they support, and because the heel of the fore foot in action first strikes the ground and thus receives much more shock or concussion than the heel of the hind foot, in which the toe first makes contact with the ground. Faulty shoeing is the great predisposing cause, or else the presence of small stones or other objects between the sole and shoe. Lameness caused by bruises of the frog is best treated by putting the foot at once in a bath of cold water in order to prevent suppuration, which will frequently be effective if the disease is caught at the beginning. If suppuration, however, has already commenced, the horn of the frog and of the bars and branches of the sole, if necessary, is to be pared thin in order that the foot may be poulticed and all pressure removed. When the lameness has subsided and the exposed part covered by a new layer of horn, the foot may be shod. Punctured wounds of the foot are of everyday occurrence, and when they, as frequently happens, involve the more important organs contained in the hoof, no disease or wound can be more serious. Most frequently a 'picked-up' nail is the cause of trouble, and again the wounds may happen from sharp pieces of rock, glass, wire, etc. The nearer the injury is to the centre of the foot the more possibilities there are of disastrous results. Punctured wounds of the anterior parts of the sole are the more dangerous because of the possibility of injury to the coffin-bone, the most serious wounds being those which puncture the centre of the foot. Sometimes it happens that a nail has penetrated the frog and remained there for several days without causing lameness, the first evidence of an injury betraying itself when the foot is being cleaned. It must be remembered that if the injury is not too deep, suppuration will be established before lameness develops, so that the feet should always be most closely scrutinized. Should the coffin-joint have been penetrated either by the external cause or by the process of suppuration, an acute inflammation of the joint will follow, which will be invariably accompanied by high fever as well as loss of appetite. The treatment recommended in all cases of punctured wounds is the thinning down of the horn near the seat of injury, a free opening created for the escape of suppurated matter, and the foot itself placed in a poultice. Where the injury is not serious, recovery in a few days' time is ordinarily assured; but where serious injuries have been inflicted, the foot should be treated to a cold bath or the stream of cold water described in the treatment for quittor (q.v.). *Contracted heels*, or, as it is more frequently called, hoof-bound, is common among saddle-horses and those kept on hard floors in dry stables. Ordinarily, but one foot is affected at a time, and it affects the fore feet principally. The disease itself is an atrophy or shrinking of the tissues of the foot, which diminishes in particular the diameter of the heels. Another very prevalent cause is faulty shoeing, although it sometimes happens that it results from other diseases of the foot, as, for instance, thrush, side bones, corns, etc. The disease is indicated by a pinched and shrunken frog, high heels, long bars, straight walls, and hoof so dry that it is almost impossible to cut it. The treatment consists first of all of preventive measures. The feet are kept moist and the horn is prevented from drying

out by the use of moist sawdust, occasional poultices of boiled turnips, and a free use of greasy hoof ointments to the sole and walls of the feet. Careful shoeing, however, will be found to be one-half of the cure. *Sand-cracks* may happen on any part of the wall, although usually they appear directly in front and are called *toe-cracks*, or on the lateral parts of the walls, and are known as *quarter-cracks* (q.v.). The latter usually affect the fore feet, and the former the hind feet. A sand-crack, which is a solution of continuity or fissure in the horn of the wall of the foot, may be superficial, involving only the outer parts of the wall, or it may be deep, involving the whole thickness of the wall as well as the soft tissues beneath. The disease is most serious when it involves the coronary band; and may be further complicated by hemorrhage, inflammation of the laminæ, suppuration, and gangrene. The predisposing cause of sand-cracks is the relative dryness of the horn, although excessive dryness is not more dangerous than alternate changes from damp to dry. Other predisposing causes are heavy shoes, large nails, and bad shoeing in general, together with such diseases as canker, quittor, and suppurative corns. Very little can be done in the way of prevention, but the suppleness of the horn may be maintained by the use of ointments, damp floor, bedding, etc., as well as by proper shoeing. After the fissure has made its appearance, all efforts should be directed to prevent its growing longer and deeper, the usual method being to arrest all motion in the edges. A very simple appliance for holding the borders of a toe-crack together is the vachette clasp (q.v.). They are made of stiff steel wire and are strong enough to prevent all motion in the borders of the crack. Where these instruments cannot be obtained a good substitute is to drill a hole through the horn across the fissure, and close the crack by means of a thin nail made of tough iron and neatly clinched at each end.

CARE OF THE HORSE. Careless and improper feeding and watering are responsible for most of the digestive disorders with which the horse may be troubled. With the horse, digestion takes place principally in the intestines, and in selecting food for a horse the anatomical arrangement of its digestive organs and the physiological functions they perform should be carefully studied. All food should be wholesome and clean; the animal should be fed regularly, and because of his small stomach, in small quantities, and frequently. A horse should never be fed too soon after a hard day's work. He may be given a small quantity of hay, but one or two hours should elapse before he gets his regular meal. When it is contemplated to change the food, care should be taken to make the change very gradually, and in any case, the quantity of food given must be in a direct proportion to the amount of labor performed. Should the horse stand several days in the stable, his food should be of a more laxative nature. The following foods are considered the best: The best hay for horses is 'timothy,' but care should be taken that it is about one year old, of a greenish color, and possessing a sweet aroma. A horse fed on grain should be allowed from ten to twelve pounds of good hay a day. Straw should not be fed unless cut and mixed with hay and crushed grain. Wheat and rye chaff should never be used. Of the grain foods, oats easily take the precedence. The best oats are one year old, plump, short, hard, bright, and sweet. They are given either whole or crushed. A fair allowance for the average horse is about twelve quarts of good oats a day. Wheat and rye should not be used except in small quantities and mixed with other grains or hay. The bran of wheat is the one most used, although its value is variously estimated. It is always fed with other grains and tends to keep the bowels open. Maize or corn is not suitable as an exclusive food for young horses, owing to its deficiency in salts. Corn on the cob is generally used as food for horses affected with 'lampas.' It is better given ground, and fed in quantities of from one to two quarts at a meal, mixed with crushed oats or bran. Linseed is occasionally fed with other foods to improve the condition of the skin and keep the bowels open. It is of particular service during convalescence. Steamed or boiled roots and potatoes are frequently used as an article of food, but carrots make the best diet, particularly during sickness. Grass is the natural food of the horse, but it is not sufficient to keep it in condition for work. The amount of water required by the horse varies according to the character of his food; but roundly stated, about eight quarts a day will be a fair average. When resting, water should be given three times a day; when at work, more frequently. The very prevalent impression that when a horse is warm he should not be allowed to drink is very erroneous. No matter how warm a horse may be, it is always safe to allow him from six to ten swallows of water. The danger is not in the water, but in the excessive quantity that the animal will take when warm, if not restrained. It should never be given when ice-cold. A water-trough should always be placed in such position that the sun may shine on it during the winter mornings.

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HORSE. A miner's term, applied to any intruded material which is the apparent cause of a sudden interruption in the continuity of a mineral that is being quarried, as when a dike of igneous rock cuts across an ore body. In vein-mining a detached mass of rock or spar which fills the vein is called a horse, while colliers apply the term to the shale which replaces the coal-bed, as well as to such interruptions as seem to have been the channels of small streams, and which were subsequently filled up by the clay that formed the roof of the coal.

HORSE. On shipboard, an iron jackstay or rail used as a traveler's guide or securing bar, usually called a *horse-rail*. Also the old name for a foot-rope on a yard; and the secondary foot-rope at the end of a yard is still called the *Flemish horse*.

HORSE, Fossil. Remains of horses, often of extinct species, have been found in the cave-beds, river-gravels, bone-licks, and loess deposits of the Quaternary Period, or 'Age of Man,' in almost all parts of the world. In the more ancient deposits of the Tertiary Period, or 'Age of Mammals,' have been found remains of a series of ancestors of the horse, which illustrate the evolution of this race through this entire geological period, a time probably of some millions of years. Fossil horses of the Age of Man are much like the existing species, and are included for the most part in the same genus (Equus). They have been found in Europe, Asia, Africa, North and South America, but none in Australia or in the Oceanic islands, except in those which, like the British Isles, were joined to the continental mainland during the early part of the Quaternary Period. With these exceptions the animal was of world-wide distribution, and inhabited especially the open grassy plains and high plateaus of the interior of the great continents, at the beginning of the Age of Man. All these races were at first wild.

In the New World they became extinct. When the Spaniards first invaded the two Americas they found no horses, wild or domesticated. The Indians, who had domesticated the llama, the alpaca, and the dog, knew nothing of the horse, and were astonished and terrified at the sight of the strange and unfamiliar animals which the newcomers rode. Yet, when introduced by the white races, the horse ran wild and flourished and increased greatly in the same regions where its native cousins had formerly lived, showing how well the country was suited to their needs. Why the earlier native horses became extinct is a problem not yet solved.

In Central Asia, two wild races, Przewalsky's horse and the Asiatic wild ass, or kiang (q.v.), persist to the present day; others were domesticated by man in the earliest times, and their use in Chaldea and Egypt for draught and riding is depicted in the ancient mural paintings. In Africa the larger species became extinct, but the smaller zebras still survive in the southern part of the continent, and the African wild ass in the northern part (Somaliland).

The wild species of Europe, a small race, short-legged and shaggy-haired, was domesticated by man, for it is represented in rude prehistoric drawings scratched on bone or ivory by men of the Neolithic or Polished-Stone Age.

The domesticated horses now in use are chiefly derived from the Asiatic race, but it is probable that in some breeds there is a considerable strain of this European species or variety, and it is possible also that African races may have been domesticated and to some extent mixed with the Asiatic species. The existing wild horses of North and South America, the broncos and mustangs, are descendants of the animals brought over by the Spaniards; but it is possible that in South America some survivors of the native races still existed at the time of the discovery of the continent, and mixed with the introduced species when it ran wild.

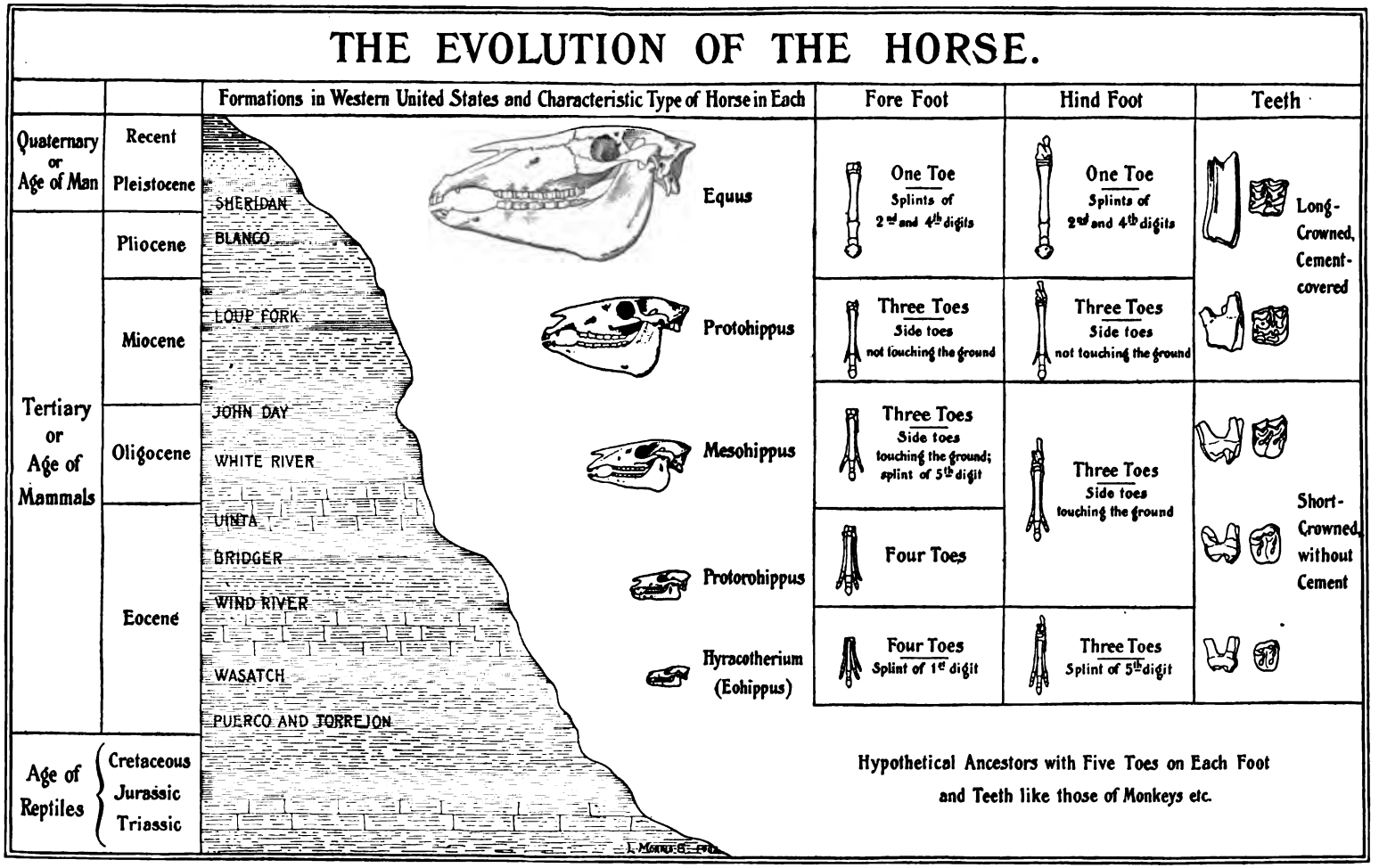
In general, only fragmentary specimens, parts of skulls, bones, or teeth of these extinct horses have been found fossil, so that their characters are very imperfectly known. A number of complete skeletons were found in Texas in 1899, one of which was placed in the American Museum of Natural History, New York. This species, *Equus Scotti*, was of the size of a trotting horse, but in proportions more like a zebra, with deep jaw, short neck and legs, and small feet. Another extinct species, the Hippidium of Argentina and Patagonia, was large-headed, with extremely short and stumpy legs and feet, exaggerating some of the peculiarities of the Shetland pony, although of larger size.

Tertiary Ancestors of the Horse. The history of the evolution of the horse through the Tertiary Period affords the best-known illustration of the doctrine of evolution by means of natural selection (q.v.), and the adaptation of a race of animals to their environment. The ancestry of this family has been traced nearly as far back as the beginning of the Tertiary without a single important break. During this long period of time, estimated at nearly three millions of years, these animals passed through important changes in all parts of the body, but especially in the teeth and in the feet, by which they became adapted more and more perfectly to that particular environment, namely, the open plains of a great plateau region with their scanty stunted herbage, which are the natural habitat of the modern horse.

Equine Characteristics. The horse (including under his name the asses and zebras, as well as the true horses—see Equidæ) is unique among modern animals in the fact that it walks on the extreme tip of the central digit of the foot, corresponding to the middle finger-nail of man, and that all the remaining toes have completely disappeared. The feet are greatly elongated, so as to equal the other segments of the limbs in length, and to raise the animal much higher above the ground than if he walked, as does a man or a bear, on the sole of the foot. In each foot the first and fifth digits (thumb and little finger) have completely disappeared and left no trace, while of the second and fourth digits only a small slender rudiment exists which represents the metapodial, or bone of the palm, and is called a 'splint.' These two splint-bones lie closely against the cannon-bone, or metapodial of the central digit, and are not indicated on the surface of the foot. The modern horse is therefore one-toed.

The teeth are equally peculiar. There are six grinding teeth in a closely set row on each side

THE EVOLUTION OF THE HORSE.



of each jaw; the crowns of these are very much elongated, so that they can be pushed up in their sockets as fast as they wear away at the grinding surface. The grinding surface displays a complicated pattern caused by infoldings of the enamel of the tooth, the enamel edges being supported on one side by the dentine of the tooth, on the other by a similar substance called cement, deposited on the outer surface of the unworn enamel before the teeth are extruded from the gums. This arrangement secures at all stages of wear a series of hard enamel ridges projecting a little above the surface of the softer dentine and cement, and makes a remarkably efficient grinder for the hard, dry grasses which are the natural food of the horse (q.v.). In the series of animals which lead up to the modern horse, we can trace every step in the evolution of these marked peculiarities of teeth and feet, from an ancestor so little suggesting the horse that when first found it was named by Richard Owen, the greatest comparative anatomist of his time, Hyracotherium, or 'coney-like beast.' Its relation to the horse was not at all suspected, and was recognized by Huxley and Marsh only when the series of intermediate stages between Hyracotherium and the modern horse was discovered. This first ancestor of the horse line is very much more like the contemporary ancestors of other lines of descent, and indicates how all the modern quadrupeds have diverged from a single type, each becoming adapted to its especial mode of life.

Stages in the Evolution Series. The Hyracotherium (renamed Eohippus) of the Lower Eocene was a small animal, no larger than the domestic cat, with four complete toes on each fore foot, and three on each hind foot. There is reason to believe that the still more ancient ancestors of this and all other mammals had five toes on each foot, and in the Hyracotherium fore foot we find a splint-bone representing the missing first digit or thumb, while in its hind foot there is a splint-bone representing the missing outer or fifth digit, but here no trace is left of the innermost (first) digit. The proportions of the skull, the short neck and arched back, and the limbs of moderate length, were very little horse-like, recalling some modern carnivorous animals, especially the civets. The teeth, short-crowned, covered with low rounded knobs of enamel, suggested those of monkeys and of pigs, but not at all the long-crowned complicated grinders of the horse. Beginning with this small and primitive animal, eleven stages have been recognized from as many successive formations, showing the gradual evolution of the race into its modern form. Each stage is characteristic of its particular geological horizon. Some have been found in several parts of the world, but by far the most complete and best-known series comes from the Tertiary Badlands of the Western States. Besides the main line of descent, which has led into the modern horses, asses, and zebras, there were also collateral branches, which have left no descendants. Only the more important stages can be mentioned here.

The successors to the Hyracotherium were the Protorohippus and Orohippus of the Middle Eocene. A complete skeleton of the former animal, from the Wind River Valley, Wyoming, is in the American Museum of Natural History in New York City. It is about the size of the kit-fox, and much like its predecessor, the Hyracotherium, except that the splint representing the fifth digit in the hind foot has disappeared.

In the Upper Eocene the Epihippus occurs, but only fragmentary specimens have been found. These show that the middle toe was becoming more prominent, and the side toes, especially the outer toe of the fore foot, were quite slender. Contemporary with this animal was the very much larger Palæotherium of Europe, related to the horses, but not in the direct line of descent.

In the Oligocene is found Mesohippus, of which several complete skeletons are known. The various species range in size from that of a red fox to a mastiff. There are but three toes in each foot, the outer digit of the fore foot being now reduced to a splint-bone, and no longer appearing as a separate toe. The central toe in both fore and hind feet is much larger, and the side toes, although they still reach the ground, are quite slender, and can support but a small part of the weight of the animal.

The teeth are of the crested or 'lophodont' type, the crests higher and sharper than in the preceding genera. This constitutes the necessary intermediate stage in the conversion of the low, round-knobbed or 'bunodont' crown into the high, sharply crested crown with cement bracing, which characterizes the later horses. See Tooth.

In the Miocene is found Protohippus, in which the side toes, although still complete, are extremely small and slender, and do not reach the ground. They can therefore no longer assist in supporting the weight of the animal, and are merely useless rudiments. Various species range from the size of a mastiff to that of a Shetland pony. The teeth in this animal are much more like those of the modern horse; the crown is greatly lengthened, the crests or ridges being higher and more complicated, and the 'valleys' between the ridges are filled up with a material ('cement') approximating the dentine in texture and hardness. A new and very effective method of grinding is thus begun, for when the sharp enamel crests wear down, they form a double ridge of enamel supported within by dentine and without by cement; the two latter are softer than the enamel and wear away more rapidly, leaving it as a sharp projecting ridge, continually renewed with the wear of the tooth. The tooth is pushed up from the jaw as fast as it wears off on the grinding surface, so that it becomes an efficient grinder for those hard, siliceous grasses which would rapidly wear down a tooth of the old pattern to a useless stump.

In the Pliocene lived the Pliohippus, of which very little is known, except that it was either one-toed or had the side toes reduced to extremely small rudiments, and the teeth were much like those of Protohippus, which it a little exceeded in size.

In the Pleistocene is found the modern genus Equus, of larger size, with but one toe on each foot, the lateral digits represented by splint-bones, and with teeth longer-crowned than those of Protohippus, enabling the animal to grind hard grasses still more efficiently. Extinct species have been found in Europe, Asia, Africa, North and South America, as we have seen above.

Meaning of the Changes in Feet and Teeth. Along with the disappearance of the side toes in the evolution of the horse there is a consider-

able increase in the proportionate length of the limbs, and especially of the lower part of the leg and foot. The surfaces of the joints, at first more or less of the ball-and-socket kind, permitting of free motion of the limb in all directions, become keeled and grooved like a pulley, thus permitting free motion forward and backward, but limiting the motion in all other directions, and increasing considerably the strength of the joint. By this means the foot is made more efficient for locomotion over a smooth, regular surface, but less so over very rough ground, of little use for striking or grasping, or the varied purposes for which the feet of many-toed animals are used.

The increased length in the lower leg and foot increases the length of the stride without decreasing its quickness, for the heavy muscles of the leg are chiefly in the upper part, and to increase the length of the lower part changes the centre of gravity of the limb very little, and it consequently swings to and fro from the socket nearly as fast; for in an ordinary step the leg swings like a pendulum, and the speed of the swing is regulated by the distance of the centre of gravity from the attachment, as that of a pendulum is by the height of the bob.

To increase the length of lower leg and foot will therefore give the animal greater speed; but it puts an increased strain on the ankle and toe joints, and these must be strengthened correspondingly, by converting them from ball-and-socket joints to 'ginglymoid' or pulley joints. Additional strength, likewise at the expense of flexibility, is obtained also by the consolidation of the two bones of the forearm (ulna and radius) and leg (tibia and fibula) into one, the shaft of the lesser bone practically disappearing while its ends become fused solidly to its larger neighbor.

Corresponding with the increase in length of limb, it is necessary for a grazing animal that the head and neck should increase in length in order to enable the mouth to reach the ground. So in the modern horse we find the neck and head much elongated when compared with the little Hyracotherium, and this elongation has taken place at equal pace with the elongation of the legs. The reduction and disappearance of the side toes, and the concentration of the step on the single central toe, serve likewise to increase the speed over smooth ground. The soft yielding surface of the polydactyl foot is able to accommodate itself to a rough, irregular surface, but on smooth ground the yielding step entails a certain loss of speed. An illustration is afforded by the pneumatic tire of a bicycle; a 'soft' tire accommodates itself to a rough road, and makes easier riding, but a 'hard' tire is faster, especially on a smooth road. Similarly the hard, firm step from the single toe allows of more speed over a smooth surface, although compelling the animal to pick its way slowly and with care on rough, irregular ground.

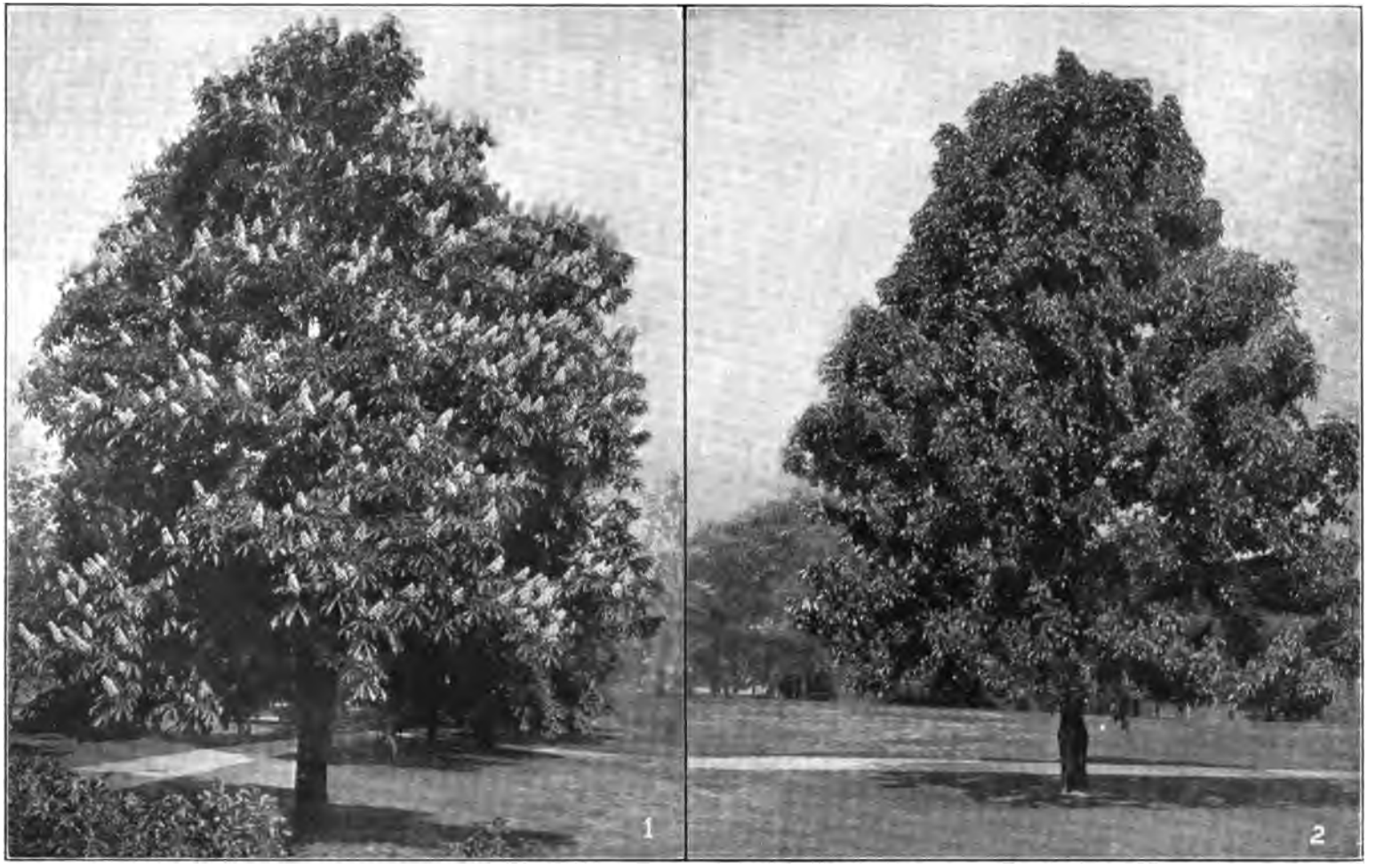
The change in the character of the teeth from 'brachydont,' or short-crowned, to 'hypsodont,' or long-crowned, enables the animal to subsist on the hard innutritious grasses of the dry plains, which require much more thorough mastication before they can be of any use as food than do the softer green foods of the swamps and forests.

All these changes in the evolution of the horse are adaptations to a life in a region of level, smooth, and open grassy plains, which are the natural habitat of the horse. The race, better fitted at first for a forest life, has become more and more completely adapted to live and compete with its enemies or rivals under the conditions which prevail in the high, dry plains of the interior of the great continents. The great increase in size, which has occurred in almost all races of animals whose evolution we can trace, is dependent on abundance of food. A larger animal, as may be shown on ordinary principles of mechanics, requires more food in proportion to its size than does a smaller one, in order to keep up a proper amount of activity. On the other hand, a larger animal is better able to defend itself against its enemies and rivals. Consequently, as long as food is abundant, the larger animals will have the advantage over their smaller brethren, and by the laws of natural selection the race will tend to become continually larger until a limit is reached when sufficient food becomes difficult to obtain, and the animal is compelled to devote nearly all its time to getting enough to eat.

Cause of the Evolution. The evolution of the horse, adapting it to live on the dry plains, probably went hand in hand with the evolution of the plains themselves. At the commencement of the Age of Mammals the western part of the North American continent was by no means so high above sea-level as now, great parts of it had but recently emerged, and the Gulf of Mexico still stretched far up the valley of the Mississippi. The climate at that time was probably very moist, warm, and tropical, as is shown by the tropical forest trees found fossil even as far north as Greenland. Such a climate, with the low elevation of the land, would favor the growth of dense forests all over the country, and to such conditions of life the animals of the beginning of the mammalian period must have been adapted. During the Tertiary the continent was steadily rising above the ocean level, and at the same time other influences were at work to make the climate continually colder and drier. These conditions restricted and thinned the forests, and caused the appearance and extension of open grassy plains. The ancient forest inhabitants must then either retreat and disappear with the forests, or adapt themselves to the new conditions of life. The ancestors of the horse, adopting the latter course, changed with the changing conditions, and the race became finally—as we see it to-day—one of the most highly specialized of animals in its adaptation to its peculiar environment. At the end of the Age of Mammals the continents stood at a higher elevation than at present, and there was a broad land connection between Asia and North America, as well as those now existing. At this time the horses became cosmopolitan, and inhabited the plains of all the great continents, excepting Australia.

It is a question whether the direct ancestry of the modern horse is to be searched for in Western America or in the little known interior plains of Eastern Asia. It is also unknown why the various species which inhabited North and South America and Europe during the early part of the Age of Man should have become extinct, while those of Asia (horse and wild ass) and of Africa (wild ass and zebra) survive. Man since his appearance has played an important part in the extermination of the larger animals; but there is nothing to show how far he was responsible for

HORSE CHESTNUT



1. HORSE CHESTNUT TREE (Æsculus Hippocastanum) IN BLOOM

2. OHIO BUCKEYE (Æsculus glabra).

PARALLEL EVOLUTION IN OTHER RACES. It is interesting to observe that while the evolution of the horse was progressing during the Tertiary period in North America another group of hoofed animals, now extinct, the Litopterna, in South America evolved a race adapted to the broad plains of Argentina and Patagonia, and singularly like the horse in many ways. These animals likewise lost the lateral toes one after another, and concentrated the step on the central toe; they also changed the form of the joint-surfaces from ball-and-socket to pulley joints; they also lengthened the limbs and the neck; and they also lengthened the teeth, and complicated their pattern; but, unlike the true horses, they could not form cement on the tooth, and it was by no means so efficient a grinder. This group of animals, native to South America, became totally extinct, and were succeeded by the horses, which immigrated from North America, which in their turn became extinct before the appearance of civilized man. Many of the contemporaries of the horse in the Northern Hemisphere, such as the camels in America, the deer, antelopes, sheep, and cattle in the Old World, were likewise lengthening the limbs, lightening and strengthening the feet, and elongating the tooth-crowns, to adapt themselves to the changing conditions around them, but none paralleled the horse's evolution quite so closely as did the pseudo-horses of South America.

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HORSE-ANT. A popular name for certain hymenopterous insects forming the family Mutillidæ. They are also known as 'cow-ants,' 'cow-killer ants,' 'solitary ants,' and 'velvet ants.' Although they resemble the true ants, they are more closely related in structure to the social wasps, in spite of the fact that they are not winged, and are solitary in their habits. They are ferocious stingers, and are clothed with hair, which is frequently brightly colored—often bright red. In their early stages some and possibly all are parasitic in the nests of wild bees.

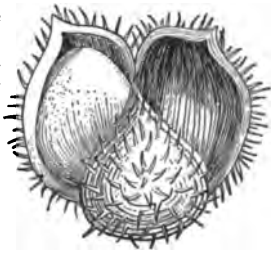
HORSE ARTILLERY. Cannon for use with cavalry troops or flying columns of any kind where great mobility is required. In horse artillery all the personnel is mounted, and the gun is lighter than the ordinary field gun. Horse artillery must be mobile enough to keep up with the cavalry in attack and pursuit. When cavalry charges cavalry, the horse artillery takes up a position and fires upon the enemy's horse. In successful attack it follows its cavalry; in defeat it covers retirement. ment and 11 in India, the gun used is the 12-pound breech-loader, calibre three inches, firing shrapnel (q.v.), shell, and case-shot. See ARTILLERY; FIELD ARTILLERY.

HORSE-BOT. The bot-fly of the horse (*Gastrophilus equi*). See BOT.

HORSE-CHESTNUT (so called probably from the large size of the nuts; less plausibly explained from the former use of them when ground as food for horses), *Æsculus*. A genus of trees of the natural order Sapindaceæ in which the

A HORSE-CHESTNUT TWIG.

leaves are large opposite digitate; flowers with five spreading unequal petals, and the capsule leathery, three-valved, and covered with soft spines. The seeds, of which there are from one to three in each fruit, are large and somewhat resemble chestnuts; but the habit of the trees, its leaves and flowers, are very unlike those of chestnuts, with which it has no botanical affinity. The common horse-chestnut (*Æsculus Hippocastanum*) is a much esteemed ornamental tree, very frequently planted whenever the climate is suitable, on account of its rich foliage and its erect racemes of beautiful reddish-white flowers, which are produced on the extremities of the branches, and contrast admirably with the dark green of the leaves. It is supposed to be a native of Persia or some parts of the East, and was introduced into Western Europe from Constantinople at the end of the sixteenth century. It attains a great size, sometimes rising to the height of 100 feet, and extending its branches very widely. Sometimes they droop almost to the ground. The leaves have long stalks, and five to seven obovate wedge-shaped leaflets. The wood is soft, not very strong, nor very durable in the open air; but is used for many ordinary purposes, and by carvers, turners, etc. The bark is bitter and astringent, contains a bitter principle called *æsculine*, and has been used in tanning and dye-



HORSE-CHESTNUT FRUIT.

cular to this natural order that when reduced to powder they may be used for washing. They contain, however, a large quantity of starch, which may be extracted and freed from bitterness by means of an alkaline solution or repeated washing. This starch is prepared on a large scale and at a cheap rate in France. Horse-chestnuts have long been employed in various countries as food for oxen, sheep, swine, and horses, all of which are fond of them, and grow fat upon them.

In the other species of Æsculus which are natives of North America the foliage is very similar to that of the common horse-chestnut. Both the leaves and fruit of the American buckeye (*Æsculus glabra*) are poisonous. This tree ranges from Pennsylvania to Alabama, and west to Kansas and Texas. North America possesses a number of other species with very similar foliage, smaller flowers, and smooth fruit. In California the seeds of *Æsculus California* are used as food by some Indian tribes, as are those of *Æsculus turbinata* in Japan. The seeds of *Æsculus parviflora*, the edible buckeye, are eaten, either boiled or roasted. This species is a shrub with long and beautiful racemes of fragrant white flowers, which have long projecting stamens. It is a native of the Southern States. *Æsculus Indica* is a lofty tree which grows at elevations of 8000 to 10,000 feet in the Himalayas, and produces seeds very similar to those of the horse-chestnut, which, although bitter, are eaten in time of scarcity.

HORSE-CREVALLÉ, kre-vâl-lā'. See CAVALLY.

HORSE FAIR, THE. A well-known painting by Rosa Bonheur, exhibited at the Salon of 1853. After passing through several hands it formed part of the Stewart collection, and was finally purchased by Cornelius Vanderbilt, and presented by him to the Metropolitan Museum, New York, where it now hangs. There are several replicas by the artist in England, and an engraving of the painting by Landseer. The canvas shows a number of horses in motion, some with riders, some led, and some free.

HORSE-FISH, or HORSEHEAD. See MOONFISH.

HORSE-FLY. See GADFLY.

HORSE-FOOT SNIPE. See TURNSTONE.

HORSE-GENTIAN. A North American medicinal plant. See FEVERWORT.

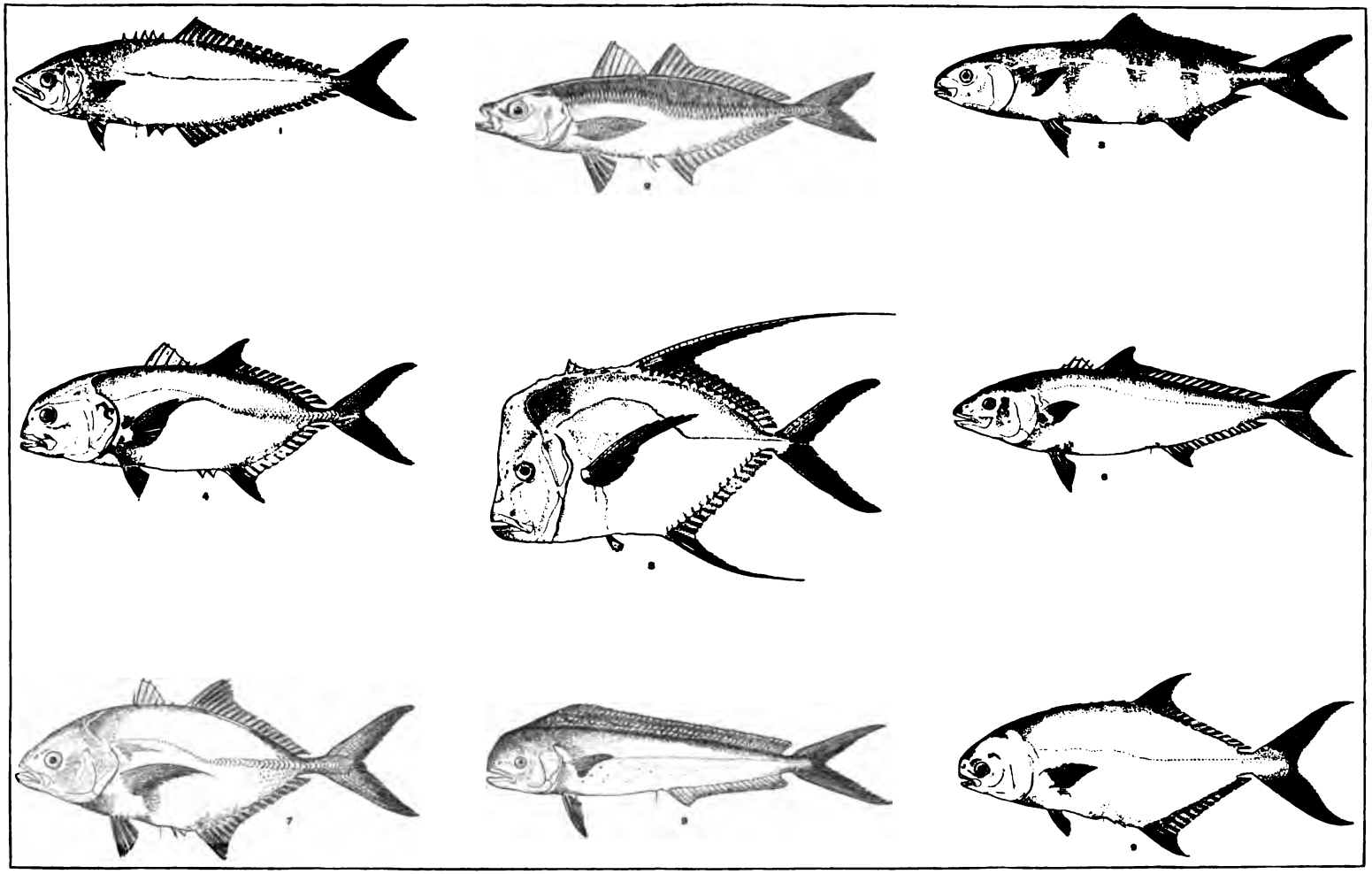
HORSE GRENADIERS. See MOUNTED INFANTRY.

HORSE GUARDS. The military headquarters of the British Army, and the offices of the Field-Marshal Commander-in-chief, War Office, Pall Mall, London, S. W. It is a term used to distinguish the purely military part of the army organization from that of the civil authority, the Secretary of State for War. The oldest cavalry regiments of the British Army are also known as the Horse Guards, the term including the Oxford Blues, first raised by the Earl of Oxford in 1660, and now styled the Royal Horse Guards, or The Blues; and the First and Second Regiments of Life Guards (q.v.), organized in 1661-62.

HORSE-MACKEREL. A name given to several species of fishes of the family Carangidæ, and especially, in Great Britain, to the scad (*Trachurus trachurus*), and in the United States to the crevallé (*Caranx hippos*). The carangids are all trim, vigorous fishes, and are peculiar in that the teeth, when present, are villiform or conical. Usually the scales are very small, or they may be altogether wanting. In many instances the lateral line is entirely or partially armed with shield-like, overlapping plates. (See Fig. 2, Plate of HORSE-MACKERELS AND ALLIES.) The horse-mackerels are distributed over all seas except the polar, and their remains go back to Cretaceous time, while they are profusely represented in marine strata of Eocene date. They sometimes gather in enormous shoals, and are captured in vast quantities in seines. They are carnivorous, and swift and fierce in pursuit of lesser fishes. Their flesh is excellent food. The typical genera are slender, compressed, mackerel-like fishes, but the family includes many others of different form, such as the amber-fishes (Seriola), the pilot-fishes (Naucrates), the moonfishes (Vomer and Selene), and the pompanos. These are described individually under their names elsewhere. Consult Goode's *American Fishes* (New York, 1888); Gunther, *Introduction to the Study of Fishes* (London, 1880).

HORSEMANSHIP. The art of managing horses. It is to the Greeks that we must look for our first knowledge of the history of horsemanship, for when primitive man first ventured upon the back of a captured horse is, at the best, a matter of conjecture. The 'bit' could not have been known before the age of bronze, but undoubtedly the first horsemen employed a halter or thong of rawhide passed through the animal's mouth in order to direct and control it. According to the evidence of the Egyptian monuments, bit, bridle, harness, and chariot were employed; and we know from other sources that the bridles of the early horsemen of Egypt and Asia were considerably decorated with tassels, crests, and embroidery, in a manner both rich and elaborate; but anything approaching the modern saddle was unknown to either Egyptian, Assyrian, or Persian. Instead, a decorated and fringed cloth fastened to the animal by a girth was employed to afford the horseman a seat. The warlike tribes occupying the northern border of Greece are credited with the introduction of horsemanship among the Greeks, among whom the art was held in very high esteem. Horse-races were a conspicuous feature of their festivals and games; a noteworthy feature in connection with which was the fact that the tact and judgment of the rider was frequently a more important factor in gaining the decision than the superiority of the horse. The Athenians were especially devoted to the art, and the rules of horsemanship, so far as the seat is concerned, did not differ in essence from the good horsemanship of to-day. That the Greeks excelled in the exercise is evident from the fact that they were in the habit of taking all sorts of 'leaps' (according to Xenophon), "across ditches, over walls, upon and from banks;" and in military evolutions particularly, demonstrated

HORSE MACKEREL



1. LEATHER-JACKET (Oligoplites saurus).
2. SAUREL (Trachurus trachurus).
3. PILOT-FISH (Naucrates ductor).
4. CREVALLE (Caranx hippos).
5. MOONFISH (Selene vomer).
6. YELLOWTAIL (Seriola dorsalis).
7. JUREL (Caranx latus).
8. DOLPHIN (Coryphæna hippurus).
9. POMPANO (Trachynotus Carolinus).

its absence helped to make them the finished horsemen they undoubtedly were. The Romans undoubtedly learned the art of horsemanship from the Greeks, and, in fact, ascribed the inventions of bridle and chariot, as well as attributed the first conquest of the horse, to their teachers. With the Romans as with the Greeks, equestrianism was a conspicuous feature of their games; and in the time of Cæsar the youths of the aristocracy vied with each other in the practice and public exhibitions of difficult feats of horsemanship.

MEDIÆVAL HORSEMANSHIP. Although there is no proof of the fact, it is nevertheless probable that the saddle-tree had been used for pack-animals from a very early date, and that the riding saddle in some form or shape was known before the fifth century B.C., the era of its reputed first appearance. The difficulty of mounting into the saddle encumbered with heavy armor led through a series of contrivances to the introduction of the stirrup. While the horsemanship of the age of chivalry cannot be said to compare with that of the Greeks and Romans, the demands of the tournament prevented its being neglected.

MODERN HORSEMANSHIP. The first treatise upon the subject was that published by Federigo Grisoni, entitled *Gli ordini del cavalcare* (Naples, 1550). A contemporary of Grisoni was the celebrated teacher Pignatelli, who is regarded by many as the author of the foundation of our present system of riding. Two of his pupils, La Broue and Pluvinel, became famous throughout Europe. Subsequent important writers and their works in England are: Blundeville, *The Fower Chiefest Offices Belonging to Horsemanshippe* (c.1570); translations from the Italian, by Gervase Markham (1593) and Sir William Hope (1696); Thomas de Gray, *Compleat Horseman and Expert Farrier* (London, 1639). The Duke of Newcastle's *Méthode nouvelle de dresser les chevaux* (Antwerp, 1648) was first written in English, and afterwards translated into the language in which it was published. It was for a long period regarded as the great standard authority on horsemanship, although to-day its teaching would be regarded as impossible. Cavalry horsemanship was the subject of a little manual published by the Earl of Pembroke in 1761.

At the present time there are several methods of mounting a horse, each one with its own distinct advantages and disadvantages. Ordinarily, the young horseman is taught to mount from either side, but usually from the 'near' or left side of the horse. The common English method is to place the snaffle rein round the third finger of the left hand, grasp a wisp of the horse's mane between the finger and thumb of the same hand, placing the left foot in the stirrup, and the right hand on the cantle, then with a spring the right leg is thrown over the horse and the rider seats himself in the saddle, meanwhile releasing the mane. He next secures the curb reins in the left hand, in such a manner that the left rein is outside the little finger, and the right between the first and second fingers. When the rein has been drawn in sufficiently for the rider to feel the horse's mouth gently, the loose part or slack is thrown over the first finger and before mounting. The whip in mounting is held in the fork of the thumb of the left hand and afterwards taken into the right hand. The manner of holding the reins differs in different countries of Europe as well as in America, the more general method, other than that of the English already described, being its exact opposite in that the curb is held inside the snaffle. Upon mounting, the rider should firmly seat himself in the middle of the saddle, which ought to be placed well behind the rise of the shoulders, his legs, which should work in sympathy with his hands, just about covering the girth, so that when using leg pressure to the horse, it may be easily and effectively applied immediately behind the girth. The elbows should hang loosely and naturally from the shoulder, permitting a free use of the hands, which latter should always be in a position to 'give and take' without compromising control over the horse, irritating, or otherwise fretting him. When riding at a walk the horseman should maintain a natural upright position, the legs from knee to heel remaining perfectly straight; toes a little higher than the heels, the feet horizontal with the horse's body. The action of the leg, like that of the hand, should be sensitively active and supple, exerting as little pressure as possible, but ready and in position to exert sufficient pressure to maintain the rider's seat and position under any and all circumstances. A beginner will find it to his advantage to practice guiding his horse in every possible manner and direction, selecting for this purpose some inclosed place, as a riding-school, inclosed yard, etc. The horse must at all times be kept well up to the bit, and the rider will do well to remember that guiding the horse military fashion by the pressure of the reins on the animal's neck is not generally advised. *Pacing* in America and *ambling* in England are practically the same gait. The two legs on each side rise and fall together. It does not call for any different method of riding than that employed for the walk. The *trot* is a diagonal pace, the right fore and left hind legs working together and alternately with the left fore and right hind legs. To make the animal trot, raise its head slightly, and press its body with the knees and side of the leg below the knee, and, if necessary, touch it with the whip, but not under any consideration should the rider give any indication by sound of mouth. Serious accidents frequently happen because of the disregard of this very necessary precaution. The horse of a fellow rider is apt to answer to the command, and possibly unseat its own rider, owing to his unpreparedness. The trot is possibly the most perfect pace of the horse. The body should be erect, but playing loosely from the hips; the legs must not be allowed to swing backward and forward, nor must the rider work his shoulders. The expert horseman rides by the aid of grip and balance, the former always ready should the balance be disturbed and there be any danger of a throw. The pressure of the legs should be according to the demand of the moment, ready to keep the rider from losing his balance, which latter saves the strain of a constant exercise of the grip. The *canter* is a very comfortable pace to the rider. It is not a natural pace, however, but, on the contrary, is fatiguing to the horse, and particularly injurious to the animal's

with the left if cantering to the left. To secure this the rider when preparing to canter should pull the right rein rather tighter than the left one, so that the horse in describing a small portion of a circle will, of necessity, lead with the right leg. *The Gallop.*—In this pace the movements of the horse follow so quickly one on the other that the eye cannot detect the various positions which constitute a cadence. The first preparation for the rider is a firm seat, which should be well down in the saddle. The reins are shortened slightly, and the hands kept low; at the same time the body should be leaning slightly forward and a moderate grip maintained with the legs. Care must be taken that the horse is held together and restrained from breaking into a headlong gallop, and possibly beyond the rider's control. To avoid this the reins are held somewhat tighter in the gallop than in any of the other paces.

Leaping requires good nerves as well as a good seat. The rider must be careful to maintain an upright position in the saddle until the horse is close to the jump, when (if it is a fence) he should swing well back from his hips, keeping his hands low and clear of the withers. The feet should be drawn back, and never under any circumstances allowed to swing forward toward the animal's shoulders. Should the feet be forward and the horse make a mistake on landing, the rider would be more easily thrown than if his feet were in the proper position. In brief, the rider should in every form of leaping keep his body at right angles to the ground; thus, the higher the jump, the more he will be required to lean back. In landing, the horse makes contact with the ground on one fore leg followed instantly by the other, after which come the hind legs. When jumping natural obstacles, such as water, ditch, etc., the general rule never to ride fast at an obstacle holds good, although expert horsemen interpret the rule to suit themselves; in any event, the rider must be careful not to pull at the reins or in any way check the horse in his effort to jump either water or ditch. Much depends on the horse in leaping, no two going at the jump in exactly the same style. One may need a little encouragement and another a great deal of steadying, so that it is an important essential for the rider to know his horse. When nearing the jump, the reins should be tightened so as to secure a firm hold of the head and at the same time make him shorten his stride so that he may the better gauge his distance. It requires some little experience on the part of the rider before he is able to tell when the horse is in his proper stride. When the animal is properly collected, and is nearing the obstacle, the hold on the reins should be relaxed and care taken that the free action of his head or limbs is in no way interfered with by pulling, etc. On landing the rider should gently feel his mouth. The horse will then collect himself, all four legs will make contact with the ground, and he will be away again without any hesitation.

The common vices of shying, bolting, kicking, rearing, etc., are much more serious in a horse kept for the saddle than in one used for driving. The horseman will usually be able to tell when his mount is about to shy, so that he will slacken he prepare for it by giving his horse any intimation that something unusual is to happen; neither should he whip or spur, or, as is sometimes done, strike him on the head on the side toward which it is feared he will plunge. The important thing for the rider is to grip fast with the legs, preserve his balance, and be careful not to hang on by the reins. If necessary, stop and encourage the horse by patting him on the neck and otherwise making much of him.

Perhaps the most dangerous vice next to rearing is that of *bolting* or *running away*, which in many instances, however, is only exuberance of spirits on the part of the horse which temporarily overcomes the control of the rider. With a skillful and ordinarily strong horseman it is very rarely that a horse runs away, but where such does happen the method of combating it will depend very much on the country and route the runaway selects. Where the route abounds with sharp turns or shut gates, the danger to be feared will be the running into a fence or gate; but on a road not much frequented and well known to the rider, it will generally be possible to guide the horse past any vehicle which may be met or overtaken. In such a case the rider should not hesitate to turn the rein around his hand and pull with all his strength toward the side he desires the horse to take. 'Sawing the mouth,' though not horsemanship, is permissible, if by its employment only the runaway can be brought to a standstill. A kicking horse should be approached and treated very carefully, and if a vicious kicker should, if possible, be just as carefully avoided. The rider usually has some sort of warning, such as the laying back of the animal's ears, in which case he should sit well back and secure his grip. Only the expert horseman should attempt to ride a rearing horse; for no amount of nerve will suffice to guard the rider from the terrible injuries likely to occur if a rearing horse should fall back on him. Of all horses, the rearer should be the most carefully shunned. There is only one thing for the rider to do in such an emergency—to remember not to hold the reins tight or use them in any way as a support. On the contrary, he should catch hold of the horse's mane, or place an arm round his neck and try in that manner to force him back on his feet.

Military horsemanship is designed to secure a uniformity of style and method, and the best results from both horse and rider. Long stirrups are used; the rider sits well down in the saddle, his seat being preserved largely by balance. *High school* riding is largely an accomplishment of the manége, and includes skill in horsemanship, and in the performance of feats requiring a trained animal. Women are now taught to ride astride, as well as by means of the side-saddle. Hygienic reasons are advanced in favor of the former method, but authorities generally are doubtful of their reasonableness. A fair statement of the question would be that a poor horsewoman derives little benefit from either method, and runs a minimum of risk of injury when riding astride; a clever horsewoman will invariably ride side-saddle with a greater degree of comfort, enjoyment, and safety, than when riding astride.

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HORSE-MEAT. See HIPPOPHAGY.

HORSE-MUSSEL. The large mussel (*Modiola modiolus*) growing abundantly on salt meadows as well as under water. See MUSSEL.

HORSE-NETTLE. See SOLANUM.

HORSENS, hôr'sĕns. A seaport of Denmark, in the Province of Aarhus, situated at the head of the fiord of Horsens, 25 miles southwest of Aarhus (Map: Denmark, C 3). The town possesses a fine church with carvings of the seventeenth century, an old convent chapel, and a high school. The chief industries are weaving, iron-working, ship-building, and the manufacture of woodenware and lime. The town carries on an active trade, importing grain, hay, and fertilizers, and exporting dairy products, pork, and beef. Population, in 1890, 17,290; in 1901, 22,232.

HORSE-POWER. A unit of rate of work, used to measure the performance of motors. It is based upon the assumption that horses in general perform a certain constant amount of work in a specified time; an assumption which is evidently erroneous. The fundamental unit of work is the foot-pound (q.v.); but in measuring the work of a horse by this unit, the estimates of the most celebrated engineers differed widely from each other. Boulton and Watt, basing their calculations upon the work of London dray-horses (working eight hours a day), estimated it at 33,000 foot-pounds per minute. D'Aubuisson, taking the work done by horses working on capstans at Freiberg, estimated the work at 16,440 foot-pounds, working eight hours a day; under similar circumstances, Desagulier's estimate was 44,000; Smeaton's, 22,000; and Tredgold's, 27,500 foot-pounds. It matters little, however, what number is assumed, provided the same be always used; and accordingly the original estimate of Watt is still counted a horse-power. In calculating the power of a steam-engine in terms of this unit, the general rule is to multiply together the pressure in pounds on a square inch of the piston, the area of the piston in inches, the length of the stroke in feet, and the number of strokes per minute; the result divided by 33,000 will give the horse-power. There is an increasing tendency, particularly in electrical machinery, to use the kilowatt as a unit of rate work. This unit is equal to $\frac{7.46}{1000}$ of a horse-power.

HORSE-RACING. The earliest recorded organized trials of speed with horses were the chariot-races at the Greek national festivals, of which the most notable were the Olympic games (q.v.), held every fourth year. Greek sculpture frequently represents the horse as used for riding, apparently without a saddle in most cases; but not as so employed for sport, except as an incident to the chariot-racing. On the other hand, the horses in the Roman contests were to a very great extent ridden. All the formalities of entering, and of differentiation of classes, and of starting were minutely laid down and followed, even to the color of the riders' uniforms. In the earlier times these Roman races were held on the open plain. There has always been a tradition in England that on Salisbury Plain, just outside Stonehenge, the remains of a Roman racecourse exist; and the oldest race which still takes place in England is run over a flat meadow just outside the walls of the Roman city of Chester. In fact, the conclusion seems almost certain from the similarities in officers and methods that horse-racing was one of the legacies left to Britain by its Roman conquerors. The natives, too, were great horsemen and charioteers, and contests were likely enough to be provoked at the feats which the Romans took with them the world over. Their successors, the Saxons, maintained the use and training of the horse; when Hugh Capet sought the hand of the sister of King Athelstan, in the ninth century, he brought as a propitiatory present several 'running horses.' Fitzstephen, in his description of the city of London, written at the end of the twelfth century, says that "races are common, of which the gentry and wealthy citizens are very fond." In the metrical romance of "Bevis of Hamtoun," we get our first glance of a regular recurring annual meet of racing horses. In 1540 the Mayor of Chester presented a silver bell to be given to the winner of a race five times round 'The Roody.' The horse that won not only bore away the bell, but eight or ten pounds, "which moneys were collected of the citizens for that purpose." By the reign of James I. (1603-25) public race meetings were held at Garterly in Yorkshire, Croydon in Surrey, Linton in Cambridgeshire, and on Enfield Chase. In the days of his successor, Charles I., Newmarket, now the metropolis of the racing world, first came into prominence, and Oliver Cromwell, whose farm at Coveney was only a few miles from Newmarket, bred and kept race-horses. Charles II. was a great patron of the turf. He built a house at Newmarket, and was a regular attendant there. From that time onward modern flat racing has a uniform history of progress.

The horses that practice flat racing are known the world over as thoroughbreds, yet as a matter of fact they are the product of cross-breeding continued for many centuries. Vegetius, who wrote in the fourth century, gave to African horses of Spanish blood the first place as chariot-racers, but commended the Persian as the best saddle-horse. James I. bought a very celebrated Arab for breeding purposes; but the Darley Barb, imported in 1705, laid the foundation (through his great-grandson Eclipse, born 1764) of the modern turf. He was the sire of Almanza and Aleppo, but his best-known son was Flying Childers. This importation was followed by many others of sires and dams, among which the Taffolet Barb and the white-legged Lowther Barb are the best known. The Byerly Turk pro-

be mentioned: Diomed (who won the Derby in 1780 and was imported to America); Bay Middleton, The Flying Dutchman, West Australian, Blink Bonny, Hermit, Galopin, Bend Or, Saint Simon, Saint Blais, Ormond, and Persimmon.

There is no radical difference between the methods of training horses for flat racing in England and America, except in the time of taking the foal in hand. In England the majority of foals are practically left to nature until well into the second year. In America, on the other hand, so considerate a trainer as W. E. Wishard would have them backed when weanlings at nine months, and tried out when fifteen months old. But then, in California, owing to climate and grass, the young ones mature very quickly. In England the training of the young racer commences in his second year under a trainer. A thorough preparation for a great race is a long and troublesome operation, depending largely upon constitution, general capacity, and temperament. Ordinarily the colt is gradually brought from a naturally loose condition to the greatest perfection possible; first by steady and continuous walking exercise, then proceeding by gradual stages to gentle galloping and sweating, and finishing by testing the capacity of the colt against a competitor at a distance equal to the forthcoming race. It has been found that, practically, the speed of almost all horses can be equalized by addition or subtraction of weight to be carried when running; and so nicely is this adjusted that the handicaps arranged on this principle provide some of the best races in the year. See HANDICAPPING.

The most celebrated race-course in England is Newmarket, established in 1667, where the Cambridgeshire, the Cesarewitch, the 1000-guineas, and the 2000-guineas are annually run. There are six meets there in the year, in May, July, and October, each occupying two weeks, with an interval of a week between them. The Derby (see DERBY DAY) has been run at Epsom since 1730, and the Oaks since 1779. The Ascot meeting has been continuous since 1727, and Goodwood since 1802. The other most important races are at Doncaster, Lincoln, Chester, and on the Curragh of Kildare, Ireland. The Jockey Club, a semi-public organization, is the flat racing authority. In France within the last thirty years great interest has been taken in breeding and racing the thoroughbred. The Grand Prix de Paris, which is run at Longchamps, near the capital, is one of the great races of the world. Austria, too, has its enthusiasts, and in Australia flat racing is a national pastime.

In America, the first and natural home of the thoroughbred was in the South, where the early settlers were of the class which in England made the breeding and care of high-mettled horses one of their delights. Many well-known horses were imported. Diomed, the Derby winner already mentioned, of the Byerly Turk blood, was one of them. He was brought over by Col. John Hoomes, of Virginia, and became the sire of Sir Archy, who in turn was the father of American Eclipse, Vingt Un, and other well-known horses. Another of these importations was Messenger, by Blais (the son of Flying Childers and grandson of the Darley Barb) out of Turf, a decess; so that in 1881 the late Pierre Lorillard was able to send over to England his Iroquois and win the Derby. Breeding establishments known all over the world are scattered throughout Kentucky and Tennessee, and there are many enthusiastic owners of thoroughbreds.

Even in the North, flat racing flourished as early as 1812. In 1830 Barefoot, a Saint Leger winner, found a home in Westchester, N. Y., and was raced there against his great rival American Eclipse. The Wagner-Grey Eagle contests caused unparalleled interest there in the autumn of 1839; and Lexington and Le Comte had their famous meetings in New Orleans in 1854-55.

The Civil War was a temporary check to thoroughbred racing, and although scarcely a city of any size was without a course, it was not until the American Jockey Club was formed, with the late August Belmont as chairman, and Jerome Park (in 1886) was made the Mecca of the sport by Leonard W. Jerome, that racing in the modern sense became a widely spread pastime. In 1881 the Coney Island Jockey Club opened the Sheepshead Bay Track; in 1888 Mr. John A. Morris built Morris Park; the next year Monmouth Park at Long Branch was created by Mr. Withers, and this was followed by the Brooklyn Jockey Club's course at Gravesend. On these four courses sums approaching $500,000 were annually added to the entry fees, for competition. Saratoga has long had an annual meet of importance, and the Washington Park Club of Chicago and the Kentucky Racing Association have an antiquity greater than any of the Eastern associations. Other important racing centres are New Orleans, Louisville, Little Rock, Ark.; Roby, Ind.; Newport, Ky.; and Washington, D. C. The Pacific Slope is represented by the San Francisco Jockey Club and the New California Jockey Club, whose principles are gradually coming into accord with those guiding the Eastern Jockey Club, probably with a view to an often discussed amalgamation.

Many noted horses, besides Iroquois, already mentioned, have been produced in America, of which the best known have been Lexington (a direct descendant of Diomed), Silver Fox, a son of Blais, Maud Hampton, Kentucky, Tournament, Firenze, La Tosca, Ethelbert, Salvator, Imp, Kinley Mack, Ballyhoo Bey, Commando, Tommy Atkins, and Nasturtium.

One fundamental difference between American and English thoroughbred race-courses is that the former are bare earth floors, and the latter are covered with a close-fitting carpet of grass. The straight mile record on the grass was, singularly enough, made at Lingfield by the American bred Caiman in 1 m. 33 s.; while on the dirt course the mile record on a circular track was made by an imported horse, Orimer, at Washington Park, Chicago, in 1 m. 38 s.

The advent of American jockeys in England in the years 1900-01 worked a complete revolution in the style of riding in a flat race, and their fame has extended to every part of Europe where thoroughbred racing exists. The main point in the American style is the placing of the jockey's weight well forward on the horse's withers and a crouching attitude, which reduces the resistance of the air against the jockey's body.

HORSERADISH (*Cochlearia Armoracia*). A perennial herb of the natural order Cruciferæ, with long, cylindrical white roots of strong pungence, due to a volatile oil which resembles mustard oil. It has flower-stems about two feet high, large, much-veined, oblong, crenate root-leaves on long stalks, and elongate-lanceolate stem-leaves. It grows in damp meadows in the middle and south of Europe, is naturalized in many places in America, and is cultivated for the sake of its roots, which are scraped or grated down and mixed in salads or used as a condiment. Horseradish-root is used also in medicine as a stimulant, and is often useful in promoting digestion; it is also regarded as an antiscorbutic, and is sometimes applied as a rubefacient instead of mustard. Since horseradish does not produce seed, it is generally propagated by root-cuttings planted in rich, moist soil and treated as an annual. The crowns are also sometimes used, but they do not produce as good roots. Horseradish is very difficult to eradicate from the ground in which it has become established, as almost any portion of the root will grow.

ROOT OF HORSERADISH.

HORSERADISH-TREE (*Moringa pterygosperma*). A tree of the natural order Moringeæ, native of India, and introduced into the West Indies and other tropical countries, in many of which it is cultivated for its fruit, which is either pickled or eaten as a vegetable. The fresh root and the leaves suggest the odor and flavor of horseradish—hence the common name. Its winged, triangular, globose, bitter seeds furnish about 30 per cent. of a bland, inodorous, nearly colorless fixed oil of long-keeping qualities which resembles olive oil and is similarly used. At a temperature of about 32° F. a deposition of its solid fats occurs, and the remaining clear fluid is removed for use in the extraction of perfumes from flowers, and the lubrication of delicate machinery. The oil is known as ben-oil or behen-oil, a name which is said to be misapplied, since it is claimed properly to belong to the oil obtained from the wingless seeds of Moringa aptera, a tree native to Abyssinia and Arabia. The oil of neither species should be confounded with bene-oil, which is derived from the seeds of Sesamum indicum. See SESAMUM.

HORSESHOE BAT. See BAT.

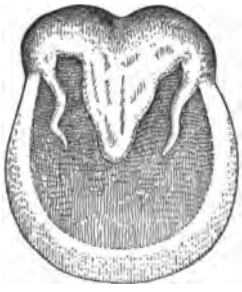
HORSESHOE, or HORSEFOOT, CRAB. See KING-CRAB.

HORSESHOE FALL. The name given to the portion of Niagara Falls included between Goat Island and the Canadian shore, also called the Canadian Fall. See NIAGARA FALLS.

HORSESHOEING. An artificial protection of some kind for the horse's foot has been well said to be "one of the penalties which civilization inexorably exacts." When it is remembered that every time that a horse is shod it implies damage to the foot and that the best and most expert shoeing of necessity inflicts some injury, the importance of horseshoeing to the horse-owner is evident. All authorities agree "that there is no such thing as absolute immunity from an evil which must always exist in inverse ratio to the skill displayed in the execution of the work." The value of the domesticated horse to man is in his fleetness and strength. It was early discovered, however, that his usefulness was limited by the condition of his feet, so that the history of horseshoeing is practically an account of the various devices that have led up to the modern shoe.

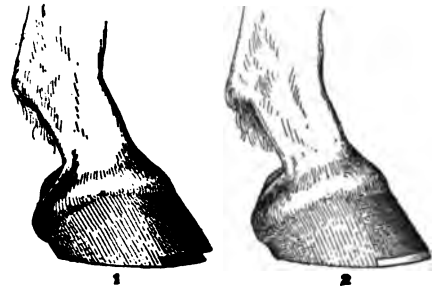
The entire weight of the body, as well as the pressure of every muscular effort, is largely concentrated in the feet. The nails or claws and their corresponding digits of other animals have in solipeds disappeared from atrophy, with the exception of the middle digit, which became much more developed and surrounded by an hypertrophied nail called the hoof, the structure of which is designed to meet every requirement of the animal except those that have devolved upon it since its domestication, such as constant traveling over hard roads or stony ground. Should the horn of the hoof be worn away, the structures which it was designed to protect are of necessity injured, the animal becomes lame, unable to work, and consequently ceases to have any value. According to Diodorus, Cinnamus, and Appian entire armies were occasionally jeopardized through the breaking down of their horses by reason of worn hoofs. Xenophon sought to solve the problem by making the hoofs hard and tough; and from other Greek and Roman writers we learn that resort was had to socks or sandals (*ippopodes, embatai, carbatinai, solea*, etc.). These were clumsy as well as ineffectual means of protection, but, strangely enough, they have their modern counterpart in the straw sandals still to be seen in various parts of the Japanese Empire. According to Beckmann, *Beiträge zur Geschichte der Erfindungen* (Leipzig, 1792), it was greatly to be doubted whether the Romans practiced, as was alleged, the art of shoeing, by attaching a metal plate or rim to the horse's foot; a doubt strengthened by the fact that on no monuments or sculptures (so far as was then known) in which horses appear could any evidence of shoeing be seen. On the other hand, a bas-relief dating from the second century, at present in the museum of Avignon, shows a chariot drawn by horses which are unmistakably shod; and Cohen in his *Description des monnaies frappées sous l'Empire Romain* tells of a medal supposed to date from the time of Domitian commemorating a cavalry victory upon which was a design of two horseshoes, surrounded by two twined serpents. Another coin, in the British Museum, from Tarentum, about B.C. 300, is supposed to represent a horse being shod. According to historical writers the horses of the Huns when they invaded Europe were shod. Some evidence that nail shoes were employed previous to the sixth century is perhaps supplied by Chifflet (*Monuments de la monarchie Française*), who tells of a fragment supposed to be part of a horseshoe found by him at Tournay in the tomb of Childeric (King of the Franks, died A.D. 481). Absolute evidence as to nail shoes in the ninth and tenth centuries is comparatively plentiful, not the least important being the *Tactica Imperatoris Leonis* of Emperor Leo VI., dating from the ninth century. There is no reason to doubt that the Arabs of the Hejira (A.D. 622) shod their horses with iron; while, according to the *Chroniques de Saint-Denis*, Char-

nature of things it was not likely that shoeing with iron was at all common in the early part of the Middle Ages. William the Conqueror is believed to have introduced the art into Britain. For centuries the art of the shoesmith ranked with that of the scholar and bard in England and France, and not only noblemen, bishops, and squires, but even kings practiced the craft. In fact, according to Solleysel (c.1665), a knowledge of the art was a necessity for all persons of high estate, which explains the fact that many of the oldest families of England, France, and Poland have to-day a horseshoe device in their insignia. Occasionally shoeing took the form of extravagance, as when Poppæa, the wife of Nero, had her mules shod with shoes of gold—a fantastic fashion often recorded in history. As late as 1616 the English Ambassador to France entered Paris riding a horse whose silver shoes were so lightly fastened on that when he came to a spot where "eminent men or beautiful women were standing" he caused his steed to prance, and so cast its shoes, which were scrambled for by the crowd. His 'argentier,' wearing a rich livery, replaced the shoes with similar ones just as loosely fastened.



NORMAL FOOT READY FOR SHOEING.
Illustration of healthy frog and bars.

MODERN HORSE-SHOEING. The advanced farriery of to-day owes its excellence to modern veterinary science; so that there is no longer excuse for the ignorance which in comparatively recent times was universal, and which even to-day is prevalent to some extent. Notwithstanding State examinations and increased general knowledge, it is admitted that the horse's feet are unnecessarily mutilated by wholesale cutting, regardless of the anatomy, physiology, and economic relations of the parts of the hoof. This practice is followed solely on the score of tradition; and, of the hoof; a vital function which is entirely destroyed by the too common use of the 'draw-



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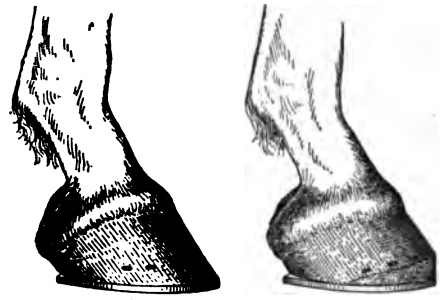

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FIG. 1. FOOT PREPARED FOR CHARLIER TIP.
FIG. 2. THE CHARLIER TIP.
FIG. 3. RIGHT FITTING SHOE.
FIG. 4. WRONG FITTING.

ing-knife,' and which converts what should be a means of protection into a source of danger. The further fault of paring down the sole, until the living structures within are almost exposed through the soft, moist, half-formed horn, which is all that the paring-knife has left, is very severely condemned. Bad farriery and shoeing are frequently guilty of still further maiming the horse in endeavoring to improve upon nature by removing the bars, or 'opening' the heels; such a foot becomes predisposed to contraction of the heels. In the effort to use a shoe too small for

TOE WEIGHT SHOE. SHOE TO BALANCE ACTION; HIND FEET. SIDE WEIGHT SHOE FOR HIND FEET.

great as the financial loss has been, it is little compared to the agony which horses have endured. The frog of the hoof is designed to act as a cushion which by its elasticity protects the other structural parts from jar and the foot the rasp is brought into play, and the foot made to fit the shoe. It is generally conceded that the outside or horny wall of the hoof, together with that portion of the sole which is in immediate contact with it, and upon which the

shoe should rest, are the only portions which require paring, and then not with the knife, but with the rasp. There is considerable difference of opinion among authorities with regard to the various details of shoeing, but all are agreed on the barbarity as well as uselessness of the frog and sole mutilation already described.

The shoe should be as light in weight as the circumstances will permit, the determining factors being the weight of the horse and the nature of the work it must do. The old adage that 'an ounce at the toe means a pound at the withers' is undoubtedly true in essence, but a still greater handicap is the increased concussion inseparable from progression. It is not true that a heavy shoe necessarily wears longer than a light one, while it is well known that a light shoe is just as effective as a heavy one in performing its legitimate mission of preventing undue wear of the walls of the hoof. The shoe should be made to conform exactly to the natural tread of the foot, and should be permitted on no account to remain on for too long a time, as the truncated cone of the hoof, which has its base downward, constantly increases in circumference, so that in time the shoe becomes too small and a source of pain to the horse. Common errors in shoeing are the employment of too many and too heavy nails, and the driving of them too high up into the walls. If shoes could be securely attached and safely worn without the use of nails much would be gained; but although numerous alternative devices have been put on the market, the best of which fastens the shoe by means of metal bands or stubs, none has been found to be generally satisfactory.

Winter shoeing demands that the shoe be capable of affording foothold as well as protection against undue wear, and for this purpose shoes are made fashioned with toe and heel calks, or calkins. Care is necessary to avoid making the calks any larger than is absolutely necessary, or else serious injury may be done to the horse. The art of shoeing for specific purposes is of American origin, and is a result of the development of the trotter (q.v.). At first, designed to influence speed or action, shoes are now made to remedy defects, natural or acquired, due to faulty conformation or bad habits. Shoes for racers, trotters, and speed horses generally have an adaptable variety of form and principle. Among those designed to remedy defects in the horse most generally employed in the business and pleasure of the community at large may be mentioned the scoop-toed or roller-motion shoe for the fore feet and a shoe for the hind feet, designed to do away with 'forging' or 'clicking.' The scooped or rolled toe hastens the action of the fore legs, and enables them to avoid being struck by the hind foot; while the lengthening of the branches of the hind shoes, by increasing the ground surface, retards the 'breaking over' of the hind foot. A common practice to 'open' the action is to increase the outside web of the hind shoes. The faults of 'dishing' or 'paddling' are remedied by similar devices. The principal diseases common to neglected or faulty shoeing will be found treated under HORSE, or under their own title throughout the book.

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HORSESHOES, LUCK OF. See SUPERSTITION.

HORSESHOE-SNAKE (so called from its markings). A large, handsomely marked colubrine serpent (*Zamenis hippocrepis*) of the Mediterranean region, closely allied to the American blacksnake.

HORSETAIL (so called from the shape). A common name given to species of Equisetum ('scouring rush'), a genus which represents one of the three great divisions of fern plants (pteridophytes). See EQUISETUM.

HORSFORD, EBEN NORTON (1818-93). An American chemist, born at Moscow, N. Y. He graduated as a civil engineer at the Rensselaer Polytechnic Institute in 1838, and was engaged during the following year on the geological survey of New York State. In 1840 he became professor in the Albany Female Academy. In 1844 he went to Germany and studied chemistry for two years under Liebig. From 1847 to 1863 he held the Rumford professorship of applied science at Harvard College. He endowed the library and laboratory of Wellesley College, and was one of the first professors in the Lawrence Scientific School. He left Harvard to engage in chemical manufactures. He was interested in antiquarian research, and was generally credited at one time with having identified the site of the supposed Norse settlement Norumbega (q.v.) as being on the Charles River near Boston. His dictionary of the Iroquois and Algonquin languages is a valuable contribution to Indian philology. He published *The Discovery of Norumbega* (1892).

HORSLEY, hôrs'li, CHARLES EDWARD (1822-76). An English organist, pianist, and musical composer, born in London. A pupil of his father, William Horsley, of Moscheles, Hauptmann, and Mendelssohn, and a friend of Spohr, he began musical composition while studying in Germany, and an overture by him was rendered at Cassel in 1845. He was organist of Saint John's, Notting Hill, London (1853-57), but went to Australia in 1868, and thence to America in 1876, where he died. He was the author of three oratorios: *David* (1846); *Joseph* (1849); and *Gideon* (1860); besides music for Milton's *Comus* (1860); *Euterpe*, an ode for the inauguration of Melbourne City Hall (1870); and a *Text-Book of Harmony* (1876), published after his death.

HORSLEY, JOHN CALCOTT (1817—). An English genre painter. He was born at Brompton, and studied at the Royal Academy's schools. Later he was one of the head masters at the School of Design, Somerset House. He received several prizes for his cartoons at the Westminster Hall competition in 1843, and painted al fresco the "Spirit of Prayer," in the House of Lords, and "Satan Touched by Ithuriel's Spear," in the Poets' Hall of the Palace of Westminster. Some of his other works are "Malvolio the Sun," "L'Allegro," and "Il Penseroso," "Under the Mistletoe," "Caught Napping," "Scenes from Don Quixote," "Healing Mercies of Christ," "Wedding Rings," and "Hide and Seek." The coloring

HORSLEY, Samuel (1733-1806). An English prelate. He was born at Saint Martin's-Place, London, September 15, 1733. He was educated at Westminster School and Trinity Hall, Cambridge. In 1758 he became curate to his father, then rector of Newington, and the next year succeeded to the rectory, a living which he held for thirty-four years, though he also enjoyed in the interval many other preferments. He was a scientist as well as a theologian, and first attracted attention by scientific writings. He is chiefly remembered, however, for his controversy with Dr. Joseph Priestley, growing out of the publication of the latter's *History of the Corruptions of Christianity* (1782), among which corruptions was included the orthodox doctrine of Christ's uncreated divinity. Horsley reviewed the work with great severity in his charge delivered to the clergy of the Archdeaconry of Saint Albans, May 22, 1783. Priestley replied the same year in a publication entitled *Letters to Dr. Horsley in Answer to His Animadversions*, etc. In 1784 Horsley retorted in seventeen *Letters from the Archdeacon of Saint Albans in Reply to Dr. Priestley*, etc. These were, in return, met by a new series from Priestley. After a silence of eighteen months, Horsley again replied in his *Remarks on Dr. Priestley's Second Letters*, etc., and in 1789 collected and published the whole that he had written on the subject. His services were rewarded with the Bishopric of Saint Davids in 1788, whence he was translated to the Bishopric of Rochester in 1793, then to Saint Asaph's in 1802. He died at Brighton, October 4, 1806. His collected theological works were published (London, 1845).

HORSLEY, Victor Alexander Haden (1857—). An English surgeon and neurologist. He studied medicine in London, and in 1881 received the gold medal in surgery from the University School. He has been president of the Medical Defense Union, and is Fellow of the Royal Medical Chirurgical Society; member of the Pathological, Clinical, and Physiological societies; corresponding member of the Biological Society of Paris, and of the Medical Society of Budapest; honorary fellow of the American Surgical Society and of the American Neurological Society; surgeon to the University College Hospital; professor of pathology in University College; surgeon to the National Hospital for paralyzed and epileptic; and secretary of the Government Commission on Hydrophobia. The results of his researches in cerebral localization are of the greatest value, and have made him eminent. He is the author of a *Report on Septic Bacteria* (1882); articles in Heath's *Dictionary of Surgery* and Quain's *Dictionary of Medicine* (1883); *Surgical Reports of University College Hospital* (1882 and 1883); "Functions of the Marginal Convolutions," in *Proceedings of the Royal Society* (1884) and *Philosophical Transactions of the Royal Society* (1888); "Analysis of Movements Produced by Stimulating Ferrier's Cortical Arm Centre" (ib., 1886-89); "On the Thyroid and Pituitary Bodies," in *British Medical Journal* (1886); *The Pathology of Epilepsy and Canine Chorea* (1885-86); "On the Functions of the Thyroid Gland," in *British Medical Journal and Its Treatment* (1888); *An Experimental Investigation of the Central Motor Innervation of the Larynx*, with Felix Semon (1890); *The Structure and Functions of the Brain and Spinal Cord* (1892); with Boyce, *Preliminary Report on Œdema* (1893); with Schäfer, *Experiments upon the Functions of the Cerebral Cortex* (1888).

HORSLEY, William (1774-1858). An English organist and composer, born in London. He early began the composition of glees, in which he did his best work, and his first appointment as organist was to Ely Chapel, Holborn (1794). Three years afterwards he became assistant, son-in-law, and successor (1802) to Dr. Calcott at the Female Orphan Asylum, having by that time received the degree of Mus. Bac. from Oxford. He was also organist at Belgrave Chapel, Grosvenor Place (1812-37), and afterwards at the Charterhouse (1838). He was one of the founders of the Philharmonic Society (1813), and belonged to several other musical organizations. He will long be remembered for his anthem, *When Israel Came Out of Egypt* (1800), *Celia's Arbor* (1807), and for five collections of such glees as *See the Chariot at Hand*, *Mine be a Cot*, *Cold is Cadwallo's Tongue*, and *Oh, Nightingale*, published 1801-27. He wrote also pianoforte pieces, hymn and psalm tunes, and several works on harmony, such as *An Explanation of Musical Intervals of the Major and Minor Scales* (1825).

HORT, Fenton John Anthony (1828-92). A distinguished English theologian. He was born of English ancestry at Leopardstown, near Dublin, Ireland, April 23, 1828, was educated at Rugby and Cambridge, fellow of Trinity College, Cambridge, 1852-57; vicar of Saint Ippolyts, Hertfordshire, 1857-72; lecturer and professor at Cambridge from 1872 to his death, November 30, 1892. Hort was one of the most learned men of the nineteenth century. He distinguished himself not only by his marvelous attainments in classical and patristic literature, but by an extensive acquaintance with botany and mathematics. Nevertheless he was always reluctant to publish the results of his studies. The great monument of his life-work is the Westcott-Hort Greek Testament (1881). For over thirty years he made the Greek text of the New Testament his chief study, and at his death was one of the first authorities in the world on this subject. To him textual criticism owes the clear and convincing exhibition of the principles of genealogical evidence presented in the *Introduction to the New Testament in Greek* (1881). Since his death many of his lectures have been edited and published. Consult his *Life and Letters*, by his son, A. J. Hort (New York, 1896).

HORTA, hôr'tȧ, *Port. pron.* ôr'tȧ. A seaport of the island of Fayal, Azores, and capital of the District of Horta. It has a safe and good harbor. Population, in 1900, 6734.

HORTENSE EUGÉNIE DE BEAUHARNAIS, ôr'tȧns' ē'zhā'nē' de bō'ȧr'nā'. See Bonaparte.

HORTENSIO, hôr-tĕn'shĭ-ō. A suitor of Bianca, the younger sister of Katharine, in Shakespeare's *Taming of the Shrew*.

binding on the whole people, and brought to an end the struggle between plebeians and patricians. Hortensius died while he was dictator.

HORTENSIUS, QUINTUS (B.C. 114-50). A Roman advocate and orator, a contemporary of Cicero, with whom he was personally on good terms, though opposed in politics, and often matched against him in legal contests. Hortensius had already obtained a name as an orator before he was twenty, and he passed through the several grades of the public service until he obtained the consulship in B.C. 69; afterwards he withdrew largely from politics and devoted himself to pleading in the courts. He was an effective, though florid, orator, but often showed himself unscrupulous in attaining his ends. None of his orations or writings have been preserved.

HORTICULTURAL SOCIETIES. Associations for the encouragement of gardening. They are now numerous in almost all civilized countries, but seem to derive their origin only from the beginning of the nineteenth century, when the London Horticultural Society was formed. The society obtained a charter in 1808. The Experimental Garden of the society, the first of its kind, was established in 1817, and was removed to its present situation at Chiswick in 1822. The progress of the society was very rapid, and its usefulness is still very great. Societies of the same kind soon began to spring up in Germany and other parts of the Continent of Europe, and now exist in almost all parts of the civilized world. In the United States there are about five hundred horticultural societies. The New York Horticultural Society, organized in 1818, and now extinct, was the first to come into existence. The American Pomological Society, established in 1850, is now one of the strongest organizations of its kind in the world. The purpose of these societies is education and the development of interest along horticultural lines.

HORTICULTURE (from Lat. *hortus*, garden + *cultura*, cultivation, from *colere*, to cultivate). The branch of general agriculture that deals with the raising of fruits, vegetables, and ornamental plants. On the one hand, horticulture merges into agriculture in its restricted sense, i.e. the raising of cereal, forage, textile, and root crops; on the other into landscape gardening, which is really a fine art. To illustrate, peas raised to be used as an esculent are classed as a horticultural crop, but if grown for the dry seed they are considered an agricultural crop; the names 'garden peas' and 'field peas' sufficiently indicate the distinction. Again, plants raised for their intrinsic ornamental merit are properly subjects of horticulture (see FLORICULTURE and SYLVICULTURE); but if their primary use is as units in a general landscape effect, they are subjects of landscape gardening (q.v.). While the development of agriculture, in the restricted sense of the term, springs from sheer necessity, that of horticulture, which serves to gratify the sense of beauty and the desire for comfort, naturally implies a state of communal or national ease, of thrift, and even luxury. This fact is emphasized by the time at which horticulture becomes industrially important in a nation's history. For

channels by diversification of interests.

But horticulture is really much less simple than may be inferred from the ordinary definition of its scope. Problems of plant physiology, of breeding and variation of plants under domestication, of the operation within its domain of natural laws in opposition or in conjunction, of the life histories of innumerable organisms, such as insects, mites, bacteria, and microscopic fungi, are closely connected with the ordinary problems of horticulture proper, and render it an art of great complexity. Further, with its growth, which, especially in America, has been phenomenal, many industries, such as the nursery and the seed industries; the manufacture of tools and implements; of artificial fertilizers; baskets, barrels, tins, jars, and other packages; the preparation of canned, evaporated, or otherwise preserved fruits and vegetables; storage by refrigeration; the transportation of all materials for manufacture and of the finished product—these and other industries have either sprung into existence or have been vastly increased in magnitude with the development of horticulture. Moreover, since each of its branches may be carried on in the open air or under glass by specialists; since each species, and in many instances each variety, cultivated, demands some special knowledge of its peculiar needs; since a total of fully 25,000 plants, some of which have thousands of varieties, are cultivated for use or ornament; since climates, soils, and other conditions differ as widely as do details of raising; since markets are as whimsical in their demands as persons; and finally, since improvements and discoveries in plants, varieties, methods of culture, marketing, etc., are annually reported, it is apparent that the realm of horticulture is exceedingly broad.

The main divisions of horticulture are floriculture, or flower-growing; pomology, or fruit-growing; and olericulture, or vegetable-growing. Each of these divisions may be further subdivided into amateur and commercial branches, the former dealing with personal ideals, the latter with commercial demands. Of course, these two are blended to some extent, and it should be noted that examples of the former are annually increasing to the no small advantage of the community, the nation, and the world.

The ancient methods of gardening were so crude, the means of disposal so limited, and the areas devoted to horticultural industry, if such it might be called, so small that the term horticulture, as now understood, if applied to that early gardening would be a misnomer. Not until within the past two hundred years was the term more than occasionally employed, and only during the past century did it come into general use. As proof of the interest taken in horticultural matters during the nineteenth century may be mentioned the development in America of a horticultural literature. In 1800 there were very few agricultural works that devoted more than a few chapters or even pages to fruits and vegetables. The first American horticultural book was published in 1804. Not only was there at the time no periodical devoted wholly to horticulture, but there was none that had even a horticultural department. Not until 1821

the nineteenth century fully 600 books were published and 500 horticultural journals were started, of which about 40 were in circulation in 1900. The tendency of recent horticultural literature has been to substitute for the long series of specific rules formerly popular a set of general principles, which, if thoroughly grasped, might enable the reader to judge as to what working method may best suit any given case under any combination of local conditions. Outside of North America, during the past century, the development of horticulture, though less marked, has been, nevertheless, very remarkable as compared with previous centuries.

BIBLIOGRAPHY. For history of horticulture in America and the bibliography of American horticulture, consult: Bailey, article "Horticulture," in *Cyclopedia of American Horticulture* (New York, 1900); for account of European horticulture, consult: Johnson, *The History of English Gardening* (London, 1829); Jäger, *Gartenkunst und Garten, sonst und jetzt* (Berlin, 1887); Huttig, *Geschichte des Gartenbaues* (Berlin, 1899); André, historical chapters in *L'art des jardins* (Paris, 1879); De Candolle, *Origine des plantes cultivées* (Paris, 1893).

For somewhat detailed discussions of special horticultural topics, see: FRUITS, CULTIVATED; HARVEST AND HARVESTING; FUNGI, ECONOMIC; DISEASES OF PLANTS; FUNGICIDE; INSECTICIDE; ELECTROCULTURE; PLANT-BREEDING; POMOLOGY; HORTICULTURAL SOCIETIES; IRRIGATION; MANURES AND MANURING; NITRIFICATION; WINDBREAK; GRAFTING; also AGRICULTURE, and the articles on various plants grown for use or ornament.

HOR'TON, SAMUEL DANA (1844-95). An American publicist, born in Pomeroy, Ohio. He graduated at Harvard College in 1864, and at the Harvard Law School in 1868; studied in Berlin from 1869 till 1870, and was admitted to the bar in Ohio in 1871, practiced in Cincinnati until 1874, and afterwards in Pomeroy. He soon became interested in questions of coinage, was among the first to argue the advantage of the establishment of an international ratio between silver and gold, and was the author of books on coinage and currency, characterized by careful historical research. In 1878 he served as secretary of the International Monetary Conference assembled in Paris, and was a delegate to the second conference held there in 1881. His most important writings are: *The Monetary Situation: An Address* (1878); *Silver and Gold, Their Relation to the Problem of Resumption* (1880); *The Silver Pound and England's Monetary System Since the Restoration*, together with *The History of the Guinea* (1887); *Silver in Europe* (1890).

HORTUS SICCUS. See HERBARIUM.

HORUK, hō'rŭk. The name of a Greek pirate, also called Barbarossa (q.v.).

HO'RUS (Lat., from Gk. Ὧρος, Egyptian *Hôr*). An Egyptian deity. His name *Hôr* (*u*) is by some scholars explained as meaning 'the superior, highest,' but this is an improbable etymology, not more probable, perhaps, than the earlier comparison with Hebrew *ôr*, 'light,' which is generally ridiculed at present. It is questionthough the god was worshiped at a great many other places. He was patron of Upper Egypt. On the very earliest monuments we find Horus as the chief god and type of the King; from the first the hawk is his symbol, and there are allusions to his antagonism to Set, so that the later theological ideas seem to be traceable to the time of the First Dynasty. The original dominating position of Horus within the pantheon is shown by the fact that his hawk stands as hieroglyph for 'god' in general. He personifies the sun, originally thought to fly over the sky in form of a hawk, and is usually represented as a young warrior with the head of a hawk, wearing the crown of Egypt. More specially he personifies the young sun, rising victoriously in the morning out of the hostile darkness. Therefore, he is connected with Osiris, the sun dying in the west, and as his son he takes vengeance for his father on the powers of darkness. More rarely he is called the son of Rê, the midday sun. He is frequently called a posthumous son of Osiris; his mother, Isis, is even said to have formed him from the mutilated members of her murdered husband. Rising gloriously, Horus begins the fight with Set-Typhon, his wicked uncle, every morning—although later (partly euhemeristic) views consider the great fight between the gods as a single event, occurring at the beginning of the world. Avenging his murdered father, Horus overthrows and emasculates Set; but he loses one eye in the contest. Possibly this refers to the moon, which loses its light every month; or else the sun may be the single eye in the face of the god, i.e. the sky. The wounded eye is healed by the moon-god (Dhouti, Thoth), which means that the second eye appears in the night. The blood of the wounded eye drips down and creates plants, animals, and all good and useful things on earth. It is curious to note how Horus is differentiated in regard to his various functions and phases. We find, for example, Harpocrates (Horus as a child) distinguished from Haroëris (the adult Horus); Harondotes (Egyptian: Harnez-iotef) 'the avenger of his father;' Horus in Khemnis, as a babe hidden by his mother in the marshes of the Delta from the persecutions of Set; Harmachis (q.v.); 'Horus uniting both lands;' and various other forms became localized and had their special cults. Many details of the Horus myth are obscure; for example, the legend that he once cut off the head of his mother, which may have been borrowed from an Asiatic cosmogonic myth. The later theology explained this story by the statement that Isis had set free the wicked Set after Horus had delivered him to her in fetters, and that Horis mutilated her in his indignation at her act. The moon-god (see above) replaced the head of Isis by a cow's head. The story of the fight against Set-Typhon is told with a great many variations, and the wicked adversary and his many helpers resist Horus in many forms and at many places. Later, the serpent Apap, as the personification of night and the hostile ocean, became confounded with Set (q.v.). The later Egyptians, under Greek influence, made strange attempts to harmonize these hundreds of different, contradictory myths. (See especially Plutarch's *De Iside et Osiride*, and the accounts given by Diodorus.) Like Osiris,

most of the mythological facts was too manifest to be entirely overlooked. The planets Mars, Jupiter, and Saturn were also considered as manifestations of Horus ('the red Horus,' 'the brilliant Horus,' 'Horus, the bull'). In the mythical accounts of the early history of Egypt, Horus was counted as the last of the divine rulers of the land. The principal temples of Horus were at Letopolis, in Lower Egypt, at Kus (Apollinopolis Narva), and at Edfu (Apollinopolis Magna—the Greeks identified Horus with their Apollo); he was worshiped also at Ombos, Denderah (Tentyra), Damanhur (Hermopolis Parva), etc. In Imperial Rome he became as popular as Iris and the other members of the Osirian family. See Plate of EGYPTIAN DEITIES, in the article EGYPT.

HORUS. An Egyptian name, usually understood as that given by Manetho to the last King of the Eighteenth Dynasty, the Har-em-heb of the hieroglyphic inscriptions. He had been Prime Minister of several of his predecessors, and by marrying a princess he ascended the throne somewhat after B.C. 1380. The duration of his reign is uncertain; five years are assigned to him by Manetho, while according to the monuments he reigned for twenty-one years at least, though this may be due to an artificial reckoning. His principal buildings are the pylons in the temple at Karnak. Of military achievements only an expedition against the negroes of the Sudan is mentioned in his rock-hewn temple at Silsileh. He completed the religious reaction against the reformation introduced by Amenophis IV. Harmais, of whom Herodotus has preserved some strange popular tales, is the same person. In other places, however, Manetho gives the name Horus to the heretic King Amenophis IV. (q.v.).

HORVATH, hôr'vät, MIHÁLY (1809-78). An Hungarian ecclesiastic, statesman, and historian, born at Szentes, in the County of Csongrad. He entered the priesthood in 1830, and before 1841 held a number of pastorates. His liberal ideas led him to abandon, temporarily, his priestly calling, and he became, in 1844, professor of the Hungarian language and literature at Vienna. In 1848 he was made Bishop of Csanád, and in the following year, upon the declaration of Hungarian independence, became Minister of Public Education and Worship. After the collapse of the revolutionary movement he fled the country, and lived abroad under sentence of death, returning only in 1867. He reëntered politics, and until his death was a member of the Lower House of the Diet, voting with the Déak party. His principal works are: *History of the Hungarians to 1823* (3d ed., 8 vols., Budapest, 1873); *Twenty-five Years of a Hungarian History, 1823-48* (2d ed., Budapest, 1868); *History of the War of Independence in Hungary, 1848-49* (2d ed., Budapest, 1872).

HORWICH, hôr'ij. A town in Lancashire, England, five miles west-northwest of Bolton (Map: England, D 3). Its industries comprise railway works, paper-making, cotton manufactures, bleaching works, and coal-mining. It owns its water-supply. Population, in 1891, 12,850; in 1901, 15,100.

HOSACK, hôs'ak, DAVID (1769-1835). An American scientist, born in New York. He graduchosen professor of botany in Columbia College in 1795. In 1807 he became professor of materia medica and of midwifery in the College of Physicians and Surgeons, then newly founded, and subsequently of the theory and practice of medicine, and of obstetrics and the diseases of women and children. He was the founder of the first botanic garden in the United States. He was connected with Drs. Mott, Macneven, and Francis in organizing the medical department of Rutgers College, at New Brunswick, N. J., and in New York City he held various medical positions in asylums and hospitals. He was one of the founders, and for twelve years president of the New York Historical Society, and was a fellow of the Royal Society of Great Britain.

HOSANNA, hō-zăn'nȧ. The cry with which Jesus was greeted at His last entry into Jerusalem (Matt. xxi. 9; Mark xi. 9; John xii. 13), and which until recently was generally considered to be identical with the Hebrew expression *hoshia-na*, 'save now,' occurring in Psalm cxviii., abbreviated to *hosha-na*. This expression occurs as part of the Psalter used at the Feast of Tabernacles. When this word was said the boughs were waved. Gradually the boughs themselves came to be called hosannas, and the day on which the hosanna prayer was said seven times came to be called 'day of the great hosanna.' But in the New Testament passages 'hosanna' is used as an acclamation almost as 'hail!' in English, and it is not easy to account for this transition, especially as Jesus' entry took place at the Passover and not at the Tabernacles season, so that there would hardly be any occasion to introduce 'hosanna.' In view of this, it is possible that 'hosanna' in the Old Testament represents originally a different word, perhaps the Aramaic *ushna*, 'strength'—which has subsequently become confused with the Old Testament 'hosha-na.' Consult: the discussion in Dalman, *Die Worte Jesu*, vol. i. (Leipzig, 1898); id., *Grammatik des jüdisch-palästinischen Aramäisch*, p. 198 (ib., 1894).

HOSEA, hō-zē'ȧ (Heb. *Hōsē a*, deliverance). One of the prophets, whose discourses, forming the Book of Hosea, come first in the group of minor prophets. Of his life we know nothing except what may be inferred from references in the discourses. His father's name is Beeri (Hos. i.), and his home is in the Kingdom of Israel. In the first three chapters he uses as an illustration a strange incident in his own life. He had taken to wife a woman, Gomer, the daughter of Diblaim, who bore him three children, but who turned out to be a faithless and worthless woman. This personal experience, the substantial reality of which there is no reason to question, appears to the prophet as typifying the faithlessness of the people of Yahweh to their God. It is not necessary to go so far as to suppose that the prophet actually gave his children the symbolical names Jezreel (q.v.), Lo-ruhamah ('not beloved') Lo-ammi ('not my people'), as indicated in chapter i. This feature is clearly allegorical, but Hosea's divorce from his wife and his subsequent reunion with her (chapter iii., unless, indeed, another wife is meant) are probably incidents in his own life. According to the present heading of the book, his activity extended ever the reigns of Uzziah, Jotham, Ahaz, and

correct, the former being too long a period, and the latter too short. Internal evidence points to the beginning of Hosea's activity as represented in his discourses at some time before the death of Jeroboam and ending before the attack of Tiglath-Pileser on the northern kingdom in B.C. 734. Hosea addresses himself chiefly to Israel, the northern kingdom, and the burden of his message is the people's infidelity toward Yahweh as exemplified by their adoption of foreign rites, by political alliances that subjected the people to foreign influences, and by the general neglect of moral standards in public and private life. These conditions were brought about by the energetic political policy inaugurated by the dynasties of Ahab and Jehu, and the prophet fairly exhausts the vocabulary in his denunciation of this policy and in predicting the dire destruction, not only of the dynasty, but of the people. The book may be divided into two parts: (1) Chapters i.-iii., detailing his personal experience of marriage to a faithless woman, and the application of the experience to conditions existing in the northern kingdom; (2) chapters iv.-xiv., in which (a) the Canaanite features in the Hebrew cult are denounced and the attendant moral degradation of the people; (b) the misrule of the Kings, the riotous life of the Court, and the fondness for foreign alliances are pictured in vivid colors. Scholars are agreed in recognizing a number of later additions and interpolations to the original text of the discourses. In these additions (1) references are supplied to the Kingdom of Judah with which it appeared the prophet did not concern himself at all; and (2) the gloomy outlook is modified by holding out the hope that a remnant at least, uncontaminated by the prevailing religious and political conditions, will escape the awful doom and form the nucleus for the reconstitution of the people on the basis of true Yahweh worship and with obedience to Yahweh's laws as the corner-stone. Consult: the commentaries mentioned in the article MINOR PROPHETS; Cheyne, in the *Cambridge Bible for Schools and Colleges* (Cambridge, 1889); Valeton, *Amos and Hosea* (London, 1894); W. R. Smith, *The Prophets of Israel* (London, 1895).

HOSEA BIGLOW. The fictitious signer of a number of Lowell's *Biglow Papers* (q.v.).

HOSEMANN, hō'ze-män, ANDR. See OSIANDER.

HOSEMANN, THEODOR (1807-75). A German painter and illustrator, born at Brandenburg. He studied lithography under Arnz and Winckelmann, and then was a pupil of Cornelius and Schadow. Afterwards he went to Berlin, and in 1857 was made professor at the Academy. His works include genre pictures in oil and water-color, such as "Shoemakers' Apprentices" and "Peasant Girls and Boys," and illustrations for *Baron Münchhausen, The Mysteries of Paris,* and Andersen's *Fairy Tales.*

HOSIERY (from *hose,* AS., OHG. *hosa,* Ger. *Hose,* hose, stockings). In its most limited sense, this term refers to the manufacture of stockings (hose); but in its more general application it comprises all knitted goods, either made by hand or by machinery. The use of stockings originated in the cold countries of the north of Europe, and the trousers, constituting trunk-hose. These garments were separated, and the art of knitting was invented, it is supposed in Scotland, about the commencement of the sixteenth century. Knitted stockings found their way to France from Scotland, and led to the establishment of a guild of stocking-knitters, who chose for their patron saint Saint Fiacre of Scotland. In 1589 William Lee, of Woodbridge, Nottinghamshire, entirely altered the hosiery trade, by inventing the knitting-frame. See KNITTING.

HOSIUS, hō'shI-ŭs (c.256-c.358). Bishop of Cordova. He became bishop about 295, and retained the office till his death about 358. Having suffered persecution under Maximian, he was honored for his steadfast faith. The Emperor Constantine was strongly attached to him, and it may be owed his conversion to him. In 324 he sent him to Alexandria to mediate between the Bishop of that city and Arius, as well as to settle the dispute concerning the observance of Easter. In the following year the Council of Nicæa was called for the purpose of considering both subjects, and Hosius was the president, or, at least, one of its presiding officers. At the close of the council he drew up, or, as some say, announced the decree, signed it first, and prevailed on the Emperor to sanction it. He was president of the Council of Sardica, called in 343-344 by Constantius and Constans at the desire of Athanasius. In 355 Constantius requested him to join in condemning Athanasius, but instead of doing so, Hosius defended him. Having persisted in this course a second, and even a third time, he was, at the close of the year, banished by the Emperor. Two years afterwards he was summoned to attend the Council of Sirmium, where, worn out with extreme age and hardship, he was prevailed on to sign a document favoring Arianism, yet he steadfastly refused to condemn Athanasius. He was then allowed to return to his home and office. Consult Gams, *Die Kirchengeschichte von Spanien* (Regensburg, 1864).

HOSMER, HARRIET (1830—). An American sculptor. She was born in Watertown, Mass., and received her education in Lenox. She was instructed in modeling under Stevenson at Boston, but later studied anatomy in the Saint Louis Medical College. Her real instruction in art was received in the studio of John Gibson (q.v.) at Rome, where she has chiefly resided. In his studio she modeled her original heads "Daphne" and "Medusa," executed for Samuel Appleton, of Boston; "Beatrice Cenci," in the public library of Saint Louis; and "Œnone" (1855), her first full-size figure. Her spirited and original statue of "Puck" was esteemed so successful that copies were ordered, among others, by the Prince of Wales and the Duke of Hamilton. Her most ambitious work is a colossal statue of "Zenobia in Chains," completed in 1859. Her bronze statue of Thomas H. Benton is in Lafayette Park, Saint Louis. The "Sleeping Faun," exhibited in Paris in 1867, is one of her best works. Its companion is called "A Waking Faun." The fountain in Central Park, New York, and the heroic statue of Queen Isabella of Castile, unveiled in San Francisco in 1894, are by her, as are also the "Queen of

Naples" and the "Heroine of Gaeta." Her latest works are two fountains in private possession in England. Miss Hosmer's art is classic in tendency, like that of her master, Gibson. She has also invented technical processes of note in connection with her art.

HOSMER, JAMES KENDALL (1834—). An American author, born in Northfield, Mass., and educated at Harvard. He left the Unitarian church at Deerfield, of which he was pastor, to go to the Civil War as a private soldier, and upon his return took a professorship in Antioch College. Thence he went to the University of Missouri, taught English and German literature for two years, and in 1874 was appointed professor of the same branches at the Washington University, Saint Louis, a post he retained until his appointment as librarian of the Minneapolis Public Library in 1892. His published writings are: *Color Guard* (1864); *Thinking Bayonet* (1865); *Short History of German Literature* (1878); *Memorial of G. W. Hosmer, D.D.* (1882); *Story of the Jews* (1885); *Life of Samuel Adams*, in the "American Statesmen Series" (1885); *Life of Sir Henry Vane* (1888); *Short History of Anglo-Saxon Freedom* (1890); *How Thankful Was Bewitched* (1894); and *Life of Thomas Hutchinson* (1896).

HOSPICE. See INN.

HOSPINIAN, RUDOLF (1547-1626). A Swiss Reformed polemical writer. He was born in the Canton of Zürich. After studying there he went to Marburg and Heidelberg, and on his return in 1568 combined the position of preacher with that of school-teacher. From 1576 to 1595 he was head of the famous Karolinenschule attached to the Great Minster. Meanwhile he pursued distinctive studies and entered the lists as a doughty champion of the Reformed Church against Roman Catholics and Lutherans. Bellarmine wrote against him on the side of Rome and Hutten on the side of Luther. His fellow townsmen highly honored him. In 1588 he was made an archdeacon of the Great Minster, and in 1594 pastor of the Fraumünster Church. He died in Zürich, March 11, 1626. His works were collected under the editorship of J. H. Heideffer, and published in seven folio volumes (1681). The latest of his writings was *Historia Jesuitica* (1619), trans., *The Jesuits' Manner of Consecrating Persons and Weapons Employed for the Murdering of Kings and Princes by Them Accounted Heretics* (Dublin, 1681).

HOSPITAL (from OF. *hospital*, Fr. *hôpital*, from ML. *hospitale*, inn, from Lat. *hospitalis*, relating to a guest or host, from *hospes*, guest, host). A place used for the shelter and treatment of the sick or wounded. In the earlier days, orphans and helpless children were brought up in institutions called hospitals. Leper hospitals were established in early times and were called 'spitals' or *hospitia*.

Hospitals were founded in very early times. India, Persia, and Arabia had hospitals supported by their kings and rulers before the Christian Era. As far back as the earliest period of Greek history the sick are said to have been treated in the Temple of Æsculapius at Epidaurus. In the early Jewish period a house for the reception of the sick was called Beth Holem. Such an institution was Beth Saida, mentioned in the New Testament. These hospitals seem to have been wooden huts. In ancient Egypt hospitals were unknown, the sick being tended at home or in temples. Plato says that the Greeks, on the other hand, maintained shelter houses for the sick in various parts of the country, supplied with attendants. The best institutions of the kind in ancient times were undoubtedly in Rome. The inscription upon a tablet discovered near Piacenza, dated in the time of Trajan, shows that the Romans not only possessed such houses, but that they were actually endowed. One of the earliest hospitals on record was probably that founded by Valens in Cæsarea, between A.D. 370 and 380.

At the present time two general classes of hospital relief work are carried on in the large cities of the world. In *dispensaries* patients are treated who are able to be about and have temporary or serious illness, not sufficiently severe to confine them to bed. In *hospitals* patients are treated who must be confined to their beds, for certain times at least. Many dispensaries are associated with teaching institutions and are then termed *clinics*, and the patients who come are, in some instances, utilized to instruct the students of medicine. The word infirmary is a common English term for both dispensaries and hospitals.

The term hospital is now rarely used for those custodial and teaching institutions that care for foundlings and orphans. These are termed asylums, or homes, or colleges. A number in England retain the old name, such as Christ's Hospital in London, Heriot's Hospital, Donaldson's Hospital, Edinburgh, etc. Similarly, institutions for the aged and indigent at the present time are rarely termed hospitals, but homes, almshouses, etc. Thus the term hospital has come to be restricted to an institution in which the sick are treated, whether such illness be of the brain or of other parts of the body.

The history of the development of the modern hospital is both interesting and instructive. One of the earliest of recognized hospitals was in France, and the present Hôtel Dieu of Paris is supposed to have had its origin as early as the seventh century. During the Crusades many hospitals were built, and there arose a special class, the *Hospitallers*, or knights whose duty it was to take care of the sick. The present Orders of Sisters of Mercy, Sisters of Charity, and allied societies, had a somewhat similar origin. With the establishment of the schools of learning, and more particularly with the development of the study of medicine, many of the hospitals formed departments in the universities, and the university towns developed large and important hospital facilities. Bologna and the Italian towns led the way. Paris and the schools of France followed, and in England and Scotland the hospitals of London and Edinburgh were the great medical schools. Thus Saint Thomas's, of London, was established in 1553; Saint Bartholomew's in 1546, where, in 1609, Harvey, who discovered the real nature of the circulation, was physician; and Bethlehem in 1547. The hospitals of the United States were largely founded on English models, although the influence of the French school was not absent in the early history of this country. It seems probable that the earliest hospital founded in the United States was the Pennsylvania Hospital, although there were earlier institutions in Canada and in Mexi-

work; but it was not until 1750-51 that the Pennsylvania Hospital first had its actual birth. Joshua Crosby was the first president of the board of managers, and Benjamin Franklin the first clerk. The New York Hospital was the second hospital of importance. Its charter was granted in 1771. From these early beginnings there has now grown up in the United States a veritable forest of hospitals. Every city, town, and village has its duly appointed hospitals, and the hospitals of the United States are now acknowledged the most handsomely and thoroughly equipped in the world; they serve as models for European architects.

In most of the larger cities of the United States there are two or more hospitals that are under the control of the city government, and used exclusively for the city poor. Such are the Johns Hopkins Hospital, in Baltimore; the Philadelphia Hospital, in Philadelphia; Bellevue, City, Fordham, Harlem, and Gouverneur hospitals in New York; Massachusetts General, and Boston City, in Boston; Cook County Hospital, in Chicago; etc. In addition to these municipal hospitals there are numerous institutions founded by private gift and by sectarian societies, such as the New York Hospital, Roosevelt, Presbyterian, Saint Luke's, German, French, Mount Sinai, Saint Vincent's, Saint Mark's hospitals, etc., etc., in New York, and hundreds of others in other cities. Further, there are numberless special hospitals for the treatment of separate diseases: hospitals for diseases of the eye, the ear, the nose, the throat; cancer hospitals; hospitals for diseases of women; for diseases of the skin, and for all the various specialties.

The details of hospital management cannot be entered into here. The medical side of the work is usually fashioned on well-established lines. In the larger hospitals the patients are immediately cared for by the nurses (nurses are paid a small salary unless they are sisters of some religious denomination); these are under the orders, so far as the treatment is concerned, of the *internes*, or young graduates in medicine who have gained this privilege by competitive examinations, and who serve in graded positions for periods of time of from one to three years. These generally reside in the hospital, receive no salary, save their living, and are constantly in attendance. The *externes*, on the other hand, are under the supervision of the *attending* or *visiting physicians*, who are practitioners in the city, chosen by the governing boards of the hospitals for their ability or for other reasons. These visit the hospitals at specified times, and outline the plans of treatment for the patients. Their time and services are usually given gratis, always so in the municipal hospitals. Many hospitals have consulting physicians who may be called in to diagnose rare conditions, but such appointments are usually rewards for work done in the other grades, and carry with them honor and position in the estimation of the laity.

In the smaller hospitals this system may be much modified to meet the circumstances, but the main features are preserved.

Chiefly within the past century a system of hospitals specially designed for the care and treatment of the insane has been established all accommodating from a few hundred to a few thousand patients. The physicians who serve in these hospitals are specialists in mental diseases, and receive salaries which vary with the length of service. Very recently acute psychopathic hospitals have been established in some of the large cities in connection with the principal general hospitals. In these institutions patients afflicted with mild and curable forms of mental trouble receive treatment without being regularly committed to an insane asylum. Such are the insane pavilions in Bellevue and Kings County hospitals, in New York. See NURSES, TRAINED. Consult Burdett, *The Hospitals and Asylums of the World* (London, 1891).

MILITARY HOSPITALS. These are hospitals designed and erected for the exclusive use of soldiers, and in some instances sailors, including every form of establishment, from the field dressing station, or first hospital, keeping pace with the firing line, to the permanent institutions of the home country. Naturally, military hospitals are of comparatively recent origin; born of the needs of warfare, and the advance of medical science and hygiene. In the Crimean War of 1854 the French alone of the allied powers possessed anything approaching the equipment now common to all armies. The English wounded were carried off the field in rough-and-ready fashion, sailors' hammocks being ultimately utilized as a rude substitute for the French stretcher and ambulance. Surgeons dressed the wounded on the field, for whom there was little or no after accommodation, until, spurred by the publication of Florence Nightingale's description of conditions, and the reports of special committees, the Government appointed Lord Herbert's commission, which resulted in more effective hospital service. Similarly, the great Civil War of America in 1861 may be said to be the parent of the present United States Army Hospital Service, if not also of the entire European system, the English branch of which proved so effective in the Boer-British War of 1899. The dread of soldier and sailor alike, and the equal despair of the surgeon, had up to 1861 been a swift and often fatal form of gangrene, peculiar to naval and military hospitals; this, with many other equally deadly phases of the old system, was effectually remedied during the Civil War. The desperate character of the fighting taxed the general surgical capacity of the nation; and with the gradual advance in hygiene, bacteriology, and antiseptic surgery, undoubtedly led to the comparative perfection of to-day.

PERMANENT AND FIELD HOSPITALS. Modern military hospitals may be divided into two general classes—permanent, and war or field hospitals. To the former belong the hospitals attached to army posts and permanent military stations, as well as such institutions as the General Military Hospital, Fort Bayard, N. M.; Netley Hospital, England; and the Val-de-Grace, Paris, France. The United States Army shares with the Navy the advantages of the general hospital at Hot Springs, Ark., which is set apart for patients suffering from such diseases as the waters of the hot springs have the reputation of benefiting, except that cases of venereal diseases are not admitted. Admission to this hospital is re-

stricted to the army and navy, including officers of the revenue-cutter service and of the marine-hospital service, and honorably discharged soldiers and sailors of the regular and volunteer army and navy, in the following order of preference: (1) Officers and enlisted men of the army, navy, and marine corps on the active lists, and cadets at the military and naval academies; (2) officers and enlisted men of the same service on the retired lists; (3) officers of the revenue-cutter service and of the marine-hospital service; (4) honorably discharged soldiers and sailors of the regular and volunteer army and navy may be admitted by authority of the Surgeon-General when there are vacant beds. The general hospital at Fort Bayard, N. M., is set apart as a sanitarium for the treatment of officers and enlisted men of the army suffering from pulmonary tuberculosis. In the regular hospital service of the United States a limited number of women are employed as hospital matrons at posts and arsenals, and also as nurses in numbers fixed by the Surgeon-General, as described below.

Field hospitals are organized according to the needs and character of the campaign, the theatre of operations, climate, and season of the year—the primary object being to evacuate the front of sick and disabled troops without interfering with the mobility of the combatants. In connection with field hospitals there is always present the transport difficulty, consequently every effort is made to lighten the total weight of equipment carried. Bearer and ambulance companies and field hospitals are essentially mobile units—their equipment usually consisting of a few small tents without beds. In the British-Boer War of 1899 the English field hospital weighed about eight tons, accommodated 100 patients, and could be pitched or struck and packed on wagons in an hour's time. Stationary hospitals are usually rest camps on long lines of communication. *General hospitals* are places to which all sick and wounded are ultimately sent; where all important surgical and medical treatment, not imperatively urgent, is carried out; and where it is determined whether the patient shall be returned to civil life or active service. In every army special corps of men are enlisted and trained during time of peace; the field-hospital section during the great annual army manœuvres of Europe receiving very practical instruction. While all civilized countries are quick to avail themselves of needed improvements, France is usually in the lead.

Hospital Trains. Modern wars of Continental Europe have developed a phase of hospital service peculiar to themselves and known as hospital trains, of which there are three distinct types—permanent, improvised, and ordinary. The first named will serve as an illustration. They are constructed so as to contain kitchen, storeroom, and compartments for the sick, who are invariably lying-down patients, demanding constant attention. There is through communication from the front to rear. In Germany they are known as *Lazaret-Züge*, and consist of 41 carriages, with an average total capacity of 300 patients; the *Trains-Sanitaires-Permanents* of the French have 23 coaches, with a capacity of 128; the Austrian *Eisenbahn Sanitäts-Züge*, 19 carriages and 104 sick-berths; and the Italian *Treni Ospedali*, ranging from 19 to 24 carriages, with accommodations for about 200. There are also similar trains belonging to the Société Française, and the Austro-Hungarian Knights of Malta. Hospital trains are conspicuously marked with the badge of the Geneva Society, but are so arranged internally that distinctions of rank and caste are rigorously maintained in the accommodations set apart for sufferers, utterly regardless of the necessities or circumstances of the case.

The Army Nurse Corps is an auxiliary branch of the medical department. In accordance with an army bill passed February 2, 1901, it was ordered that army nurses should be assigned to duty at military hospitals, and at hospitals where more than one nurse is serving one will be assigned to duty as chief. They are appointed for three years, two years of which period must be served without the limit of the United States. The pay and allowance of a nurse on active service is $40 per month, when on duty in the United States and abroad. Chief nurses receive $5 extra, except where there are five or more nurses under them, when they receive $10 extra, and $25 extra when they have charge of ten or more subordinates. Nurses are retired on reaching the age of forty-five years, or if they cease for five years to practice their profession, or if they become permanently incapacitated, from illness or other good or sufficient reason. The uniform of the corps consists of a waist and skirt of suitable white material, adjustable white cuffs, bishop collar, white apron, and cap. The badge of the corps is the cross of the medical department and hospital corps, in green enamel with gilt edge, pinned on the left side of the collar of the uniform, or on a corresponding part of the nurse's dress when she is not in uniform. See Medical Department; and Surgeon, Military.

HOSPITAL CORPS, United States. In the United States recruits are enlisted for the Hospital Corps, and permanently attached to the Medical Department; and in time of war perform the necessary ambulance service under such officers of the Medical Department and assistants as may be detailed for that duty. They are not required to perform any military duties other than those pertaining to their corps; receiving instruction in such drills, both foot and mounted, as are necessary for their efficiency. Their equipment consists of canteen complete, waist-belt and plate, one-half shelter tent complete, and in the case of privates, pouch and litter-sling. At every permanent military post there is at least one non-commissioned officer of the Hospital Corps, and an additional one for every additional four privates of the corps. Special instructions in the duties of litter-bearer and the methods of rendering first aid to the sick and wounded are given to all enlisted men of the line of the army by their company officers, for at least four hours in each month, except in the case of the seacoast artillery, which is limited to one hour per month, post surgeons under the direction of post commanders being responsible for the professional instruction of the company officers.

In field service troops are accompanied by detachments of the Hospital Corps, each medical officer, on the march, being attended by a mounted private of the hospital corps. Members are not permitted to carry arms except under circumstances where their rights as non-combatants, under the Geneva Convention, are not likely to be recognized.

guest). Charitable brotherhoods, founded at various times and in different countries, for the care of the sick in hospitals. The vow to devote one's self to this work of mercy is usually superadded to the ordinary vows of poverty, chastity, and obedience, commanded by Saint Augustine. One of the earliest recorded instances of such a brotherhood is the Order of Madonna della Scala, in Italy in the ninth century. The Knights of Saint John of Jerusalem (q.v.), as also the Teutonic Knights (q.v.), were originally hospitalers. There are many other local institutes or congregations having various names and living under various rules.

HOSPITAL SHIP. A ship designed to take care of the sick and wounded either as a floating hospital or as a transport hospital. The second Geneva Convention in 1868 provided that hospital ships, merchantmen (i.e. unarmed ships not used for any military or naval purpose), having wounded on board, and boats picking up wounded or wrecked men, shall be neutral. They are required to fly the red cross flag and their men must wear the red cross armlet. Government hospital ships are required to be painted white with a broad longitudinal green stripe on each side extending from bow to stern; hospital ships belonging to aid societies to be similarly painted, but the stripe is to be red. Both varieties of ships must fly the red cross flag as well as their national ensign, and no arms of any sort are to be allowed on board. Any evidence amounting to presumption that the enemy is violating the rules of the convention and using the ships for improper purposes constitutes sufficient ground for refusing the further granting of immunity until the contrary is proved.

HOSPITAL SUNDAY. In the United States, the last Sunday of December; in England, the Sunday nearest June 15th, on which days the collections in the churches are devoted to the support of hospitals. The custom has been generally adopted since 1873.

HOS'PODAR (Upper Sorbian, master, lord). A title formerly given to the governors of Moldavia and Wallachia. Hospodar (*gospodar, gospod, gospodin*, in the various Slav languages) means simply 'master.' The hospodar held his power at the pleasure of the Sultan, who made a practice of farming out the office to the highest bidder. The incumbent held his office for a short period, or else secured reappointment by repeated gifts. The Lithuanian princes were likewise called hospodars, and the Polish kings, down to the time of Sobieski, assumed that title in their diplomatic negotiations with Russia. *Gosudar* (ruler, monarch) is even now one of the titles of the Emperor of Russia.

HOST. See MASS; LORD'S SUPPER.

HOSTAGE (OF. *hostage, ostage*, Fr. *ôtage*, It. *ostaggio*, from Lat. *obsidatus*, state of being a hostage, from *obses*, OLat. *opses*, hostage, from *obsidere*, to remain, from *ob*, at + *sidere*, to sit; influenced in popular etymology by Lat. *hostis*). A person or thing given in pledge for the performance of conditions. When a town capitulates, victors and vanquished usually give into the custody, one of the other, several officers, as evaded the opposite side holds the right to put to death or otherwise punish the hostages in its possession.

HOSTIL'IUS, TULLUS. A semi-legendary King of Rome, grandson of Hostus Hostilius, the champion of Rome in the first war with the Sabines; he succeeded Numa Pompilius on the throne of Rome, B.C. 670 (according to the common chronology). According to Livy and other writers, Hostilius made the famous arrangement, by the combat of the Horatii with the Curiatii, for the decision of the question of supremacy between Rome and Alba, which was decided in favor of the former; he fought against Fidenæ and Veii, and conquered these cities, destroyed Alba, and removed the inhabitants to Rome, settling them on Mons Cælius, and carried on war against the Sabines. He is said to have reigned to about B.C. 638. The story of the earlier Kings of Rome is mere legend, but doubtless contains some germs of truth, though the personality and name of Tullus Hostilius are not to be credited.

HOS'TIUS. A Roman poet of the second century B.C., author of metrical annals after the manner of Ennius, and *Bellum Histricum*, a poem on the Istrian War. Fragments of the latter work, quoted by Macrobius (v. i. 3, 5) and Servius (ad *Æn.* xii. 121), are printed in Baehrens, *Fragmenta Poetarum Romanorum* (1886). Some authorities think he is the original of the *doctus avus* of Propertius (iv. 20, 8).

HOSTRUP, hŏs'trŭp, JENS CHRISTIAN (1818-92). A Danish poet and dramatist, born at Copenhagen. His first comedy, *Gjenboerne* (1843, published in 1847), was acted by his fellow students before he left the university. It was played afterwards at the Royal Theatre, and remains a favorite piece. Among his other plays, composed under the pseudonym of Kristrup, are *Intrigerne* (1846); *En Spuro i Tranedans* (1850); *Eventyrpaa Fodreisen* (1850); *Soldaterlöjer* (1849); *En Vat Mellem Fjeldene* (1852, music by Emil Hartmann), and *Mester og Loerling* (1852). From 1855, when he took orders, to 1881, he had charge of a parish. A volume of his poems, *Sange og Digte*, appeared in 1884, and his drama, *Eva*, in 1881. After this he wrote little but what was demanded by his parochial work. The last years of his life were spent at Copenhagen. His popularity is largely due to the national character of his plays, his humor without vulgarity, and the vivacity of his dialogue. His poetical writings were collected in six volumes (1852-56), and a fifth edition of his comedies was published in 1888-89.

HOT-AIR ENGINE. See CALORIC ENGINE.

HOTBED. A bed of fermenting compost or manure covered with a layer of earth, and generally surmounted by a frame, for the cultivation of plants which require more than the natural heat of the climate or season, but not so much as to render the hothouse necessary. The heat is the result of fermentation. Hotbeds are in very general use for growing plants from seed in spring, to be planted in the open ground as summer advances, and for forcing vegetables and flowers. The material mostly used is horse

manure, either alone or mixed with litter; but tan-bark, leaves, the waste of flax, cotton, or woolen factories, etc., are sometimes substituted for it. It is necessary that the heat of very rapid fermentation be expended before the hotbed is planted; and it is usual, on this account, to prepare the materials some days in advance of planting. A hotbed is made highest at the back, sloping toward the south. The bed extends on all sides 12 inches or more beyond the frame, according to the temperature of the outside air. The frame has a movable glass sash or sashes, according to its size, or is covered with cloth. The thickness of the hotbed, and of the earth upon it, is accommodated to the purpose intended and the degree of heat required. When the heat decreases it is for some purposes necessary to keep it up by 'linings' of the same material as the hotbed, added to the sides of it. The sashes of hotbeds must be partially removed during the day to permit ventilation and the escape of vapor.

HOTCHKISS, Benjamin Berkely (1826-85). An American inventor, born in Watertown, Conn., of humble parentage. He was at an early age employed in a gun-factory, where he came into contact with Samuel Colt (q.v.), in the manufacture of revolvers. During the Civil War he was engaged in the manufacture of ordnance in New York, and later invented the Hotchkiss magazine gun, used by the United States troops in the West and the United States Marine Corps. This was followed in 1882 by the Hotchkiss machine gun, for use in the fighting tops of war-vessels. He was also the inventor of several important improvements in projectiles and heavy ordnance. His guns were in general use throughout the armies and navies of the world until displaced in the more advanced nations by later inventions. His death occurred in Paris, where in 1870 he established a gun-factory, a branch of which he was organizing in England at the time of his death. See Machine Gun and Rapid-Firing Gun.

HOTCHKISS GUN. See Mountain Gun; Machine Gun; Rapid-Firing Gun; Ordnance.

HOTCHPOT (OF. *hochepot*, from ODutch *hutspot*, chopped beef or mutton boiled in a pot, from *hutsen*, *hotsen*, to shake + *pot*, AS. *pott*, from Ir. *pota*, *puite*, Welsh *pot*, Bret. *pōd*, pot; connected with Lat. *potare*, Skt. *pā*, to drink, Gk. *ποτός*, *potos*, drunk). The mixing and blending together of advancements made to children during a parent's life and of property left at his death, in order that the whole may be equally divided among all the children. According to Blackstone the doctrine came into English jurisprudence from the law of the Lombards, but the term is explained by him in the language of Littleton, as follows: "Hotchpot is in English a pudding; for in a pudding is not commonly put one thing alone, but one thing with other things together." By this housewifely metaphor, adds Blackstone, our ancestors meant to inform us that the lands which had been given to one or more daughters in frank marriage, as well as the lands descending in fee simple, should be mixed and blended together and then divided among all the daughters. After estates in frank marriage fell into disuse the principle of the law of hotchpot was revived and applied by the statute of distributions (22 and 23 Car. II., ch. 10). The provisions of this statute have been reënacted by the Legislatures of our States with some shades of difference, and on the basis of the rules as to hotchpot throughout this country. The great object of these rules is to produce equality among the children of a deceased person. Property which has been turned over to a child as an advancement, instead of a pure gift, is to be brought into hotchpot as a condition of his taking a child's share in the parent's estate. It is not necessary that he actually bring and surrender the very chattel or other form of property advanced to him. It is enough that its fair value be accounted for and added to the decedent's estate. In arriving at this value its worth is to be estimated at the death of the parent, relation being had to its situation at the time of advancement. Accordingly, where a slave boy, twelve years old, was given to a child as an advancement, the child was chargeable with the fair value of such a boy at the father's death; not the value of the particular slave who was then an adult. So the profits of an advancement, or the enhanced value due to improvements, are not to be accounted for. Consult the *Commentaries* of Blackstone and Kent.

HOTEL (Fr. *hôtel*, OF. *hostel*, from ML. *hospitale*, large house, palace, inn). The origin of the modern hotel, especially in the United States, dates from the introduction of the railroad. Its advent transformed the small road-house, which was planned for occasional guests, into the more pretentious hotel. Again, about 1888, came another revolution in hotel-building, and the modern fireproof structures began to replace their poorly planned prototypes. Still later, the idea of specialization, that is, of providing particularly for a certain class in the community, began to gain ground. In the United States there are three general kinds of hotels: (1) Those which are run on the American plan; (2) those using the European plan; and (3) those combining both systems. The European plan, on which practically all the great hotels of Europe are run, consists in paying a certain daily rate for a room, and then paying separately for whatever food is ordered. By the American plan the guest pays a certain amount a day for both room and meals. The difference between an American hotel which is run on the European plan and the Continental hotel, is that in the former the various minor items, such as light and service, are included in the price of the room; while on the Continent these items are often charged for separately. One of the most characteristic establishments of Europe is the road-house, which is found throughout the Continent, but especially in France, Germany, and Austria. It is, as a rule, marked by simplicity and comfort and is preferred by many to the more elaborate hotel. Indeed, the small hotel in Europe is a model of its kind, and its cuisine is generally superior to that of second-class hotels in this country. The large first-class hotels of the United States are, however, unexcelled. The following description applies to the modern hotel.

By far the greater part of the space in a hotel is occupied with private rooms for guests, but the central feature of the design of a modern hotel is the great office and lobby, which is the common place for arrival and departure, and for meeting people from both without and within the building. A large and generally imposing entrance and vestibule lead to the office

or lobby, which frequently occupies an inclosed central court, two or three stories in height. The lobby generally contains not only the public office of the hotel, but also news and cigar stands, a telegraph office, and telephone booths; or, if these are not in, they are adjacent to and connect with the lobby. Reading, writing, and smoking rooms also adjoin the lobby, and there may be a parlor or reception-room near at hand. The hotel parlors are more generally on an upper floor, commonly on the second. Both public and private parlors are usually provided. Another marked feature of a hotel is its dining-room. Here the object is to get a large, unobstructed floor-space, with plenty of natural light, where possible, and at the same time to have the room only second in general accessibility to the lobby or office. Smaller public dining-rooms, frequently called breakfast-rooms, are generally provided, and also a gentlemen's café, besides which there are private dining-rooms in proportion to the size and general character of the hotel. A conspicuous feature of hotels in this country is the bar, which is likely to be near, if not connected with, the café. The bar is often on the office floor, but where this floor is well above the street level the bar and café, together with barber-shops, lavatories, and, perhaps, the public baths, are in the basement. The hotel kitchen must be either near or in speedy communication with the dining-room. It may be on a different floor, if dumb-waiters are provided. Where there are numerous dining-rooms, public and private, several kitchens are a practical necessity.

Spacious stairways almost invariably lead from the office or lobby to the parlor or dining-room, although the universal use of elevators has lessened their importance. An impressive feature of some of the finest hotels is a gallery above and around the lobby, giving access to whatever public rooms may be located on the second floor. The elevators should be conveniently arranged so as to give quick access to private dining-rooms, ballrooms, and parlors; and there should be separate elevators for servants and freight. The guests' rooms, if any, on the second floor of large hotels, are generally in suites (bedroom, parlor, and bathroom), but similar suites may, of course, be distributed on the other floors. Above the second floor the building commonly assumes, at least in city hotels, the form of a hollow square, or rectangle. The guests' rooms are arranged along corridors, the outer ones fronting on the street, the inner ones on the court. Even third or fourth rate hotels of the present day rarely offer guests a room which does not have an ample window opening into the outer air. Fire-escapes must be provided on each floor, and red lights are placed near them and at the heads of staircases to mark their location. Besides the various rooms, public and private, already mentioned, baggage and storage rooms, ballrooms, halls for concerts, conventions, and other assemblies, music-rooms, and sometimes roof gardens, are, some or all, found in the best hotels.

Mountain and seaside resorts call for various modifications in design, including many spacious verandas and balconies, sun-parlors for winter use, and other features suited to the changed conditions of a hotel life where recreation and social amusements, or perhaps the search for health, are the main objects. The constructional features of hotels are not sufficiently different in the material employed and the way in which it is put together to require separate treatment.

The governing principle in the design of a hotel should be to make it as safe, convenient, comfortable, and generally attractive as possible. Unfortunately, the order of these requirements sometimes is reversed; or, at least, inadequate attention is given to the safety of the guests. Safety is used broadly here, to include all that goes to make the building structurally sound, to reduce dangers from fire, and to conduce to good sanitation. Fireproof construction (q.v.) should be employed as far as possible, and there should be adequate fire-escapes and fire-protection facilities. The latter, at least in all large hotels, include apparatus in the way of fire-pumps, standpipes, hose, chemical extinguishers, and the like. A plentiful supply of water is, of course, essential. This necessity frequently entails an independent pumping plant, and always requires an extensive system of piping for both hot and cold water. To meet the demands for purity in drinking-water, it is frequently advisable to install a filter plant in the basement of the hotel; or, where possible, to sink deep artesian wells. Spring waters are often supplied at table.

Both public and private baths are required. The latter should be in separate rooms with independent air and light. Private water-closets generally accompany private baths. The public lavatories and water-closets, both as regards spaciousness and good sanitation, may be taken as a fair index of the rank of most hotels. In general, all plumbing should be of the simplest possible design and should be readily accessible for inspection and repairs. In the choice of floors and floor-coverings, wall finish and decorations, window and other hangings, it should never be forgotten that frequent and thorough cleansing is imperative, and that everything that creates or serves as a lodging-place for dust, or that cannot be thoroughly disinfected, is a menace to health. Ventilation is most important and, together with heating, its arrangement should be intrusted to a heating and ventilation engineer. In the best hotels in the colder sections of America, the buildings are heated with steam or hot water throughout, supplemented, in some instances, by open fireplaces. Well-equipped laundries, with drying closets, are becoming more and more common even in smaller hotels. Either gas or electric lights, and frequently both, are provided in most hotels.

Whatever the rank of a hotel, some means is provided for making known wants without leaving one's room. The most common method is a simple push-button electrically connected with an annunciator in the hotel office. In some hotels elaborate signal systems are provided so that by moving a pointer over a dial in one's room any want may be made known in the office. Such cumbersome devices, however, bid fair to be superseded by the house telephone system, with a telephone in every room.

The management of modern hotels presents a difficult executive problem. The number of employees (which varies according to the hotel, but which is always over 50 per cent. of the guests), the constantly shifting crowd of guests, the numberless mechanical details, and the large amount of provisions and supplies which is necessary, all

complicate the problem. Under the manager, and directly responsible to him, are a steward and a chef. The former has charge of the supplies and general supervision over the housekeeper, storekeeper, head laundress (and their subordinates), and over the clerks of the accounting department and the plumbers, carpenters, and upholsterers. The steward also generally buys the necessary provisions and supplies. Most of the provisions are ordered fresh every day, though usually the larder is stocked with a supply sufficient for two days, while the supply of dry stuff on hand is sufficient for a week. The chef has absolute charge of the kitchen and its staff. The steward makes his purchases according to lists furnished him by the chef, who oversees all details in connection with the cuisine. A head waiter superintends the dining-rooms and arranges for private dinners and suppers. For the history of the early hotel, see INN.

HOTEL (in law). See INN; INNKEEPER.

HÔTEL DE CLUNY, ō'tĕl' de klụ'nē'. See CLUNY, HÔTEL DE.

HÔTEL DE RAMBOUILLET, de răn'-bōō'yā'. See RAMBOUILLET, HÔTEL DE.

HÔTEL DES INVALIDES, dā zăn'vā'lēd'. See INVALIDES.

HÔTEL DE VILLE, de vēl. The city hall of Paris. The seat of the municipal government was originally on the left bank of the Seine, whence it was transferred to a position near the Châtelet on the right bank in the thirteenth century, and in 1357 was established in a building on the Place de Grève, now the Place de l'Hôtel de Ville. Under Francis I. the building had been outgrown, and a new edifice was begun, which was completed under Henry IV. It was totally destroyed by the Communists in 1871, with the loss of 600 of their companions who were unable to escape from the building, and was rebuilt between 1873 and 1883. The new building is a fine Renaissance structure, with an imposing façade enriched with allegorical groups and single statues typifying the principal French cities. The interior is richly ornamented with sculpture and paintings by great French artists, and contains a fine grand staircase and a large decorated hall. Generically, the name is applied by the French to any town hall.

HÔTEL DIEU, dyĕ. One of the oldest hospitals in Europe and the most important in Paris, said to have been founded in 660. It formerly stood on the south side of the Ile de la Cité, and was connected with an annex on the right bank of the Seine. In 1772 the hospital was destroyed and subsequently rebuilt on the same spot. The institution was transferred in 1868 to its present position on the north side of the island, near Notre Dame. It contains 559 beds, and three medical professorships are attached to it.

HOTHO, hō'tō, HEINRICH GUSTAV (1802-73). A German art historian, born in Berlin. He studied at the university of his native city, in 1829 became one of its professors, and the next year was appointed assistant director of the gallery of paintings in the Royal Museum. He was well known as a disciple of Hegel, for the complete edition of whose works he elaborated the *Vorlesungen über Aesthetik* (3 vols., 2d ed. 1842-43). In addition he published *Geschichte der deutschen und niederländischen Malerei* (1842-43); *Die Malerschule Huberts van Eyck* (2 vols., 1855-58); *Die Meisterwerke der Malerei vom Ende des 3. bis Anfang des 18. Jahrh. in photo- und photolithographischen Nachbildungen* 1865); and an unfinished work entitled *Geschichte der christlichen Malerei* (1867-72).

HOTHOUSE. A building intended for the cultivation of exotic plants which require a higher temperature than that of the open air. The term is more generally applied to those buildings in which artificial heat is used. It includes such terms as 'stove,' 'bark stove,' etc., in the former of which the heat was derived from fires, and in the latter by fermenting tan-bark, which not only produced heat, but kept the air moist. See GREENHOUSE.

HOTMAN, ōt'măn', or **HOTMAN'NUS,** FRANÇOIS (1524-90). A French jurist and author, born in Paris. He received the degree of doctor at Orleans, and afterwards, though but twenty-two years old, gave lectures on Roman law at the University of Paris. At this time he became a convert to the reformed religion, and was forced to take refuge in Geneva. On the recommendation of Calvin, he was made professor of belles-lettres at Lausanne in 1549. Afterwards he went to Strassburg as professor of civil law; then to Valence (1562) and Bourges (1567). For a short time he returned to Paris, but the massacre of Saint Bartholomew sent him back to Geneva. His last years were spent at Basel. Hotman's books had a great influence on the time, and wrought a reformation in the study and teaching of law. His two most important works are *L'Anti-tribonian, ou discours sur l'étude des lois* (1567), and *Franco-Gallia* (1573), often reprinted with changes of matter and titles.

HOT SPRINGS. A city and the county-seat of Garland County, Ark., 50 miles west by south of Little Rock; on the Choctaw, Oklahoma and Gulf, and the Saint Louis, Iron Mountain and Southern railroads (Map: Arkansas, C 3). It is one of the most beautiful towns in the United States, and is widely noted for the hot waters that flow from 72 springs, included in a space of 10 acres on the west side of Hot Springs Mountain. The waters of these springs range in temperature from 76° to 157° Fahr., and are beneficial in a multitude of diseases. In 1832 four sections of land, the thermal springs being in the centre of the district, were set off by Congress as a Government reservation. Since then the Government has established on the mountain the Army and Navy General Hospital, and expended large sums in improving and developing the reservation. The Government bath-houses, extending along Central Avenue, are tasteful in design, and have attractive surroundings. There are many hotels here, the Eastman, the Arlington, and the Park ranking among the largest in the country; and the city is one of the most popular resorts in America, having annually 100,000 visitors. Settled about 1804, Hot Springs was incorporated as a town in 1876, and was chartered as a city of the first class in 1879. The government is administered by a mayor, elected every two years, and a municipal council, of which the executive is a member. Population, in 1890, 8086: in 1900, 9973.

HOT SPRINGS. A town in Madison County, N. C., 38 miles northwest of Asheville; on the

French Broad River, and on the Southern Railway (Map: North Carolina, B 4). It has a fine site at an elevation of over 1300 feet, in a picturesque valley inclosed by high mountains, and is a noted health resort because of the medicinal value of its hot mineral waters. Dorland Institute, a mission boarding-school for mountaineers, was established here in 1894. The principal industries are lumbering and mining. Population, in 1890, 695; in 1900, 445.

HOT SPRINGS. A city and the county-seat of Fall River County, S. D., 106 miles south of Deadwood; on Fall River, and on the Burlington and Missouri River and the Fremont, Elkhorn and Missouri Valley railroads (Map: South Dakota, B 6). It is noted for its thermal and medicinal springs, and is the seat of the State Soldiers' Home and of Black Hills College (Methodist Episcopal), opened in 1890. The city is the commercial centre for important mining, live stock, and lumber interests, and has a good water-power and manufactures of stucco. Population, in 1890, 1423; in 1900, 1319.

HOTSPUR. A name given to Henry Percy (q.v.).

HOTTENTOT FIGS. See ICE-PLANT.

HOTTENTOTS (*Khoi-Khoin*, Men of Men). A dwarf race in Namaland, South Africa (census of 1891, 50,388). Their domain is said to extend from Orange River to Walfisch Bay and far into the Damara upland. A study of their somatology shows them to have the following characteristics: Cranial capacity, 1290; cephalic index, 74.3. Their skin is yellow, brown, or gray, not black; the hair is long and woolly; the cheek-bones are prominent; eyes are dark chestnut or black, wide apart; the nose is very broad and flat, nostrils thick; the mouth is large, with heavy, upturning lips, and enormous prognathism, chin pointed, and receding jaw. They have little beard, and no hair on the body. The ears are large, without lobules. (See Colored Plate of AFRICA, DARK RACES OF.) Steatopygia is common. There are three divisions of them, the Hottentots proper, the mongrel Griquas of Griqualand West, and the Koranas on the Orange, Vaal, and Modder rivers. They, or the Bushmen, their kindred, and not the negroes of the family of Bantu, are doubtless the aborigines of the country, but between the persecutions of the spreading Bantu tribes and later the occupation of the lowlands by Dutch and English settlers, most of them have been driven into the mountains and waste places, and they are slowly dying out. They live in low, oval, dome-shaped huts, made by setting rough poles in the ground, bending them down and tying them together. Over all is a thatch or layer of mats woven by the women. In the centre of each hut is the fire-pit where meat is roasted, and around the sides are holes in which they sleep. They wear little costume beyond a cloak of skin, but smear their bodies lavishly with fat and soot. At the time of the advent of the Europeans their wealth consisted largely in cattle. Their chief weapons were bows and poisoned arrows. In their villages the huts were arranged in a circle, forming what is known as a kraal. A portion of the Hottentots shared the fortunes and stood the oppressions of the settlers, and their descendants form a mixed race, many of whom are prosperous in flocks and herds.

Hottentot men do little work besides helping to tend cattle and occasionally hunting and fishing. Some pursue the trades of smith or armorer, tailor or tanner. The women make cords, mats, and pottery, cook, tend cattle, and perform most of the labor.

Trade is carried on by barter in cattle, and oxen are used for bearing burdens. Little beef is eaten, and meat is procured by hunting, milk being the chief food; from their environment the Hottentots secure many roots and fruits, which supply the vegetable element in their diet. Cooking of meat is by roasting or seething in a skin bag by means of hot stones. They make an intoxicating mead and chew a narcotic root.

Puberty, marriage, and funeral feasts are held. Their amusements are mock fights, games accompanied with music, drinking, and smoking. Family affection seems strong, and they are friendly, liberal, and hospitable among themselves.

Their yellow skin has been an enigma to anthropologists, and the discovery of similarities in grammar, together with the existence of words representing abstractions of a high order, strengthened the theory that the Bushmen Hottentots had separated from the Caucasian kindred in the north in prehistoric times, settling the southern portion of the continent, where they were pressed upon later by the black Bantu tribes. More probably they are an isolated race, like the Australians. The theory that they are lost Hamites is weakened by the fact that their language has elements resembling those of other races. The clicks in the vocal sounds, resembling the smacking of the mouth in clucking, etc., are made by pressing the tongue against the teeth, the palate, the sides of the upper jaw, or doubling it backward and then producing an explosive noise. These clicks usually occur at the beginning of words, and while each one is not difficult to imitate, the European is quite unable to follow them up with the vocal sounds that make up the word. The name Hottentot is an effort of the Dutch to imitate the dental clicks pronounced like the expression of surprise, tut! tut! with an inhalation.

The unit of government among the Hottentots was the kraal, with its subchief, who, with the leading men, had jurisdiction even to the extent of the death penalty. The tribes were ruled by hereditary chiefs, who were greatly revered and received their pay in kind, being entitled to a share of whatever was killed or produced. Descent was in the female line for sons, and initiation into the tribe was with ceremonial scarification of the body. Their instruments of music were the gorah, or musical bow, a rude fiddle, *l'gutha*, an imitation of European violin, a tomo, a bow rubbed with another bow, and a single-head drum.

The religious belief of the Hottentots was in keeping with their social scale and organization. They held to the existence of the soul after death. The ruler of all things is a deified patriarch, Heitsi-Eibib, or a Great Captain, Tsu-goab, who was formerly one of their mighty chiefs, and came from the East. Hence all Hottentots' graves are oriented, and when they pass a cemetery they leave stones on the spot to express good will and ask a blessing. The existence of this practice in former times enables the student to follow the trail of the Hottentot in his wanderings. The cult of these people is obscure. It has been stated that they had no temples or places of

function, yet medicine men, witch doctors, or sorcerers, were common among them, called in to heal the sick by magic. An immense folklore is based on the primitive conceptions of ghosts, charms, signs, offerings, luck, and causation by spirit influences that cram the air.

Accounts of the Hottentots are to be found in the narrative of Francisco de Almeida (1509); also in the records of the Dutch East India Company from 1652, and of the British occupation after 1795. Consult also: P. Kolben, *Present State of the Cape of Good Hope* (London, 1731-38); A. Sparman, *Voyage to the Cape of Good Hope* (Perth, 1786); Sir John Barrow, *Travels into the Interior of South Africa* (London, 1801); Emil Holub, *Seven Years in South Africa* (Eng. trans., Boston, 1881).

HOTTENTOT'S BREAD (*Testudinaria Elephantipes*). A species of the order Dioscoreaceæ, indigenous to South Africa. Its slender, many-branched, vine-like stems, which die down during the dry season, grow to a height of 30 to 40 feet, and bear bright, heart-shaped leaves. The hemispherical or nearly globular rootstock, sometimes three feet in diameter, protrudes conspicuously above ground, and is covered with a brown, cork-like substance with many-sided protuberances separated by deep cracks and fissures. Both the scientific name and one of the common names, elephant's foot, have been derived from fancied resemblances to the foot of an elephant. It is sometimes called tortoise-plant. The fleshy interior affords food to baboons and other animals, but it is said that the natives do not eat it. The rootstalks are exported apparently dead, but when placed in the ground they soon throw out rootlets and stems grow rapidly from the upper surface. The plant is cultivated as a greenhouse curiosity.

HOTTINGER, hŏt'tĭng-ẽr, JOHANN HEINRICH (1620-67). A Swiss Orientalist and biblical scholar. He was born at Zürich. After studying at Geneva, Groningen, and Leyden, he became professor of church history in Zürich, where he remained until 1655, holding successively the chairs of theology and Oriental languages, and rhetoric and logic. In 1655 he became professor of Oriental languages at Heidelberg. In 1661 he returned to Zürich to take charge of a German translation of the Bible; and in 1662 he was elected rector of the University in Zürich, which title he kept for life. In 1667 he was called to Leyden, but was drowned at Zürich by the capsizing of his boat while on a pleasure excursion before leaving for his new work. Hottinger was a prolific writer on Oriental subjects. The most important of his works are the following: *Thesaurus Philologicus seu Clavis Scripturæ* (1649); *Historia Ecclesiastica* (1651-67); and the *Etymologicon Orientale, sive Lexicon Harmonicum Heptaglotton* (1661).

HOTTINGER, JOHANN JAKOB (1783-1860). A Swiss historian and educator. He was born at Zürich, studied there and at Leipzig, and, returning to his birthplace, taught history in the girls' academy, in the art school, and in the university (1833). As a member of the council on education, Hottinger was prominent in the introduction of reform measures. He edited the *Archiv für schweizische Geschichte und Landes-* wrote: *Geschichte der Eidgenossen während der Zeiten der schweis. Kirchentrennung* (1825-27); *Huldreich Zwingli* (1841); *Geschichte des Untergangs der Eidgenossenschaft der 13 Orte* (1844); and *Hans Konrad Escher von der Linth* (1852).

HOUARIOS, ōō-ä'rē-ōz. Small coasting vessels and pleasure-boats used in parts of the Mediterranean. They bear lateen sails, and have each two masts and a bowsprit.

HOUBARA, hōō-bä'rä. See BUSTARD.

HOUBRAKEN, hou'brä'ken. A Dutch family of artists. ARNOLD (1660-1719) was born at Dordrecht, and studied under Samuel van Hoogstraeten. In 1713 he visited England. He painted a number of historical pictures and figure subjects, none of great value, and wrote a biography of Dutch painters, *Groote schouburgh der nederlandsche konstschilders en schilderessen* (1718), which is not reliable.—His brother and pupil, JACOBUS (1698-1780), a well-known engraver, was also born at Dordrecht. His first work was a series of portraits for his brother's book. He did a hundred plates for *The Heads of Illustrious Persons of Great Britain* (1743-52), by T. Birchs. His individual portraits are said to number four hundred, but his best work is a series of scenes after C. Troost. After Houbraken's death engraving in the Netherlands became almost a lost art.

HOUDAN, hōō'dan. A breed of domestic fowls, in the French class with the crevecœur and la fleche. They are widely bred in the United States, and are hardy and profitable. These fowls are of medium size, mottled black and white in color, with black wing-bars and primaries, and a heavy crest divided in the middle of the crown in the cock, but falling backward in the hen. They have five toes, like Dorkings. A hen should weigh 6 pounds; a cock 7. The other breeds mentioned are highly esteemed in France, but little known in America.

HOUDETOT, ōō'd'-tō', ELISABETH FRANÇOISE SOTHIE DE LA LIVE DE BELLEGRADE, Countess d' (c.1730-1813). The mistress of Rousseau and also of Saint-Lambert. She was the wife of a French general and the sister-in-law of Madame d'Epinay. Rousseau mentions her in his *Confessions*, and attributes to her influence much of his poetical inspiration. Their love is partly represented in *La nouvelle Heloïse*. Her face was plain and slightly scarred with smallpox; but she possessed a brilliant wit and a sunny disposition.

HOUDIN, ōō'dăn', ROBERT (1805-71). A French conjurer and mechanician. His apprenticeship to the watch-making trade schooled his fingers in the manipulation of intricate machinery, and his hatred of shams led him to apply his mechanical knowledge to the unveiling of the conjuring tricks of his time, especially those which appealed to the religious side of human nature. By producing more wonderful illusions, with the credit given to natural causes, than those which his predecessors had attributed to supernatural, he completely revolutionized the art of magic, and was honored by medals in 1844 and 1855 for his mechanical toys and the practical value of some of his inventions. He was the author of an autobiography, *Robert Houdin*

printed ten years later as *Comment on devient sorcier*. This work and *Magie et physique amusante* (1877) were translated into English by Hoffmann.

HOUDON, ōō'dôn', JEAN ANTOINE (1741-1828). One of the foremost French sculptors of the eighteenth century. He was born at Versailles, France, March 20, 1741, the son of a domestic attached to the house of De la Motte, a courtier. His first impulse toward art came from the splendid decorative sculpture of the park at Versailles, and as a boy of ten or twelve he haunted the ateliers of the Royal School of Sculpture. In the catalogue of the Salon of 1795 he calls himself a pupil of Slodtz, but he was really much more influenced by Pigalle and the younger Lemoyne. In 1761 Houdon won the Prix de Rome, but was not influenced greatly by the treasures of art in Rome. His personality was too healthy and powerful to follow the lead of any other master, and could only be satisfied by its own direct and intelligent interpretation of nature. His stay in Rome is marked by two characteristic and important productions: the superb "Ecorché," an anatomical model, which has served as a guide to all artists since his day, and the statue of Saint Bruno in the Church of Santa Maria degli Angeli in Rome—a work of very powerful characterization.

After ten years' stay in Rome Houdon returned to Paris, and soon became one of the foremost French sculptors; he was admitted to the Academy April 23, 1769. In 1785 he visited America in company with Benjamin Franklin, in order to make the statue of Washington which had been ordered by the Legislature of Virginia. He visited Washington at Mount Vernon, and the bronze statue which followed now adorns the capitol at Richmond. During the French Revolution Houdon was in danger before the Tribunal for executing a statue of Saint Scholastica, but succeeded in convincing the judges that his saint was in reality a statue of Philosophy. Houdon died July 16, 1828, in Paris.

Houdon was a perfectly trained and competent technician, producing easily and abundantly, with equal success both in marble and bronze. His knowledge of anatomy was marvelous, and he was a thorough naturalist who succeeded best in portraiture. His name is principally connected with a fine series of more than two hundred portrait busts, which form one of the chief monuments of French sculpture. Among these were those of Diderot (about 1769), Benjamin Franklin (1766), and of Gluck (1777); on the death of Rousseau in 1778 he made two busts in bronze and terra-cotta from a cast of his face. One of the most characteristic of his busts is that of Molière in the Théâtre Français, Paris. Among his statues are those of "Morpheus," in the Ecole des Beaux-Arts; "Diana the Huntress," the best of his nude female figures; and especially the portrait statue of Voltaire (1781), in the Théâtre Français, one of the finest in modern art.

HOUGH, hŭf, GEORGE WASHINGTON (1836—). An American astronomer, born in Montgomery County, N. Y. He graduated at Union College in 1856, and three years afterwards was

tory in Albany, and in 1879 went West to become director of the Dearborn Observatory and professor of astronomy in Chicago University; but in 1887 he gave up the latter position to accept a similar one in the Northwestern University. He discovered more than 600 double stars, and invented a number of astronomical instruments. His chief publication is *Annals of the Dudley Observatory* (1866-71).

HOUGH, WALTER (1859—). An American ethnologist, born at Morgantown, W. Va. He was educated at Monongalia Academy, West Virginia Agricultural College, and the University of West Virginia. He entered the employ of the Smithsonian Institution in 1886, and soon became assistant curator of its ethnological department. In 1892 he went with the United States Commission to Madrid, and was made Knight of the Order of Isabella. He was a member of Dr. J. Walter Fewkes's expedition to Arizona (1896-97), and went to Mexico with Dr. J. W. Rose (1899). He became a corresponding member of the Anthropological Society of Paris in 1899, and two years later was chosen secretary of the Anthropological Society of Washington.

HOUGHTON, hō'ton. A village and the county-seat of Houghton County, Mich., 94 miles northwest of Marquette; on Portage Lake, near Lake Superior, with which it is connected by a canal, and on the Duluth, South Shore and Atlantic and the Copper Range railroads (Map: Michigan, E 1). It is the centre of a rich mineral district, copper being mined and exported in great quantities. The Michigan College of Mines, established here in 1885, occupies a fine building, which, with the high school and county courthouse and jail, is among the finest structures of the village. The water-works are owned by the municipality. Population, in 1890, 2062; in 1900, 3359.

HOUGHTON, GEORGE HENDRICK (1820-97). An American Episcopal clergyman. He was born in Deerfield, Mass.; graduated at New York University in 1842, and at the General Theological Seminary in 1845. In 1848 he organized, and until his death was rector of the Church of the Transfiguration, better known as 'The Little Church Around the Corner,' in New York City. The story which explains the origin of this name is that a certain actor having died, his friends requested one of the city pastors to conduct the funeral services. The latter refused, but advised them to try the 'little church around the corner.' Dr. Houghton was distinguished for his activity in benevolent work. At his death he was succeeded by his nephew, George Clarke Houghton.

HOUGHTON, HENRY OSCAR (1823-95). An American publisher, born at Sutton, Vt. He graduated in 1846 at the University of Vermont, and worked in Boston as compositor and newspaper reporter. In 1849 he entered the Cambridge firm of Messrs. Bolles & Houghton, and in 1852, upon Mr. Bolles's retirement, transferred the office to its present site, and established the well-known Riverside Press. In 1872 he was elected Mayor of Cambridge. In 1878, by acquiring control of the large list of the old firm of Messrs. Ticknor & Fields, the Houghton house secured exclusive publication rights for the works

of many leading American authors, such as Emerson, Longfellow, and Holmes. For many years *Webster's International Dictionary* has been printed by the Riverside Press.

HOUGHTON, hâ'ton *or* hou'ton, RICHARD MONCKTON MILNES, Lord. See MILNES, RICHARD MONCKTON.

HOUL'TON. A town and the county-seat of Aroostook County, Maine, 140 miles northeast of Bangor; on the Bangor and Aroostook and the Canadian Pacific railroads (Map: Maine, H 3). It is surrounded by a farming and lumbering district, and has considerable commercial importance. There are a foundry and machine-shops, saw, planing, and molding mills, woolen-mills, starch-factories, a flour-mill, a butter-factory, and a large slaughter-house. The town has a public library and the Ricker Classical Institute. The government is administered by town meetings. Population, in 1890, 4015; in 1900, 4686.

HOUMA, hōō'mȧ. A town and the parish-seat of Terrebonne Parish, La., 70 miles southwest of New Orleans; on the Bayou Terrebonne, and on the Southern Pacific Railroad (Map: Louisiana, E 4). It has several oyster-packing establishments, a large moss-factory, manufactures of sugar, molasses, and lumber, and considerable trade in rice and grain. Population, in 1890, 1280; in 1900, 3212.

HOUND (AS. *hund*, OHG. *hunt*, Ger. *Hund*, Goth. *hunds;* connected with Lat. *canis*, Gk. κύων, *kyōn*, OIr. *cú*, Lith. *szů*, Skt. *śvan*, dog). Broadly, the term 'hound' distinguishes hunting-dogs, who follow their animal quarry by scent, from the greyhound group, who hunt by sight; and also from the field dogs (q.v.).

Hounds, then, comprise the bloodhound or sleuth-hound, as he is still called in Scotland, the buck or stag hound, the foxhound, the otter-hound, the harrier, the beagle, the basset, and the Great Dane. The origin of all the breeds of hounds is the Talbot, or old Southern hound (*Canis sagax* of Linnæus), of which probably no true example exists to-day, although a few were preserved well up into the nineteenth century. These dogs were remarkable for their great size and strength, the depth of the chest, length of ears, and the breadth of the head in the region covering the olfactory nerves; hence their capacity for tracing the 'sleuth,' 'slot,' or track. Before the Christian Era the bloodhound or sleuth-hound of Great Britain had become so celebrated for these qualities that, as we know on the authority of Gratius, they were imported into Gaul. Strabo, who flourished somewhat later, confirms this, and Oppian praises their powers of scent and their courage.

THE BLOODHOUND. This hound is the nearest to the original Talbot, and for centuries was the hound of the huntsman whose quarry had to be followed by scent. During many centuries he was the principal agent in Europe in bringing the bear, the boar, and the stag to bay; but swifter breeds were gradually evolved, and the bloodhound's occupation dwindled to that of employing his extraordinary capacity to maintain a trail, however crossed and faint, in tracking human poachers to their hiding-places. Had it not been for this need, the breed would in all probability have entirely disappeared, as, in fact, it nearly had, when in the middle of the nineteenth century a few enthusiasts took up the breeding and restored the dog to his rightful position. The stories of carnage following the dog's overtaking man do not apply to the true bloodhound. When he has treed or fixed his man, he gives tongue and takes care that the pursued does not escape; but he will never lay hold viciously and maliciously. The bloodhound's practical use to-day is in tracking fugitives, refugees, and missing persons; and for this purpose packs of them are maintained by many public authorities. Their capacity to do this borders on the incredible; for, however the footsteps of the one sought for may be crossed by others, in country or street, the nose of this hound, once it has taken up the trail, will follow it. Running water is apparently the only medium that will baffle him. This sense is, of course, natural; but to develop it and bring the dog's use of it into subjection, and make it intelligently useful, the puppy has to be trained and his powers gradually extended and kept in practice.

The characteristics adopted as the standard by the American Bloodhound Club depict the modern dog. He should be from 25 to 27 inches high at the shoulder for dogs, and a little less for the other sex; in color, black and tan; the black, extending to the back, top of neck, and top of head, is, however, always more or less mixed with tan. The tan is a deep rich red; the coat should be short and hard on the body, but silky on the ears and top of head. The ears should be long enough to overlap each other when drawn down together in front of the dog's nose. The eyes should be hazel, deeply sunk, and with triangular lids, showing the third eyelid or 'haw.' The head should be large in all dimensions except width; the muzzle deep and square; the brows fairly prominent. The skin covering the forehead and cheeks is wrinkled, and the general expression of the whole head is majestic. The neck is long, to enable him to drop the head to the trail without altering his pace. The chest and ribs wide and deep, and the legs straight and muscular; the ankles of full size, and the feet round and cat-like.

THE FOXHOUND. As a breed distinctly characteristic and solely used for the hunting of the fox, the foxhound is a comparatively modern development, not reaching further back than two hundred years; but it has been developed from the bloodhound and the Talbot or old Southern hound, traceable for two thousand years. When England gradually became more or less deforested, and animals of the chase had more open spaces for their speed, it naturally followed that this dog had to have increased pace, and for all kinds of game except the very heaviest the bloodhound and Talbot gradually gave place to lighter hounds grafted on the old model. The stag or buck hound was the first variety of what we now class under the general term 'foxhound.' He was the first to come, and practically the first to go, for not one pack of the larger buckhound exists to every hundred packs of the true foxhound. The establishment of regular packs of hounds for hunting the fox, the first of which was the Pytchley in 1750, stamped the breed on the lines from which the English hound has never varied—indeed, into some packs not a single drop of extraneous blood has ever been introduced. Most of the packs established in the latter part of that century are still, so far as other blood is concerned, in unbroken exist-

ence; such are the Belvoir (founded, 1756), the Quorn, and the Cottesmores.

Where the game chased is as swift and crafty as the fox, and the country as open, yet studded with hedgerows and walls, which act as an ever-recurring screen from sight, it follows that the pursuing hound must have unfailing powers of scent, endurance, and swiftness. These are the three characteristics of the bony, muscular, compact, big-bodied, typical foxhound. His height is not so material as are other points; 23 to 24 inches at the shoulder is a safe medium. Nor is color imperative, though necessarily, from the jealousy with which the breed has been guarded, there are no variations outside the yellow or tan, black and white, in ever-varying and clearly marked blotches over the whole body. The head should have a girth in front of the ears of fully 16 inches; the nose should be 4½ inches long, and wide, with open nostrils, and ears set low and lying close to the cheeks. The neck should taper from the shoulders to the head. The chest of a dog 24 inches high should be more than 30 inches in girth, to give the necessary lung capacity, and the ribs must be deep and grade into the loins without an observable break. The hind quarters must be very strong, and the front legs straight and strong. So important are these two features that in judging they call for 20 points out of the total 100. The modern dog, being better trained, is lighter than his ancestor; 70 to 80 pounds is the limit of a dog's weight, and the female may be ten pounds lighter.

In America the local conditions differ so widely, and are so various, that it is almost impossible to define the American foxhound. In some districts, like Maryland and in the Genesee Valley, the fox is followed very much after the English fashion, on horseback, over rolling grasslands; elsewhere, the dog does the hunting and the man waits behind a wall on the supposed runway with a gun; in a third, the men follow the dogs afoot; in still others, they hunt the fox at night. It follows, therefore, that the dogs locally needed must be as various as the methods, and they are so; but, speaking broadly, and of the hound favored by the American Foxhound Club, it need only be said that it is bred on lighter and finer lines than its English ancestor. It is shorter at the shoulder—21 to 23½ inches—and weighs not more than 57 pounds. The chest is narrower in proportion to depth than the English standard; 20 inches in a 23½-inch hound is considered good. In most other respects, naturally the requirements are very similar. One minor point of some importance may be noticed: the English dog always has his ears artificially rounded, while the American dog retains them untrimmed.

The Harrier. From the earliest times the hare has been hunted by dogs. There is a cameo among the Greek gems which depicts him chased by his especial enemy, the long dog or greyhound; but he had an equally persistent foe in the old Southern hound, the immediate ancestor of the modern harrier. The original harriers must not be confused with the dwarf foxhound, which does duty as a harrier to-day. It was only after the draining and clearing of England and Ireland at the beginning of the nineteenth century, when, for the first time, the chase could be followed on horseback, that the old Sussex blue-mottled harrier, the first step in refining the old stock, came into fashion. The persistence with which a scent-hunted hare can be worried by dogs with good noses, and the sport it afforded to watch the tricks and subtleties of hare and hounds, made hare-hunting very popular. In order further to insure the needed qualities, the smaller foxhound strain was called into requisition, and 'Tyrant,' a sire from the Duke of Grafton's kennel, became the foundation of the pack of Sir John Dashwood King, of West Wycombe, whence the strain spread throughout Great Britain. There are still packs of the older and slower kind, however, and there is a 'standard of points,' but it is scarcely worth repeating here.

The Beagle. The harrier looks like a diminutive foxhound, and the beagle looks like a diminutive harrier; but he is not that. He has a most ancient lineage, and for beauty of form, gentleness of manner, sweetness of voice, and hunting qualities he has no equal. The length of the separate existence of the beagle has allowed opportunity for many varieties besides the 'rough' and the 'smooth.' A very pygmy breed called 'lap-dog beagle' was once popular. So small were one pack of these that the whole ten or twelve couples were carried to the field in a pair of panniers slung across a horse. Even the common-sized beagle is slow enough to allow any ordinarily active man to follow the chase afoot. There is a Beagle Club in America which sets the standard, and field trials are annually held under its auspices. Though diminutive, some classes not exceeding 15 inches, the beagle is every inch a dog, with a wiry frame and a determined, though placid, look. His standard of form closely follows that of the foxhound.

The Basset. This dog is the French equivalent of the English beagle, inasmuch as he is the diminutive of an ancient breed, and his quarry is the rabbit. In other respects, as the beagle follows the characteristics of the old Southern hound, the basset resembles their other ancient common ancestor, the bloodhound. His body is longer, and his legs even shorter than the beagle's. His head is long and narrow, with heavy flews, and his forehead wrinkled to the eyes, which, like the bloodhound's, show the haw; his expression is dignified; the neck is very powerful, with heavy dewlaps, and the ears so long he is likely to tread on them, for his legs are not more than four inches long. The stifles are bent, and the quarters full of muscle. He is very barrel-like, and has a character easily recognized.

The Dachshund. Except that this dog hunts rabbits, and, like the beagle and the basset, is short on the leg and long in the body, he has nothing in common with the others. He is a curious mixture. He has the smooth coat and body of a pointer, the tail and nose of a black and tan terrier, the ear of a foxhound, with more than the foxhound's sensitiveness, the hinder legs taller than the front ones, and the latter comically bowed. He is a very ancient breed. One of his kind is painted on an Egyptian monument of the period B.C. 2000. He has many modern admirers, and a club devoted to his interests, whose standard calls for a general appearance long, low, and graceful—not cloddy—a wedge-shaped head, long and lean, broadest at its base; skull moderately arched, bridge of nose somewhat curved or nearly straight, no stop; muzzle strong, not snipey, but fairly pointed, with open

nostrils; ears medium, long, broad and soft, round at end, set on high and well back; eyes showing no white, and with keen expression; jaws strong, with strong and regular teeth; neck tapering from the shoulders to the head; shoulders well muscled and plastic; chest well developed, especially the breastbone; body long, back ribs very short; fore ribs well sprung; fore legs short and strong in bone; forearms crooked; feet large, round, and strong; hind legs smaller in bone and higher than fore legs; lower thigh very short and forming nearly a right angle with the upper thigh; feet of hind legs smaller than those of fore legs; coat short (except on the wire-haired), dense, strong, and glossy, but short and fine on the under side of the body; skin loose and supple; color, red in all tints, black and tan, liver and tan, grey and tan, and spotted. White is objectionable, except in a small stripe from the breastbone (which is prominent) downward.

TURNSPIT. A dog closely akin in build to the dachshund, and called the bath-hound or turnspit, was used in England in some localities well into the nineteenth century to drive a wheel by which the roasting-spits were turned before the fire. He was put in a box in such a position that he could apply his fore feet one after another to a paddle-wheel, and by that means the spit went round. A similar dog, used for rabbiting, was early known to English hunters as the 'wry-legged terrier.'

THE OTTER-HOUND. This is the gamiest and pluckiest of dogs. His prime requisite is such hardihood as will enable him to follow the otter to its water den and fight him there, withstanding without complaint the severest bites from this most vicious of animals. If fish are to be 'preserved' in certain streams, otters must be limited, and to this end otter-hounds are a necessity. This dog must have powerful jaws and good teeth, also a rough grizzly coat, which defies alike the chill of the water and the teeth of the otter. Beneath the wiry outer coat, an under coat of oily wool is essential. This hound is a large dog, standing about 25 inches high, and weighing 50 to 75 pounds.

THE GREAT DANE, or GERMAN BOARHOUND. This is the last visible remnant of one of the two great classes into which dogs were divided by Xenophon and the early Greek writers—the 'fighting dogs,' famed for their huge frame, their pugnacity and ferocity under training. Most of the ancient nations cultivated this dog as an ally in their armies. Arrian enumerates those of "the Mede, Celt, Ser or Indian, Albanian, Iberian, Lycaonian, Libyan, Egyptian, Magnesian, Molossian, Briton, Arcanian, and a few others nearly allied." Cyrus had his war-dogs, and at Marathon dogs shared the honors of the day. That their use was continued by the Romans is evidenced by the fact that from the ruins of Herculaneum have been exhumed the calcined corpses of dogs wearing mail armor. The use of this huge dog for aggressive pugnacity has long since passed, but as a companion and safeguard he has always been valued by German game wardens.

The standard adopted by the Great Dane Club of America maintains all the great and marked qualities of this giant of the canine world, decreeing for dogs a minimum height of 30 inches and a weight of 100 pounds, with an approximate height of 32 inches and a weight of 140 pounds. It requires a powerful and elegant brute. The body must be long, round, and compact; the coat short and fine; the ears small and carried high; the eyes small, deeply set, and with a sharp expression. The recognized colors are the various shades of gray or blue, mouse color, black, white, red or fawn; also brindle or tiger-striped or white ground, with patches of dark colors.

THE MASTIFF. This dog (the *Canis Anglicus* of Linnæus) is a true hound, and undoubtedly is of British origin, for he was exported from there before the Roman conquest of the islands. He was used by the Britons as a guard-dog for their persons and their flocks, more than in the hunt; and he remains preëminently *the* watch-dog of the present day. Watching has become almost instinctive with him. He is the largest and most muscular dog known, exceeding even the Great Dane, and has the courage of the bulldog, yet withal is so gentle that he is the especial favorite of children. In color he is apricot, or silver fawn, or dark fawn brindle, with the muzzle, ears and nose black in all cases; his coat is short and close-lying; his head is a very ideal of strength and massiveness, and it is set on a neck and chest in proportion. No height is set in the standard, but a dog which must weigh from 155 to 175 pounds should be very little under three feet tall.

BIBLIOGRAPHY. Consult authorities mentioned under DOG—DOMESTIC DOGS.

HOUND. A small shark. A name more common in Great Britain than in America for the 'dogfish' of the genus Mustelus, especially the blue or 'smooth' hound (*Mustelus canis*), common to both sides of the Atlantic. See DOGFISH.

HOUNDFISH. (1) A needle-fish, especially *Tylosorus raphidoma*, also called 'guardfish.' See AGUJA, and Plate of NEEDLE-FISH, PIKES, ETC. (2) A dogfish.

HOUND, HOUNDING. A hound is a dog employed in the chase; specifically, in England, one adapted to fox-hunting. Hounding is the pursuit of game by hounds. The keeping of hounds and the sport of hounding are, to a greater or less extent, regulated by law. Those who follow hounds in fox-hunting, in England, are exempt to some extent from the common-law liability of other trespassers, such sport ranking as a privileged pursuit. The employment of hounds in deer-hunting is prohibited by statute in some of our States. Fox-hunting with hounds, however, is becoming popular in certain parts of this country. Consult Peer, *Cross Country with Horse and Hounds* (New York, 1902), and the authorities referred to under GAME LAWS.

HOUND'S-TONGUE (so called from the appearance of the flowers), *Cynoglossum*. A genus of coarse-appearing, small-flowered plants of the natural order Boragineæ, of which there are many species. The common hound's-tongue (*Cynoglossum officinale*) is a native of Europe, Asia, and Africa introduced in North America. It has soft downy leaves, of a dull-green color, purplish-red flowers, and a stem about two feet high. Its odor is very disagreeable. The root was formerly administered in scrofula, dysentery, etc., and is said to be anodyne. It is also one of the pretended specifics for serpent-bites and hydrophobia. The hound's-tongue is considered a pernicious weed on account of its burs, which

Cynoglossum Virginianum, known as wild comfrey, is a common plant from Canada to Florida. The species of Echinospermum, formerly united with Cynoglossum, are weeds, Echinospermum being the beggar's lice or stick-tights. The quality of sheep's wool is often considerably lowered from the abundance of their burs in it.

HOUNSLOW HEATH. A region west of the township of Hounslow, London, covering in 1546 an extent of 4293 acres. It was formerly notorious as the resort of highwaymen, and it was customary to leave the bodies of those who had been executed hanging on gibbets along the road. In 1686 James II. established a camp on the Heath for the purpose of overawing the Londoners. Extensive barracks were erected in 1793, and part of the land is now occupied by powder-mills. The region is in great part under cultivation and inclosed.

HOUR (AF. *ure*, OF. *ure, hure, ore, hore*, Fr. *heure*, from Lat. *hora*, from Gk. *ὥρα*, hour, season). A measure of time equal to one twenty-fourth part of a day (q.v.). As there are two kinds of days, the solar and sidereal, so there are two kinds of hours, the solar and sidereal. The latter is shorter than the former by 9.856 solar seconds. Sidereal time is used by astronomers in discussing the motions of the stars; but in the ordinary affairs of life solar time only is employed. Twenty-four ordinary solar hours correspond to an interval of time equal to the mean or average period elapsing between two successive returns of the sun to any given meridian. The first hour of the civil or ordinary day is numbered XII., and commences at midnight. The following hours are then numbered I., II., etc., up to XII., which number is attached to the hour beginning at noon. In Italy, until November, 1893, when the standard time was adopted, time was reckoned from sunset continuously, from 1 to 24 hours. On the Continent, France is to-day the only country that is outside the time-zone, i.e. that uses local time.

HOUR-GLASS. An instrument for measuring intervals of time. It is made of glass, and consists of two bulbs united by a narrow neck; one of the bulbs is nearly filled with dry sand, fine enough to run freely through the orifice in the neck, and the quantity of sand is just as much as can run through the orifice in an hour, if the instrument is to be an hour-glass; in a minute, if a minute-glass, etc. The obvious defects of this instrument are the expansion or contraction of the orifice produced by heat or cold, and the variations in the dryness of the sand, all of which produce deviations from the true measurement of time. Instruments constructed on this principle are still used by navigators in 'heaving the log,' for the purpose of measuring the time during which the log-line is allowed to run out. Similar instruments are also employed by cooks in fixing the proper time for boiling eggs.

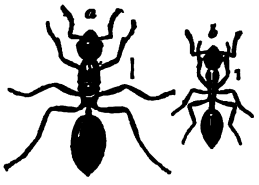
HOURI, hou'rĭ (Ar. *ḥawrā'*, woman with bright black eyes, from *ḥawira*, to have brilliant black eyes). The beautiful celestial maidens, described in the Koran (Sura lvi. 24; lv. 55; et al.) and Mohammedan tradition as dwelling in Paradise, whose companionship is one of the rewards held out to the pious Mussulman. Numerous descriptions amplifying the notices in the Koran on gorgeous couches in pavilions of pearl. Their countenances are so bright one can see his face reflected from a houri's cheek. They are made by 'a peculiar creation,' not of clay, like ordinary women, but of musk, saffron, incense, and amber. While retaining all the qualities of virgins, they have none of the failings of women, remain ever young and free from physical defect, and have the power to conceive and bear children at will, who within an hour grow to maturity. The later Mohammedan theologians, like Ghazzali (q.v.), whose more refined instincts were offended by this rather sensual picture of Paradise, endeavored to place an allegorical interpretation upon the houri; but there can be little doubt that to Mohammed and to his immediate followers, as to the bulk of present-day Mohammedans, they represent an intense reality. This follows from the details of the houri given by Mohammed and amplified by subsequent writers, on the basis of tradition, and which accord with the general view of Paradise as a place where life will be full of secret delights, where there will be plenty of water, delicious fruits, with attendants waiting on the pleasure of the inhabitants, and the like. Mohammed's conception of Paradise, while based in part on the current Jewish, and more particularly Christian views, embodies as its original factors the adaptation of these views to his own mental horizon and to that of his surroundings; and one is inclined to conjecture that the houri represent the reverse of the popular conception of demoniac beings, frequently pictured as female spirits, who plague and torture man in this world.

HOURS, in mythology. See HORÆ.

HOURS OF LABOR. See LABOR LEGISLATION.

HOUSATONIC, hōō'sȧ-tŏn'ĭk. A river of New England, rising in the Berkshire Hills, Massachusetts, and flowing south through Connecticut (Map: Connecticut, C 4). It empties into Long Island Sound, four miles east of Bridgeport, after a course of 150 miles through a region full of wild and beautiful scenery. It supplies water-power to numerous manufactories.

HOUSE-ANT. The little red ant of households (*Monomorium Pharaonis*), a species which has accommodated itself perfectly to the conditions of civilization. It nests in the walls of houses or in rubbish in cellars or old closets, and feeds on all sorts of household stores. It becomes a great nuisance, not so much from the amount it eats as from its inordinate propensity for getting into things, especially sugar, syrup, and sweet substances generally. Careful watching will sometimes reveal the crack from which most of them come, and the nest may thus be found and destroyed. They may be trapped by thousands by a sponge moistened with sweetened water, which is daily relieved of its burden of ants by plunging it into scalding water. The cracks by which the ants enter storerooms and pantries may be plugged with cotton soaked with kerosene, or



RED HOUSE-ANT.
a, female; b, worker; in relative proportions.

the entire house may be fumigated with bisulphide of carbon or hydrocyanic acid gas. Directions for such fumigation are printed in circular form by the Department of Agriculture at Washington and are sent to all applicants free of charge. Two little black ants (*Monomorium minutum* and *Tetramorium cæspitum*) are also found in houses, but nest outside. Consult Howard and Marlatt, *Household Insects* (Department of Agriculture, Washington, 1896).

HOUSEBOATING. The passing of the summer-time, as a recreation, on what really is a flat-bottomed raft supporting a more or less extensive and luxurious suite of rooms, occupying the centre of the raft. At each end of the house is an open deck, and an open gallery along the sides; the top, which is railed round and covered by an awning, forms an open court or garden. There are endless varieties in design, but this general description substantially covers the characteristics of most modern houseboats. This manner of passing the summer holidays began about 1870 on the Thames. To-day a hundred houseboats are to be found on it, and a regular weekly paper is published, which gives the whereabouts of every such boat from day to day. Some of these boats are models of beauty in decorations and fittings, and veritable floating palaces of luxury and fashion. They are either poled from point to point, or towed from the path by a horse, or else tugged by an auxiliary launch. The proximity of riverside villages and inns precludes the necessity of giving up much of the internal space to stores. American conditions are so different as to need a much greater variety of treatment, and in every section of the country houseboating is popular. Houseboats are abundant on the Pacific Coast, and the Mississippi system is dotted with them wherever a great city forms the necessary social nucleus. On the Saint Lawrence and the Lakes George and Champlain they are a summer feature, and the neighborhood of New York is especially favorable to them. In the Florida waters are some of the largest ever built, as well as many of the humbler and truer kind.

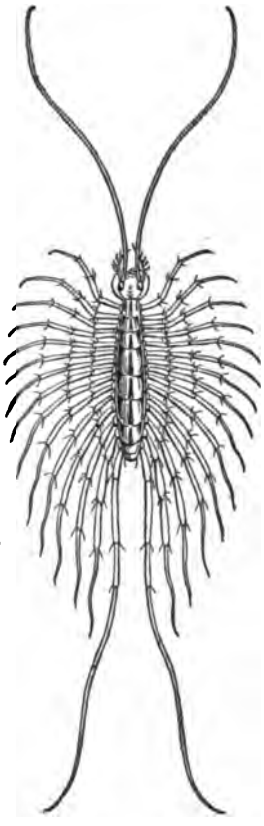
For convenience of description, houseboats may be divided into four classes, according as they (1) simply float, and are moored to stay; (2) are meant to move from place to place, but have no power; (3) carry their own sails; or (4) are propelled by their own engines. Within these divisions every kind of craft is in service. There is the *Alameda*, a converted 85-foot schooner, which can cruise by sail or steam, and the *Caiman*, a double-decker, 97 feet long, capable of navigating with her own steam power the inlets and inland waters of Florida. Scarcely less pretentious are the *Idler* and the *Wanderer*, designed especially for the shallow rivers of the upper Mississippi Valley. Among sailing houseboats there are the *Sommerheim*, 70x20, on which a house 30x16 is carried, and the *Nautilus*, with a deckhouse constructed of four abandoned street cars. Others are floating studios, like *Dragon*, 30x16; and *Outing*, built for the waters inside the keys of the Jersey coast, a roomy sloop-rigged houseboat 35x11 and 13 inches draught; hunting-boxes, like the *Ruth*, with her house sunk level with her deck, for use in duck-shooting; and broad-beamed rafts, like the *Belvidere*, of which half a hundred may be found in San Francisco Bay and its tributaries.

An ordinary flat-boat, without power, except some simple sails, steered by a rudder, and carrying a house of Georgia pine, can be built (home-made) or purchased anywhere for $300 to $800. Practical working designs and instructions for building will be found in articles by Norton in *Outing* for July (New York, 1892) and August (New York, 1900).

HOUSEBOTE (from *house* + ME. *bote*, AS. *bōt*, Goth. *bōta*, OHG. *buoza*, Ger. *Busse*, recompense, atonement). At common law, the right of a tenant for life or years to cut and take from the premises occupied by him sufficient wood for repairing the house and other buildings on the estate and for use as fuel, without becoming liable for waste. It belongs to the class of tenants' rights known as estovers. See ESTOVER.

HOUSEBREAKING. See BURGLARY.

HOUSE CENTIPEDE. A myriapod with very long legs and long antennæ, which is numerous in the Southern States, and brightly colored. It haunts houses and is feared by ignorant persons as poisonous, but is harmless and really beneficial, as it feeds on small insect vermin. It is the only representative in this country of the chilopodous family Cermatiidæ, and is named *Scutigera forceps*. Consult Marlatt, *Household Insects* (Washington, 1896). See MYRIAPOD.



HOUSE CENTIPEDE.

HOUSE-CRICKET. See CRICKET.

HOUSE-FINCH, or LINNET. A small finch (*Carpodacus frontalis*) very common throughout California, Arizona, and Northern Mexico, and familiar in all valley towns and rural gardens, where it is welcome for its beautiful plumage and exceedingly sweet, canary-like song, heard throughout the year. It is related to and resembles the purple finch of the Eastern States, but is smaller and trimmer. The head and breast of the male are a rich red-wine color, varying from carmine to crimson, and the remainder of its plumage a mixture of reds, soft grays, and browns; the females and young have no red, and in winter the colors are less bright than in early summer. This finch makes its nest normally in trees, but now also occupies holes and crannies about houses and buildings, where it is never disturbed by the people, although much harassed by swallows in competition for desirable quarters. The eggs are pale blue, sparingly marked with dark lines and dots about the large end. Other

iar fly of civilization (*Musca domestica*), the type of the family Muscidæ (see FLY). It is remarkable for its extensive geographic distribution, and is found practically in every spot where man has been. It is a very rapid breeder and swarms in enormous numbers during the summer and in warm regions. Its eggs for the most part are laid in horse-manure, and it is safe to say that more than 90 per cent. of the house-flies in America to-day were reared from horse-manure. In the absence of this substance, however, they will breed in cow-dung, in decaying vegetation, and in privies. The eggs are small, slender, and white in color, and in summer-time hatch in four or five hours. The larvæ become full grown in three days, and the pupa stage lasts only three to five days. The total life-round of a generation may be as short as seven or eight days. Each female lays about 150 eggs, and this prolificness and rapidity of breeding, taken in connection with the general abundance of larval food, readily accounts for the enormous numbers of flies which infest dwellings.

The house-fly is undoubtedly an important factor in the spread of certain diseases, especially enteric fevers and cholera, as it may breed in human excreta and afterwards visit food-supplies or dining-tables. The best remedy is the exercise of great care and cleanliness. Stables where horses are kept should be cleaned every day or so. The manure should be put in a close room or pit, and each day's additions should be sprinkled over with a shovelful of chloride of lime.

HOUSEHOLD, ROYAL (of Great Britain). The personal attendants upon the reigning sovereign. Among all primitive Germanic peoples we find such attendants. The chief officers of the household are usually four in number: the steward, who is the head of the household; the marshal, or head of the royal stables; the cupbearer; and the chamberlain, who has charge of the King's chambers. These four officers are found among the Anglo-Saxons and at the Court of the Norman dukes. As the royal power developed, the household attendants became officers of state, and the King's household is his ministry. Under the Norman kings of England the royal household consisted of two sets of officers, whose functions greatly resembled each other. Foremost among them was the justiciar, the King's chief adviser and his representative in England when the King was abroad. The steward, whose most important functions of state passed over to the justiciar, remained head of the royal household. Other members were the treasurer, who had charge of the King's treasury, and the chamberlain, who audited the accounts; the constable, a sort of quartermaster-general of the Court and the army, who had a seat in the exchequer, and the marshal, whose functions were similar. Some of these officers, viz. the steward, the constable, butler and marshal, were hereditary in the great Norman families, and either lost their importance or became merely household officers. Others which were appointed, like the justiciar, chancellor, and treasurer, became the important officers of state.

In the present organization of the royal household the other household officers and servants except those of the chapel, the chamber, and the stable. The dean and the subdean are the principal officers of the chapel, which is composed of a number of clerks and chaplains. The lord chamberlain controls the officers and servants of the royal chambers, and appoints the tradesmen who are purveyors to the sovereign. The master of the horse is in charge of the royal stables, and has under his charge the master of the hounds, the grand falconer, the crown equerry, and other servants. In the court of a female sovereign the ladies of the household play an important part. The mistress of the robes is the head of this department, and under her are the ladies of the bedchamber, maids of honor, and other attendants. The ladies of the bedchamber are the personal attendants of the Queen. Besides these there are a large number of physicians, surgeons, apothecaries, druggists, and dentists in attendance. The other members of the royal family have similar households, but on a much smaller scale.

The expenses connected with the royal household have varied greatly in the different periods of English history. In the Middle Ages the King was always attended by a large following of lords, both spiritual and temporal, besides knights, esquires, and other inferior attendants. He obtained provisions for his Court by exercising the right of PURVEYANCE (q.v.), which has been abolished. Notwithstanding this, the expenses of the royal household often proved a burden to Parliament, which sometimes regulated them. This was most carefully done in the *Household Book* of Edward IV., which rigorously defined the officers of the household and the duties of its members. The expenses of the household of Edward IV. were £13,000 a year, which may be taken as a fair average sum for the household expenses of a king during that period. Since the accession of William III., Parliament has fixed the amount of the appropriation at the beginning of each reign. Queen Victoria received an allowance of £385,000 a year, distributed as follows: Privy purse, £60,000; household salaries and retired allowances, £131,260; household expenses, £172,500; royal bounty, arms and special services, £13,200; leaving an unappropriated balance of £8040, to be used at discretion. The Prince of Wales received an annuity of £40,000 over and above his other revenues, the Duke of Connaught £25,000, and the other members of the royal family in proportion to their rank. By a grant of May 9, 1901, Parliament increased the civil list to £415,000 for Edward VII., the King's privy purse being increased to £110,000.

For the early period consult: Kemble, *Saxons in England*, vol. iii. (London, 1886); Stubbs, *Constitutional History of England*, vol. i. (6th ed., Oxford, 1897); *The Ordinances and Regulations for the Government of the Royal Household* were published by the Society of Antiquaries (London, 1790); Lindsay, *The Royal Household* (London, 1898).

HOUSEHOLD GODS (Lat. *di familiares*, or *domestici*). Among the ancient Romans, the divinities supposed to preside and watch over the house and the family. Thus Vesta was the goddess of the hearth and guardian of domestic

unity. But the name was applied especially to the *lares* and *penates*, spirits of the deceased ancestors under whose beneficent care the household prospered. The *lares* had special charge of the members of the family, and the *penates* of the dwelling; and they were worshiped at the *lararium*, or family shrine, which stood in the *atrium*, or central hall.

HOUSEHOLD SUFFRAGE. The form of the Parliamentary franchise at present in force in Great Britain. It was established in the boroughs by the Reform Bill of 1867-68, which conferred the right of voting for members of Parliament on all adult male household owners or lodgers who were the occupants of a dwelling capable of bringing in a yearly rental of £10 and over. By the Franchise Bill of 1884 the right was extended to the inhabitants of the counties who possessed the same qualifications.

HOUSEHOLD TROOPS. Specifically, the term applies to those regiments of the British Army which form the permanent garrison of the city of London, and whose especial duty it is to attend the sovereign. Details from these troops mount guard over the royal residences and important public buildings and institutions. The term includes the following troops: Two regiments of the Life Guards (First and Second); the Royal Horse Guards; the first, second, and third battalions of Grenadier Guards; the first and second battalions of Coldstream Guards; the first and second battalions of Scots Guards; and the Irish Guards. (See GUARDS.) The term household troops is frequently used by English and American writers to describe the élite regiments of Germany and other monarchical countries.

HOUSEHOLD WORDS. A weekly periodical founded March 30, 1849, by Charles Dickens, who became its chief editor. The opening numbers contained a serial story by Mrs. Gaskell. *Hard Times*, and many of Dickens's minor stories, first appeared in it. It was discontinued in 1858, and was succeeded by *All the Year Round* (April 30, 1859).

HOUSE INDUSTRY. A form of industrial organization in which the workman labors at home for a manufacturer or contractor. It is to be contrasted, on the one hand, with the artisan organization of industry in which the master craftsman was his own business manager and produced for the needs of a local market, and, on the other, with the factory organization with its groups of workmen coöperating under a common direction and division of labor. Historically it forms a transition from the former to the latter. It was the outgrowth of a widening market for goods, and marked a change in the mercantile organization of industry which kept pace with and in many cases outstripped its technical progress. As a dominant form of organization it marked especially the closing years of the eighteenth and early years of the nineteenth centuries, and while it still lingers in backward regions, and even grows up anew under peculiarly favorable circumstances, it is in the main a thing of the past.

The characteristics of the system are the isolation of the worker's production by the crude processes of hand labor, and the marketing of the product by third persons. The workman may in the first instance supply his materials, but the need of uniformity in the product soon brings it about that the latter are supplied to him and he is paid at piece rates for the work he does upon them.

Such an organization can compete with factories only when the technical processes of production remain comparatively primitive. When complicated machinery and minute subdivision of labor is introduced into factory work, house industry is doomed. It has under such circumstances kept up for a time an unequal struggle in which long hours of labor and the assistance of the entire family marked the labor in the homes. Bad as were the conditions in the factories of England in the early part of the last century, their misery was exceeded by that of the poor hand workers with whom the factories competed.

The modern counterpart of house industry in Great Britain and America is found in the sweating system. This is confined to the garment trade, in which the mercantile transformation was later than in other lines of industry, and in which the relative scope of hand labor as compared with use of machines is very large. The textile industries and the manufacture of boots and shoes both passed through this stage. While spinning-machines and power-looms were yet primitive, the hand workers were able to maintain themselves for a while by working for others. In New England the factory system had its beginnings in the domestic occupations of the people. Throughout northeastern Massachusetts may still be seen about the farms ruins of small workshops where during the winter the farmers made shoes for the merchants of Lynn and Boston. Elsewhere in the State, straw for the manufacture of hats was plaited by the women on the farms, and by men, in the winter-time. In Sweden and Russia such industrial occupation among the rural population is quite frequent. In Central Europe house industry is far more extensive. The hilly region of Central Germany, from the Thuringian to the Silesian mountains, is its peculiar home. See SWEATING SYSTEM.

HOUSELEEK, or LIVE-FOREVER (*Sempervivum*). A genus of plants of the natural order Crassulaceæ, the members of which have the petals equal in number to the sepals, and inserted in the base of the calyx; the leaves are generally very succulent, and form close rosettes. The common houseleek, or cyphel (*Sempervivum tectorum*), grows wild on the rocks of the Alps, but has long been common in almost every part of Europe, planted on walls, roofs of cottages, etc. It sends up leafy flowering stems of six to twelve inches in height, which bear branches of pale-red star-like flowers, equally curious and beautiful. The leaves cut or bruised, and applied to burns, insect-stings, ulcers, and inflamed sores, afford immediate relief. They were formerly in high esteem as a remedy for fevers and other diseases, and an edict of Charlemagne contributed greatly to the extensive distribution of the plant. Other species possess similar properties. Sempervivum globiferum, with yellowish-green flowers, is very frequently planted on walls in Germany. Some of the species, natives of the south of Europe, the Canary Isles, etc., are shrubby; others are common greenhouse plants.

HOUSEMAID'S KNEE. A term commonly applied to an acute inflammation of the bursa

surfaces. It causes considerable pain, swelling, and febrile disturbance. The only disease for which it can be mistaken is acute inflammation of the synovial membrane lining the cavity of the joint; but in this disease the patella is thrown forward, and the swelling is at the sides, while in housemaid's knee the swelling is very superficial, and is in front of the patella. The treatment consists essentially in the employment of rest, cold applications, and bandaging. Where the condition has become chronic, radical relief can be secured by the excision of the bursa, or injection of iodine into it. If suppuration take place, the sac must be freely opened and the pus evacuated.

HOUSE-MARTIN. See HOUSE-SWALLOW.

HOUSE OF COMMONS. See PARLIAMENT.

HOUSE OF CORRECTION. See PRISONS.

HOUSE OF FAME, THE. A poem by Chaucer, in three books, probably written in 1384. The influence of Dante is evident in the construction of the poem, which tells first of the poet's dream of the glass temple of Venus, a direct suggestion from Vergil; next, his flight on an eagle to the House of Fame, where names of great men were written on walls of ice, and awards were made by the goddess of fame to claimants in the presence of the poet.

HOUSE OF KEYS. See MAN, ISLE OF.

HOUSE OF LIFE, THE. A century of sonnets by Dante Gabriel Rossetti, published among the *Ballads and Sonnets* in 1881. Some of the poems contained in it were merely reprints from the *Poems* of 1870.

HOUSE OF LORDS. See PARLIAMENT.

HOUSE OF THE FAUN (It. *Casa del Fauno*). One of the largest and finest houses of Pompeii, famous for its elaborate decorations. In it was discovered the statue of the "Dancing Faun," from which the house received its name. Its mosaics are the most beautiful that have been preserved to the present day. Among them, occupying the floor of the exedra, was discovered the celebrated mosaic of the Battle of Issus, showing Darius fleeing from Alexander, now in the Naples Museum, where the other mosaics belonging to the House of the Faun are also preserved. These include a representation of the creatures of the Nile, which formed the threshold to the Battle of Issus; the Genius of Autumn riding on a panther, doves pulling a necklace out of a jewel-box, and other compositions.

HOUSE OF THE SEVEN GABLES, THE. A novel by Nathaniel Hawthorne, written at Lenox, Mass., in 1850, and published in 1851. It is the story of a decayed New England family, and deals with the heritage of evil which has been passed down to an inoffensive generation. The leading character, Hepzibah Pyncheon, a spinster, finds herself obliged, in her old age, to open a toy-shop in the old homestead.

HOUSE-SNAKE. See MILK-SNAKE.

HOUSE, or 'ENGLISH,' SPARROW. This typical sparrow (*Pyrgita domestica*) is the most familiar fringilline bird of Europe, and latterly of the whole civilized world. It is indigenous to Europe and Asia, where it is only partly

tion of those regions caused its introduction there; and since 1850 it has become a resident of both North and South America. Everywhere it flourishes, increases with amazing rapidity, and impresses itself upon the locality by its adaptability, and pugnacity toward native birds. From the earliest times it has associated fearlessly with mankind, and has been a denizen of towns more than of the country. This characteristic is most prominent in the new countries, where it clings at first to cities, and later spreads along railroads and other highways to the interior towns. It remains everywhere a town bird, rarely visiting, and never nesting in, the wilderness. To this urban habit is due in large measure its extraordinary hardihood and prolificacy, for in town it can always find an abundance of food in the streets, or about warehouses, railroads, etc. Consequently it is nearly independent of season in breeding, and may rear several broods a year; moreover, its nests and fledgelings are safe against nearly all the enemies and dangers which beset the lives of wild birds. The result is a longevity and a rapidity of multiplication which may speedily render the species a serious local nuisance. This is felt in the more populous parts of the Old World, as well as in the countries to which it has been transplanted, and where it flourishes with aggressive vigor.

While the sparrow seems able to eat all sorts of food, it is naturally graminivorous, and only when young, or in feeding its young, does this species consume insects in any considerable quantity. Its services to agriculture in this way are so limited in time and amount that they are insignificant, and more than overbalanced by its incessant attacks upon the smaller insect-eating birds, which otherwise would come freely about villages, orchards, and farmhouses. In the United States it has greatly lessened the number of such birds in some localities, or at any rate has driven them away from villages and farmsteads—particularly bluebirds, wrens, and all sorts of swallows, whose nests it destroys or appropriates; but there is reason to believe that the native birds are learning more and more how to cope with this bandit. Moreover, in some districts, besides great destruction wrought to the buds of fruit-trees, the sparrows annually migrate in summer in large companies to the grain-fields, and devour or shake down quantities of ripening grain. A third evil attributed to this bird is the spread of disease, due to its propensity for using feathers and rags in the construction of the nest, and for placing this nest upon or as near as possible to the house; since it may, and frequently does, gather these materials from infected clothing or bedding thrown out of sick-rooms.

INTRODUCTION INTO AMERICA. The house-sparrow was first brought to the United States from England in 1860 by Nicholas Pike and other directors of the Brooklyn Institute, when eight pairs were liberated in Brooklyn, N. Y.; but a second importation in 1853 was needed to establish the race. Sparrows were brought in and colonized elsewhere during the next twenty years, in various parts of the country, including California, the city government of Philadelphia im-

free the shade-trees of devastating caterpillars, which about that time were especially numerous and annoying throughout the Eastern States. A few far-seeing persons protested, but were not listened to. Only a few years elapsed, however, before a mass of evidence was presented that the sparrows were of no practical service as insect-destroyers, and were an increasing nuisance and menace. The outcome of much discussion and writing was an exhaustive inquiry, conducted by the United States Department of Agriculture, the results of which, unfavorable to the bird, were published in 1889 in *Bulletin No. 1*, of the Department, a document of 400 pages. Whether, as many believe, a balance will after a time be obtained, and these imported sparrows cease to be relatively more numerous and troublesome than native birds of the same nature, remains to be seen. The fact that the people of Great Britain make the same complaint as the United States against their prolificacy and destructiveness discourages this expectation.

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HOUSE-SWALLOW, or HOUSE-MARTIN. The English name of the familiar European swallow (*Hirundo rustica*), which makes its mud nest about houses and barns, more often than otherwise in the interstices of farmhouse chimneys, so that it is also called 'chimney-swallow' (q.v.). It is widely distributed throughout the Old World, and everywhere a familiar of civilization. See SWALLOW, and Plate of SWALLOWS.

HOUSE TAX. In England, as early as 1428, a tax was levied on houses; but the practice was soon dropped and did not reappear until 1696, when it was introduced in imitation of a similar tax then existing in Holland. In the latter year a fixed tax of two shillings was levied on all houses, with a higher rate for those which had more than a specified number of windows, on the theory that in this way occupants could be taxed in proportion to their means. With certain modifications as to rate, this tax continued to be levied until 1778, when it was changed to a tax on inhabited houses, proportioned to the rental value, again in imitation of the Dutch practice. The tax was repealed in 1834, but was renewed in 1851, and is still in force. At present houses of less than £20 rental value are exempt; the tax is graduated up to £60. The theory of the tax on houses is that expenditure for house-rent is one of the best available tests of income. The tax is, however, unpopular and unproductive, and for these reasons does not find a place in the fiscal systems of other modern States.

HOUSE THAT JACK BUILT, THE. A nursery rhyme in *Mother Goose*. It relies for its interest on the accumulative manner in which it is told. Hallowell conjectures that its original was a Chaldean hymn or fable, in *Sepher Haggadah*, which is strikingly like the rhyme of *The Old Woman and the Crooked Sixpence*.

which resulted from the rapid growth of cities in the latter half of the nineteenth century aroused the philanthropist and the public to the realization that they must solve the problem of housing the working classes and the poor. In view of the fact that much emphasis is placed upon the characteristic feature of American architecture—the middle-class home with its many comforts and conveniences—the housing problem as a question of environment for the individual is taking on larger proportions than a mere tenement-house reform. Comfortable housing involves questions of heat, light, sanitation, and conveniences, better facilities for which the increased production and the inventions of the nineteenth century are continually putting within reach of the masses. In small cities, in rural industrial centres, and especially in the expanding suburbs, the kind of housing facilities provided are recognized as an important element in the standard of living.

Previous to the nineteenth century little attention was paid to the homes of the common people. Ancient and mediæval history tells of great personalities, and we possess to-day tombs and temples, palaces and arches, churches and castles, as relics of the past civilization; but the daily life of the people is not recorded, and has passed away with the rude hovels and noisome dens in which they herded. Southern nations easily adapted their dwellings to the climate, although extreme squalor frequently existed. Real comfort, however, was unknown to the northern nations until the great merchant princes introduced into Europe the conveniences familiar to southern potentates. The means by which modern life is made comfortable are the distinctive features of Western civilization, especially of the United States; but certain conditions have prevented the working classes from sharing these benefits. The workman must live near his work. The demand for property in the centre of cities for business purposes has increased the value of the land, and also lessened the amount available for homes for the workers. As the demand for dwellings exceeded the supply, it became profitable to subdivide and sublet old mansions, stores, or cottages built when the city was a country town. These buildings became entombed in blocks of buildings, with no provisions for ventilation, sanitation, or conveniences, and often one hydrant supplied a whole house with water. As the demand increased, the rents rose and more people were crowded into a few rooms. Forty per cent. is said to have been an average return on such property, upon which no repairs were made. To reap this harvest, badly constructed buildings were erected, often by ex-tenants who recognized the opportunity to make money. All available space was used. Back-to-back cottages were put on the same lot. The worst type of tenement is the 'double-decker dumb-bell,' peculiar to New York. In English manufacturing towns, small cottages—rows upon rows in narrow alleys—were built on leased land. No unnecessary expenditures were made, as the houses were intended to fall when the lease expired. (Consult Engels, *The Condition of the Working Class in England in 1844*.) Damp cellars, dark halls, vermin, filth, lack of repair, no ventilation or adequate water-supply are characteristic of all slum dwellings. Not only does a whole family

daytime for manufacturing purposes. The mortality in such dwellings is very high, the prevailing diseases being typhoid fever, diarrhœa, and all contagious diseases. Tuberculosis is characteristic of the tenement.

For the individual, bad housing means uncleanliness, sickness, lack of privacy, and often contact with criminals and prostitutes. This causes the corruption of the young, lack of self-respect, discouragement, intemperance, and low morality. In New York City it was estimated that out of a population of 255,033 only 306 had access to a bath. Ordinarily the most primitive provisions for cleanliness are lacking. Home life, with normal parental and marital relations, is impossible. Furthermore, every working man and woman loses, on an average, twenty days a year on account of sickness. Economists are agreed that where more than 20 per cent. of the income of the head of a family goes for rent, as is often the case among the poor, privations must be endured along other lines of consumption, especially in food. The districts where overcrowding and bad housing prevail are centres of crime, vice, and epidemics, and impose upon society not only a large bill for the maintenance of hospitals, almshouses, and prisons, but greatly lessen production through the inefficiency of workers. It is estimated that the working population of England between the ages of fifteen and sixty-five lose 20,000,000 weeks in a year. To this loss in working time must be added the inferior quality of the work of people enfeebled in mind and body by poor food and unsanitary homes.

In England the housing question was taken up as a municipal problem, and it has recently become a question of public policy. Lord Shaftesbury was influential in obtaining legislation as early as 1851. The housing problem on the Continent represents a phase of industrial life. Small homes for operatives are built near the large factories. As early as 1835 André Koechlin, a manufacturer at Mulhouse, France, began building houses for his workers. The United States has been far behind European countries. Public interest has finally been aroused by the reports of tenement-house commissions, and the knowledge of what has been done abroad. The American public was astonished to learn that New York below the Harlem was the most densely populated city in the world, with 143.2 persons to the acre in 1890, and 156.7 in 1900. The eleventh ward had in 1890 a population of 763.59 to the acre.

Efforts to improve housing conditions have been made by cities and by private individuals. The municipality has two methods: (1) Expropriation; and (2) regulation. (1) Expropriation has been carried on to some extent in all English cities. It involves questions of increased taxation resulting from the expense incurred, the displacement of the population who will overcrowd neighboring districts if not provided for, and occasionally the building of model tenements, by the city. Liverpool (1866), Glasgow (1866), and London (1868) first undertook to reconstruct unsanitary districts. Later, general laws were passed, the most important of which is that of 1890, which provides for displacement and for the intervention of the municipality only the owners. Glasgow has been especially successful in her financial management of these areas. Edinburgh and Liverpool have left much of the expropriated ground as open space, while Dundee has converted these districts into thoroughfares. London, Liverpool, Glasgow, Huddersfield, and Birmingham have erected model dwellings. Expropriation is a success in lowering death-rates and decreasing crime. Better methods of construction make it possible to house more people in the same area. (2) Municipalities may also improve housing conditions by sanitary and building codes and provision for inspection. Such legislation includes requirements as to light, air, cellars, halls, windows, fire-escapes, plumbing, and sanitary conveniences. The New York laws are in advance of all others, for which they serve as a model, but adequate inspection is seldom provided. If owners are compelled to keep their property in a good condition, they become more careful in the choice of tenants. Thus the undesirable classes are gathered into one district where they are easily looked after. Private associations do a good work in looking up abuses until laws are well enforced and the people taught to deal directly with boards of health. In New York City there are over thirty societies. The Sanitary Aid Society, Ladies' Health Protective Association, and the New York Association for Improving the Condition of the Poor may be mentioned. The Mansion House Council on Dwellings of Poor and the Sanitary Society of Edinburgh are prominent in Great Britain. In France and Belgium the elements of household hygiene are taught in public schools.

Efforts undertaken by private individuals may be classified as: (1) Commercial, (2) semi-philanthropic, (3) philanthropic, and (4) houses built by private employers for the benefit of their employees. The commercial enterprises pay as large a per cent. as possible, giving at the same time good accommodations. The semi-philanthropic companies limit their dividends to a normal commercial rate on high-class investments. The profits of the philanthropic trusts are used in improvements and erecting new property. Housing by employers usually pays a good return. The buildings put up by these various enterprises are blocks, small houses, and lodging-houses. The very poor must rent rooms or small houses. For the lowest classes, so degraded that they cannot make use of improvements, the methods of the Octavia Hill Association are most satisfactory. Miss Hill began the work in 1864, when John Ruskin spent £3000 in purchasing unsanitary property in a vicious neighborhood. The plan is to take old property, to put in necessary repairs, to demand a prompt payment of rent, and gradually to add improvements out of the surplus from a repair fund. The standard of living of the people is raised by making the tenants realize that care on their part results in improvements. Thrift is encouraged by discounts for payment of rent in advance. When the tenants are ready, new buildings are erected. The association owns property, or, as agents, collects rents. Women volunteers have happily combined rent-collecting with friendly visiting. Similar methods have been adopted in other cities. Philadelphia has an Octavia Hill Association, Gotham

Among the companies providing better housing facilities may be mentioned: In England—the Metropolitan Association for Improving the Dwellings of the Industrious Classes (1841), which owns fourteen estates in London, and pays 4½ per cent.; the Peabody Donation Fund, which owns enormous blocks of tenements; the Improved Industrial Dwellings Company of London, founded by Sir Sidney Waterlow as the result of a successful experiment (1862), and which endeavors to combine beauty and utility in large blocks; the Guinness Trust. On the Continent of Europe are the Berlin Mutual Building Company (1849), and other commercial and semi-philanthropic companies in different cities. In the United States A. T. White founded the Improved Dwelling Company of Brooklyn (1876), which has erected the Home Tower and Riverside buildings, the older buildings paying 10 per cent., the new buildings 5 or 6 per cent. Other New York enterprises are the Astral Apartments (Brooklyn) of Pratt Institute; Improved Dwellings Association with model tenements at Seventy-first Street, paying 6 per cent.; Tenement House Building Company, with property on Cherry Street. In Boston, the Harrison Avenue Estate, the Rufus Ellis Memorial Building, Coöperative Building Company (1871), and the Improved Dwelling Association (1885). In Philadelphia, Theodore Starr Property. The City and Suburban Company of New York City was organized in 1896 as the outcome of the Improved Housing Conference. It aims to offer a safe investment returning 5 per cent., and to provide the best accommodations for working classes. The company is willing to undertake the reconstruction of the East Side of New York City. In this connection the Marylebone Association of London, which undertakes to improve the immediate surroundings of working-class homes, should be mentioned.

Companies have been formed to build and sell property, or to make it possible for the artisans themselves to build. The Artisans', Laborers', and General Dwelling Company of London has opened up suburban estates; the Workingmen's Dwellings Company of Passy-Auteuil, the Discount Bank of Paris, and the Berlin Building Association are important examples. In the United States, building and loan associations, started in Philadelphia, have reached low-salaried clerks and artisans. The best and cheapest method originated in Belgium in 1889, and it has been tried in France and Germany. General savings banks with Government guarantee loan capital to companies of responsible individuals, who act as intermediaries in making loans to workingmen. There are two general forms of companies: (1) Joint-stock and coöperative-loan companies, which allow the individual to select his land and lend him money to put up his house; and (2) joint-stock and coöperative-building companies, who build houses and sell them. The workman pays 10 per cent. and gives a mortgage. The important feature of this system is the arrangement for a life insurance which prevents any loss to his family in case of death.

Railroad, mining, and manufacturing companies in several countries have erected dwellings for their employees. Among the cottages and even entire villages put up by employers are those

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HOUSSA. See HAUSA.

widely known as the author of two romances, *La couronne de bluets* and *La pécheresse*. He attracted attention particularly as an art critic, publishing his *Histoire de la peinture flamande et hollandaise* in 1846. In 1849 Houssaye was appointed director of the Comédie Française at the suggestion of Rachel, and held the place until 1856. He was a prolific writer in many departments of literature, producing poetry, dramas, romances, philosophical, historical, and critical works—the last being of especial merit. He was long editor of *L'Artiste*, and for some years was editor and proprietor of *La Presse*. Among his works are: *Histoire du quarante et unième fauteuil* (1845), dealing with the great men who failed of election to the French Academy; *La poésie dans les bois* (1845); *Le voyage à ma fenêtre* (1851); *Le roi Voltaire* (1858); *Rousseau et Mme. de Warens* (1864); and *Les confessions* (1885-91).

HOUSSAYE, Henry (1848—). A French historian and critic, born in Paris. He distinguished himself in the Franco-Prussian War, and was subsequently an editor of the *Journal des Débats* and the *Revue des Deux Mondes*. His *Histoire d'Alcibiade et de la république athénienne depuis la mort de Périclès jusqu'à l'avènement des trente tyrans* (1873) received from the French Academy the prize established by Thiers. In 1864 he was elected to the Academy. His further works include: *Athènes, Rome, Paris* (1878); *L'art français depuis dix ans* (1882). He made a careful study from the original documents of the fall of Napoleon and of the first French Empire. The work is in three parts, the first entitled *1814;* the second, entitled *1815,* includes the first Restoration, the return from Elba, and the Hundred Days. The third volume, also entitled *1815,* is devoted to Waterloo. These books are among the most readable that have ever been published upon the latter part of Napoleon's career.

HOUSTON, hū'ston. A city and the county-seat of Harris County, Tex., 50 miles northwest of Galveston; on Buffalo Bayou, an arm of Galveston Bay, at the head of navigation, and on the International and Great Northern, the Southern Pacific, the Missouri, Kansas and Texas, the Houston and Texas Central, and several other railroads (Map: Texas, G 5). It is a railroad centre of great importance, and improvements by the Federal Government have added to its transportation facilities by giving direct water communication with the Gulf of Mexico and the Atlantic Ocean; while local transit is facilitated by several bridges across the bayou. Houston occupies an area of nine square miles. It has the Houston Lyceum and Carnegie libraries, the building of the latter costing $50,000. Other prominent structures include the high school ($155,000), the United States Government building, the city hall, the court-house, the cotton exchange and market, and the Masonic Temple. The William M. Rice Polytechnical Institute, endowed with the estate of the founder, amounting to about $20,000,000, will be located in Houston. The city controls extensive commercial interests; it is one of the most important cotton markets in the United States, and in its lumber trade ranks There are extensive railroad car and machine shops, cotton-compresses and oil-mills, planing-mills, foundries and machine-shops, rolling-mills, potteries, brick and tile works, flour-mills, carriage and wagon shops, etc. The government, under a charter of 1897, is vested in a mayor, elected every two years, a municipal council, and administrative officials, who are chosen by popular vote. Houston spends annually in maintenance and operation about $565,000, the principal items of expenditure being $145,000 for interest on debt, $100,000 for schools, $70,000 for street expenditures, $55,000 for the fire department, $50,000 for the police department (including amounts for courts, jails, reformatories, etc.), and $20,000 for the health department (including amounts for charitable institutions). Houston was laid out and settled in 1836, was named in honor of General Sam Houston, and temporarily (in 1837) was capital of the Republic of Texas. Population, in 1890, 27,557; in 1900, 44,633.

HOUSTON, Sam (1793-1863). An American soldier and political leader, who was instrumental in securing the independence of Texas. He was born near Lexington, in Rockbridge County, Va., March 2, 1793, of Scotch-Irish parentage. After his father's death in 1806, the family emigrated to Tennessee, where he entered an academy, but left to try a clerkship in a store, and wearying of this, went to live among the Cherokees. He remained with them three years, when he returned to civilization and taught school. In 1813 he enlisted as a private in the United States Army; served bravely in General Jackson's campaign against the Creeks, being wounded at Tohopeka, and soon rose to be lieutenant. In 1817 he was appointed agent to aid in negotiations with the Cherokees; incurred hostility for attempting to prevent the smuggling of negroes from Florida into the United States, and resigned his commission, 1818, and began the study of law at Nashville. He soon opened an office at Lebanon, was made Adjutant-General of the State in 1819, and major of the State Militia. He was elected to Congress in 1822, was reëlected in 1824, and in 1827 was elected Governor. In January, 1829, he married Miss Allen, a Tennessee lady, but three months afterwards left her, and, resigning his office without giving either public or private reasons for his course, went to live among his old friends the Cherokees, who had emigrated to Arkansas. He championed their cause before Congress, incurring by this much enmity, especially from the 'Indian ring,' and becoming involved in an encounter with William R. Stanbury, Representative from Ohio, who had accused him of fraudulent attempts to obtain a contract for Indian rations. For beating Stanbury he was reprimanded in the House of Representatives, and was tried and fined, but President Jackson remitted the fine. The incident served to give Houston once more a national notoriety.

Visiting Texas in December, 1832, he was invited to settle there and become the leader of the American colonists in their struggle for their rights. He complied, and was elected a delegate to the convention held April 1, 1833, to form a State Constitution and seek membership in the

joined and in which the anti-American party was predominant. The rejection of the Constitution and the attempt to disarm the Americans led to open warfare, and Houston was then chosen general of the military district east of Trinity River, and soon afterwards commander-in-chief of the Texan army. At the head of a small force of undrilled volunteers he led in the military movements which resulted in the defeat of Santa Anna on the San Jacinto, April 21-22, 1836, and in the independence of Texas. In September he was elected President of Texas, was inaugurated October 22d, and served again from 1841 to 1844. The annexation of Texas to the United States, in 1845, was due to his negotiations, and he was one of its representatives in the Senate from 1846 to 1859. In 1859 he was again elected Governor of Texas, but opposed secession in 1861, and refused to take an oath of allegiance to the Confederate States, for which, on March 18, 1861, he was deposed. He then retired to Huntsville, Tex., where, on July 25, 1863, he died. Consult: Williams, *Sam Houston and the War of Independence in Texas* (Boston, 1893); Crane, *Life and Select Literary Remains of Sam Houston* (Philadelphia, 1884); and Bruce, *Life of General Houston* (New York, 1891), in the "Makers of America Series." See TEXAS.

HOUTMAN, hout'mȧn, CORNELIUS. A famous Dutch traveler and founder of trade with the East Indies, born at Gouda in the middle of the sixteenth century. He went on a trading voyage with his brother, Frederik, to Lisbon in 1593, where he was thrown into a debtor's prison. Released by a friend, he studied the Portuguese routes to the Far East, and returning with charts to Amsterdam, organized an expedition which sailed in four ships out of the Texel (1595). He rounded the Cape of Good Hope, passed through the Straits of Sunda to the south coast of Java, and returned safely to Holland in 1597, having demonstrated an easy route to the Spice Islands. This voyage was followed by many others, and led to the formation of the Dutch East India Company. In a second expedition of two ships in a conflict with the natives of Achin, assisted by the Portuguese, he was killed.—His brother, FREDERIK, navigator of his fleet, also played an important part in the opening of the East to trade and commerce. In 1598 he was taken prisoner by the King of Achin, but, having been freed by Paulus van Caarden, he reached Holland in 1601, and in December, 1603, went again to the East Indies, and was Governor of Amboyna during six years. In 1609 he became commander of twenty-three ships, and in 1625 was honored with a gold medal for having opened the treasures of the East to Dutch enterprise. Almost as great as his exploits in war and commerce and explorations were his linguistic attainments. Having learned the Malay language during his captivity in Achin, he opened the Malay languages to European study. In 1603 he published a dictionary with grammatical notes of Malay and Madagascar, with comparison of many Arabic and Turkish words, which work was republished in 1680 as a grammar and dictionary of Dutch and Malay. In 1880 bronze statues of the brothers Houtman were erected at Gouda, from models by Strackée of Amsterdam.

advanced civilization, gifted with reason and without passions, which Gulliver visits, in the fourth part of Swift's *Gulliver's Travels*. Their nature is supposed in the story to be as far superior to that of humanity as it is inferior in actual life.

HOVA. See MADAGASCAR, *Ethnology*.

HOVE. A town in Sussex, England, on the English Channel, west of and adjacent to Brighton (Map: England, F 6). It has all the characteristics of its larger neighbor, handsome streets, avenues, squares, public buildings, parks and recreation-grounds, marine walk, baths, etc., and is lighted with electricity. It maintains a free library, with news-room, lending and reference departments. Population, in 1891, 28,300; in 1901, 36,500.

HOVEDON, hūv'den *or* hōv'den, ROGER OF (?-c.1201). An English chronicler, born probably at Howden, in Yorkshire. He was clerk in the household of Henry II., and was employed by him on various missions. He was appointed an itinerant justice for the forests of Cumberland, Northumberland, and Yorkshire in 1189, and is supposed to have retired to Howden to write his chronicle. This begins with the year 732. Most of the work is copied, but from 1192 to 1201 is in his own writing, and has a certain value. The *Chronicle* was edited by Bishop Stubbs (1868-71, 4 vols.).

HOVELACQUE, ō'v'-lȧk', ALEXANDRE ABEL (1843-96). A French linguist and anthropologist, born in Paris. He was a pupil of Chavée in languages, and of Broca in comparative anatomy. In 1876 he was one of the founders of the Ecole d'Anthropologie, in which he was made professor of linguistic ethnography, and of which, after the death of Gavarret, he became director (1890). In spite of his scientific interests, he took an active part in politics as an extreme Republican. His works include: *Mélanges des linguistique et d'anthropologie* (1889, with Emile Picot and Julien Vinson); *Les races humaines* (1882); and *Précis d'anthropologie* (1887, with G. Hervé). In 1886 Hovelacque and Chavée founded the *Revue de Linguistique*.

HO'VEN. See BLOAT.

HO'VENDEN, THOMAS (1810-95). An American genre painter, born in Dunmanway, Ireland. He studied at the Cork School of Art, and at the National Academy of Design after he came to America, in 1863. Afterwards he was a pupil of Cabanel in Paris. He was elected a National Academician in 1882, and was a member of the American Water-Color Society, the Society of American Artists, and the Philadelphia Society of Artists. His "John Brown Being Led to Execution" is in the Metropolitan Museum of Art, New York City. His other works include: "In the Hands of the Enemy," "Jerusalem the Golden," "Chloë and Sam," and "A Breton Interior." His composition is dramatic and effective, and his pictures are very popular.

HOVEY, hō'vĭ *or* hūv'ĭ, ALVAH (1820—). An American Baptist theologian. He was born at Greene, N. Y., and graduated at Dartmouth in 1844 and at the Newton Theological Institution in 1848. After a year spent in the ministry he returned to Newton Centre as a teacher, became professor of Church history (1853), of theology and Christian ethics (1855), and was president from 1868 until 1899, and afterwards was pro-

Scriptural Law of Divorce (1866); *Manual of Christian Theology* (6th ed. 1900); *Systematic Theology and Christian Ethics* (1877); *Biblical Eschatology* (1888); *Studies in Ethics and Religion* (1892); and *Christian Teaching and Life* (1895).

HOVEY, hŭv'ĭ, ALVIN PETERSON (1821-91). An American soldier. He was born at Mount Vernon, Ind., attended the common schools, studied law, was admitted to the bar in 1843, and served successively as a circuit judge, judge of the Supreme Court, and United States District Attorney. At the outbreak of the Civil War he was appointed major of Indiana Volunteers, and later became major-general. The battle of Champion's Hill in 1863, which Grant considered the turning-point of his Vicksburg campaign, was won largely through General Hovey's efforts. When the war terminated he returned to his native State, and took an active part in politics. He became Minister to Peru in 1866, and a member of Congress in 1886, and from 1888 until his death was Governor of Indiana.

HOVEY, CHARLES MASON (1810-87). An American horticultural editor and nurseryman, born at Cambridge, Mass. He edited the *Magazine of Horticulture*, which prospered under his management longer than any other American horticultural journal. He was the first to introduced a pistillate strawberry, 'The Hovey,' the variety that marks the beginning of profitable strawberry culture in the United States. His *Fruits of America*, of which two volumes only were completed, is one of the best examples of art fruit-work attempted in this country.

HOVEY, RICHARD (1864-1900). An American poet, born at Normal, Ill. He was graduated at Dartmouth in 1885; studied for one year in the General Theological Seminary, New York; was for a time assistant in the Church of Saint Mary the Virgin, New York; and afterwards journalist, actor, dramatist, poet, and lecturer on English literature in Barnard College, New York. He passed some years in Europe, and was much influenced by French and Belgian poets, especially Maeterlinck, some of whose work he translated. His original verse was always marked by high aims, and he was ridding himself of affectations when he suddenly died. His many admirers felt that he had accomplished more than most of his poetic contemporaries, and that he died on the eve of great performances. Certainly his *Launcelot and Guenevere*—a series of dramas comprising *The Quest of Merlin*, *The Marriage of Guenevere*, and *The Birth of Galahad* (1880-98)—and *Taliesin: A Masque* (1900), though they scarcely show dramatic mastery, exhibit lyrical power and remarkable imagination. *Seaward* (1893) is an elegy upon T. W. Parsons (q.v.). Hovey also collaborated with Bliss Carman (q.v.) in *Songs from Vagabondia* (1893; another series, 1896), and published a collection of his miscellaneous poems in *Along the Trail* (1898). In these works he showed that he could touch the more immediate and ordinary human interests; but these are on the whole not emphasized in his work, which belongs to the idealistic school.

HOW, WILLIAM WALSHAM (1823-97). An English prelate, born at Shrewsbury. He was shire (1851), which position he held until he went to the Parish of Saint Andrew Undershaft, in London (1879). In that year he was appointed Suffragan Bishop of Bedford, and a year afterwards Bishop of Wakefield. His numerous works in prose include: *Private Life and Ministration of a Parish Priest* (1873); *Commentary upon Saint John* (1879); *The Papal Claims in the Light of Scriptural History* (1881); and some *Pastoral Lectures* (1883). He also wrote some *Poems* (1886) and *Hymns* (1886).

HOWADJI, hou-ăj'ĭ. A nom-de-plume of George William Curtis.

HOW'ARD. A city and the county-seat of Elk County, Kan., 72 miles south of Emporia, on the Elk River and on the Atchison, Topeka and Santa Fé Railroad (Map: Kansas, F 4). Farming and stock-raising are the leading industries. Population, in 1890, 1015; in 1900, 1207.

HOWARD. A noble English family, which for many centuries has stood at the head of the English peerage, and has held the dukedom of Norfolk since the middle of the fifteenth century. The earliest of the house to gain distinction was Sir William Howard, a learned Chief Justice of the Common Pleas under Edward I. and Edward II. His grandson, Sir John Howard, was admiral and captain of the King's navy in the north of England and also sheriff of Norfolk, in which county he held extensive estates, subsequently increased by the marriage of his grandson, Sir Robert, with the co-heiress of the House of Mowbray, Dukes of Norfolk. The only son of this union was Sir John Howard, one of the leading supporters of the House of York, who, having gained early distinction in the French wars of Henry VI., was appointed by Edward IV. constable of the important castle of Norwich, and sheriff of Norfolk and Suffolk. Afterwards he became treasurer of the royal household, obtained a grant of the whole benefit that should accrue to the King by coinage of money in the city and Tower of London, and elsewhere in England; and was raised to the peerage as Lord Howard and Duke of Norfolk. We find him in 1470 made captain-general of the King's forces at sea, and most strenuous in that capacity in his resistance to the House of Lancaster. Finally he was created Earl Marshal of England, an honorary distinction still borne by his descendants, and in 1484 was appointed Lord Admiral of England, Ireland, and Aquitaine. He fell next year, however, on Bosworth Field, and after his death his honors were attainted, as also were those of his son Thomas, who had been created Earl of Surrey. The latter, however, after suffering three years of imprisonment in the Tower of London, obtained a reversal of his own and his father's attainders, and became distinguished as a general, winning fame by his defeat of the Scotch at Flodden in 1513. His son Thomas, third Duke of Norfolk, by his marriage with a daughter of King Edward IV., became the father of the accomplished but ill-fated Earl of Surrey, who was put to death by Henry VIII. Norfolk, too, was sentenced, but the death of Henry saved him from the block. The Earl's son Thomas, fourth Duke of Norfolk, suffered attainder, and was executed on Tower Hill for high treason, for

Charles II., to his great-great-grandson, Thomas, who became eighth Duke, and whose cousin and successor, Charles, ninth Duke, was the direct ancestor of the present Duke of Norfolk.

In one or other of their widespread branches, the Howards either have enjoyed within the last three centuries, or still enjoy, the earldoms of Carlisle, Suffolk, Berkshire, Northampton, Arundel, Wicklow, Norwich, and Effingham, and the baronies of Bindon, Howard de Walden, Howard of Castle Rising, and Howard of Effingham.

Among the other distinguished members of the family, Sir Edward Howard, brother of the first Earl of Surrey, was made by Henry VIII. King's standard-bearer and admiral of the fleet, in which capacity he lost his life in boarding a French vessel off Brest in 1513; his brother, Sir Edmund, acted as Marshal of the Horse at Flodden, and his half-brother, Sir Thomas Howard, was attainted, and died a prisoner in the Tower, for aspiring to the hand of Lady Margaret Douglas, daughter of Margaret, Queen of Scotland, and niece of Henry VIII., one of whose ill-fated consorts was Lady Catharine Howard. Consult: Collins, *Peerage of England* (5th ed., London, 1779); Dugdale, *Baronage of England* (London, 1675-76); Doyle, *Official Baronage of England* (London, 1886); Howard, *Memorials of the Howard Family* (privately printed, 1834); Lodge, *Portraits of Illustrious Personages* (London, 1835).

HOWARD, Benjamin Chew (1791-1872). An American statesman, born at Belvedere, Md., son of John Eager Howard, Revolutionary officer, and grandson of Chief Justice Benjamin Chew. He was educated at Princeton (1809), studied law, and practiced in Baltimore. In 1814 he was active in the defense of the city, and he fought at North Point. He was a United States Representative (1829-33, 1835-39), became head of the Committee on Foreign Relations, and wrote its report on the boundary question. For twenty years he was reporter of the United States Supreme Court. He was nominated for Governor of his State in 1861, but withdrew his name. In the same year he was delegate to the Peace Congress. His *Reports of Cases in the Supreme Court of the United States from 1843 till 1855* was published in the latter year.

HOWARD, Blanche Willis (1847-98). An American novelist, born in Bangor, Maine. She was educated in New York City, but dwelt after 1878 in Stuttgart, where she taught and wrote. In 1890 she married Baron von Teuffel, a physician. The more noteworthy of her novels are: *One Summer* (1875); *Aunt Serena* (1880); *Guenn* (1882); *Aulnay Tower* (1886); *The Open Door* (1889); *No Heroes* (1893), a story for boys; *A Fellowe and His Wife*, in collaboration with William Sharp (1892); a volume of short stories, *Seven on the Highway* (1897); the posthumously published *Dionysius the Weaver's Heart's Dearest* (1899), and *Garden of Eden* (1900). She wrote also a book of travel, *One Year Abroad* (1877).

HOWARD, Bronson (1842—). A well-known American dramatist, born at Detroit. He prepared for college at New Haven, but instead of entering Yale, turned to journalism in New

a dramatic piece called
played in Detroit, but hi
was *Saratoga*, produced
1870. It was very succe
first of the long series of
Howard a foremost posi
playwrights. Among his
are: *The Banker's Daugh*
Letters (1878); *Young M*
One of Our Girls (1885);
Shenandoah (1889); and
In 1899 he collaborated w
in *Peter Stuyvesant. A*
satire upon some featur
American society, has be
best play, though the war
is more ambitious, and *Old*
a different line, is an in
mental comedy. Mr. How
Sir Charles Wyndham, t
he made his home in both
where some of his plays h
lar than in America.

HOWARD, Catharine
of Henry VIII. She was a
Howard, third son of the
King married her soon afte
of Cleves, in 1540. She wa
conduct before her marria
conduct after it. After a tr
seems to have been establis
with Lady Rochfort, who
intrigues, February 13, 15
History of England, vol. iv.

HOWARD, George Eli
American educator and auth
N. Y. He graduated at t
braska in 1876, studied a
Munich and Paris in 1876-7
of history in the Universit
1879 to 1891. From 1891
head of the history departm
American and institutional
Stanford, Junior, Universit
special courses in history a
and the University of Wisco
was secretary of the Nebra
Society. His writings, in a
tions to professional and o
clude: *Local Constitutional*
States (1889); *The Evolutio*
(1890); and *The King's P*
Peace Magistracy (1891).

HOWARD, George Willi
Carlisle, seventh Earl of.

HOWARD, Henry. See

HOWARD, Jacob Merri
American legislator, born at
graduated at Williams Colle
law, and began to practice in
was a member of the State
and in 1840 was elected to C
in which party he was an acti
in 1844, 1848, and 1852. He
part in bringing about a coal
and Free-Soil Democrats in 18
of the platform drawn up at
of the two parties held at

June 6, 1854, and is said to have suggested the name of 'Republican' for the new political organization thus brought into existence. He was nominated for Attorney-General of the State by the new party in that year, and was elected and reëlected twice thereafter, serving until 1859. In 1862 he was elected to the United States Senate, to fill a vacancy caused by the death of Senator Bingham, and was reëlected for a full term in 1864. He translated from the French the *Secret Memoirs of the Empress Josephine* (1847).

HOWARD, JOHN (1726-90). An English philanthropist, best known for his work in behalf of prison reform. He inherited a considerable fortune from his father, and spent his early life in travel. Settling at Cardington, Bedfordshire, in 1756, he erected model cottages for his tenants, and furnished schools for children of all sects. In 1773 he was appointed high sheriff of Bedfordshire, and soon the defective arrangements of prisons and the intolerable distress of prisoners were brought under his notice. Finding that all the abuses he had seen at home existed in neighboring counties, he traveled all over the United Kingdom, and finally became a self-appointed prison inspector, not only of Great Britain and Ireland, but of all Europe. He gave evidence before the House of Commons, and in 1774 laws were passed for the improvement of the sanitation of prisons and the abolition of jailers' fees. In 1777 he published his *State of the Prisons in England and Wales, with . . . an Account of Some Foreign Prisons.* After each of his many tours new editions, with additional facts, were published. One important result of this book was the adoption of the hard-labor system in English prisons. In 1785 Howard investigated the infection hospitals of Europe, with a view to discovering the best means of preventing the plague, and published *An Account of the Principal Lazarettos in Europe* (1789). He died of camp fever, while studying the Russian military hospitals. He was a man of deep religious feelings. He traveled more than 50,000 miles in making his investigations, on which he spent at least £30,000 of his own fortune, refusing all Government aid. Of the numerous works on Howard, consult, especially, his *Correspondence,* edited by J. Field (1855), and lives by Hepworth Dixon (1849), by J. Field (1850), and by John Stoughton (1853; new ed. 1884).

HOWARD, JOHN EAGER (1752-1827). An American soldier, born in Baltimore County, Md. He served throughout the Revolutionary War, participating in the battles of White Plains, Germantown, Monmouth, Camden, Cowpens, Guilford Court House, and Eutaw Springs, becoming lieutenant-colonel in 1780, and receiving a silver medal from Congress for his conduct at the battle of Cowpens. He was wounded at Eutaw Springs. At the close of the war he entered politics, and represented Maryland in Congress from 1787 to 1788. He was the Governor of his State from 1789 to 1792. In 1795 he was a member of the Maryland Senate; was a United States Senator from 1796 to 1803, declining in 1796 the portfolio of Secretary of War; and in 1798 was made a brigadier-general by Washington, when a war with France seemed certain. He organized a defense of Baltimore in 1814, when the English forces threatened the city, and two years later was a Federal candidate for Vice-President.

HOWARD, LELAND OSSIAN (1857—). An American entomologist, born at Rockford, Ill. He took a scientific course at Cornell, followed by post-graduate work at Georgetown University, and was for six years assistant in entomology at the United States Department of Agriculture. He was made curator of the same in 1895, edited "Insect Life" for its *Journal,* lectured on entomology, and wrote on that subject for the *Century* and *Standard* dictionaries. He was president of the Association of Economic Entomologists (1894), of the Washington Biological Society (1897-98), and a member of many other scientific bodies.

HOWARD, OLIVER OTIS (1830—). An American soldier. He was born in Leeds, Maine; graduated at Bowdoin in 1850, and at West Point in 1854; served as chief of ordnance during the Seminole troubles of 1857; and was assistant professor of mathematics at West Point from 1857 to 1861. Leaving the Regular Army in June, 1861, he became colonel of the Third Maine Volunteers, and commanded a brigade in the first battle of Bull Run. He was promoted to be brigadier-general of United States volunteers in September; participated in the Peninsular campaign; and in the battle of Fair Oaks (June 1, 1862) received a wound which necessitated the amputation of his right arm. After a short leave of absence he rejoined the Army of the Potomac; took a prominent part in the battle of Antietam; was promoted to be major-general of volunteers in November; and was engaged in the battle of Fredericksburg (December 13th). In April, 1863, he was placed in command of the Eleventh Army Corps, and as such took a conspicuous part in the battles of Chancellorsville and Gettysburg. He then served in the Chattanooga campaign, taking part in the battle of Chattanooga, and accompanying Sherman on his march for the relief of Knoxville. From April to July, 1864, he commanded the Fourth Army Corps of the Army of the Cumberland, and during the march to the sea and the campaign in the Carolinas commanded the Army of the Tennessee, which constituted the right wing of General Sherman's army. In December, 1864, he was appointed brigadier-general in the Regular Army, and in March, 1865, was brevetted major-general for services at Ezra Church and during the Atlanta campaign. From May, 1865, to July, 1874, he was commissioner of the Bureau of Refugees, Freedmen, and Abandoned Lands. Within less than three years 1400 schools (not including 700 Sabbath schools) had been established, and many of the freedmen had been enabled to buy and maintain homesteads of their own. (See FREEDMEN'S BUREAU.) In 1874 Howard was placed in command of the Department of the Columbia, and in this capacity conducted the operations against the Nez Percés Indians in 1877, and against the Bannocks in 1878. He subsequently was superintendent of the United States Military Academy at West Point (1881-82), and commanded successively the departments of the Platte, of California, and of the East. In 1886 he was appointed major-general in the Regular Army, and in November, 1894, retired from the service. In 1895 he founded the Lincoln Memorial University at Cumberland Gap, Tenn. Besides numerous magazine articles, his publications include: *Donald's School Days* (1879); *Chief Joseph, or the Nez Percés in Peace and*

War (1881); *General Zachary Taylor* (1892), in the "Great Commanders Series;" *Isabella of Castile* (1894); *Fighting for Humanity;* and *Henry in the War.* Consult Stowe, *Men of Our Times* (New York, 1868).

HOWARD, Sir ROBERT (1626-98). An English dramatist, son of Thomas Howard, first Earl of Berkshire, by Elizabeth, daughter of William Cecil, Lord Burghley. During the Civil War he took the Royalist side, and was knighted (1644). He was imprisoned under the Commonwealth in Windsor Castle; but after the Restoration lucrative posts were given him, and he sat in Parliament. He is the Crites of Dryden's *Essay on Dramatic Poesy.* Dryden married his sister Elizabeth. Of Howard's five extant plays, *The Committee* (1692), caricaturing the manners of the Commonwealth, is most interesting.

HOWARD, THOMAS, Earl of Arundel. See ARUNDEL.

HOWARD UNIVERSITY. An educational institution, situated in Washington, D. C., incorporated in 1867, and named for Gen. O. O. Howard, one of its founders and early presidents. The university was established by the Government, and, with the exception of its medical department, is supported by Congressional appropriations administered by the Secretary of the Interior. It has, in addition, a general endowment fund of $175,000, and property valued at $1,000,000. The university is non-sectarian, and is open to students of both sexes, without regard to nationality. It is chiefly known, however, for its work in the higher education of the negro. No tuition is charged in any department except the medical, and the outside expenses of worthy students are also partially defrayed by the university. In addition to preparatory, collegiate, and medical departments, the university maintains schools of pedagogy, law, pharmacy, dentistry, theology, music, and agriculture. Trade instruction is provided by the industrial department, in which students of the preparatory and English courses are given practice in carpentry, tinsmithing, printing, and bookbinding, under the direction of skilled workmen. The university printing-office issues monthly the *Howard Standard.* In 1902 the students, exclusive of those in the departments of agriculture and music, numbered 939. The library contains about 40,000 volumes.

HOWARTH, hou'ërth, ELLEN CLEMENTINE (1827—). An American poet, born at Cooperstown, N. Y. She wrote a number of songs, such as "'Tis but a Little Faded Flower," and published a volume, *The Wind-Harp and Other Poems* (1864). Her later work has been edited, with an introduction by Richard W. Gilder.

HOWE, ALBION PARIS (1818-97). An American artillery officer in the War of the Rebellion. He was born in Maine and educated at West Point. He entered the Fourth Artillery, from 1843 to 1846 was a mathematical instructor at West Point, served creditably in the Mexican War, was made a captain in 1855, and after the outbreak of the rebellion became General McClellan's chief of artillery in western Virginia in 1861. During the campaign on the Peninsula, in 1862, he commanded a light-artillery brigade in the Army of the Potomac. Having been appointed a brigadier-general of volunteers in 1862, he was assigned to a brigade in Couch's division, Fourth Army Corps; was in command of the artillery depot at Washington in 1864-66; and was brevetted major-general in the Regular Army in 1865 for meritorious service during the rebellion. General Howe took part in the battles of Manassas, South Mountain, Antietam, Fredericksburg, and Gettysburg. He was retired from the army in 1882.

HOWE, ELIAS (1819-67). An American inventor, born in Spencer, Mass. His father was a miller, and after working in his mills the boy went, in 1835, to Lowell, where he entered a manufactory of cotton machinery. Two years later he lost his position on account of the financial panic, but finally secured work in a machine-shop, first in Cambridge, and later in Boston. About 1843 he commenced the practical working out of his idea for a sewing-machine, and by 1845 the invention was finished; but, despite its obvious advantages, met with bitter opposition. For the next nine years Howe was wretchedly poor. A trip to England in 1847 in hope of being able to interest capitalists there was unsuccessful, and he sold the English rights to his machine for $250. Upon his return to this country he found that his invention had been pirated, and that many sewing-machines were already in use. He secured influential backing, and immediately began action to establish his patent. After long suits he won his case, and thereafter was one of the leading manufacturers in the United States. Although improvements on Howe's machines were subsequently made by Singer and others, there is no doubt that the Howe was the original prototype of the present machine. When the Civil War broke out, Howe volunteered as a private in the Seventeenth Connecticut Volunteers. In 1867 he received the gold medal and the cross of the Legion of Honor at the Paris Exhibition.

HOWE, HENRY (1816-93). An American historian and publisher, born at New Haven, Conn., son of Gen. Hezekiah Howe, the publisher. He entered the publishing business in 1839, and in 1840 began his historical research in New York and New Jersey, together with John W. Barber. He made like studies in Ohio, sketching old landmarks and interviewing old settlers. Soon after the publication of his work in Ohio he removed to Cincinnati, where he published subscription books for nearly thirty years. In 1878 he returned to New Haven, but in 1885 went back to Ohio, prepared a second edition of his history of that State, and entered the publishing business again. He wrote: *Eminent Mechanics* (1839); *Historical Collections of New York* (1841), of *New Jersey* (1843), and of *Ohio* (1847 and 1891); *The Great West* (1851); *Travels and Adventures of Celebrated Travelers* (1853); *Life and Death of the Ocean* (1855); *Adventures and Achievements of Americans* (1858); *Our Whole Country* (1861); *Times of the Rebellion in the West* (1876); *Over the World* (1883); *Outline History of New Haven* (1884); and *New Haven Elms and Greens* (1885).

HOWE, JOHN (1630-1705). A Puritan clergyman, called the *Platonic Puritan.* He was born May 17, 1630, at Loughborough, in Leicestershire. He studied both at Cambridge and Oxford, and after preaching for some time at Winwick, in Lancashire, and Great Torrington, in Devonshire, he was appointed domestic chaplain to Cromwell in 1656. He held the same position

ing the Commonwealth made him an object of close suspicion to the Government. The Act of Uniformity ejected him from his parish (1662), and he wandered about preaching in secret till 1671, when he was invited by Lord Massereene, of Antrim Castle, in Ireland, to become his domestic chaplain. There he began his greatest work, *The Good Man the Living Temple of God* (1676-1702), which occupies one of the highest places in Puritan theology. In 1676 he became pastor of the dissenting congregation in Silver Street, London. In 1677 he published, at the request of Robert Boyle, *The Reconcilableness of God's Prescience of the Sins of Men with the Wisdom of His Counsels and Exhortations;* in 1681, *Thoughtfulness for the Morrow;* in 1682, *Self-Dedication;* in 1683, *Union Among Protestants;* and in 1684, *The Redeemer's Tears Wept Over Lost Souls.* In 1685 he was invited by Lord Wharton to travel with him on the Continent; and, after visiting the principal cities, in 1686 he settled, owing to the state of England, at Utrecht. In 1687 King James's "Declaration for Liberty of Conscience" induced him to return to England, and at the revolution the next year he headed the deputation of dissenting clergymen when they brought their address to the throne. Besides smaller works, he published, in 1693, *Carnality of Religious Contention;* in 1694-95, several treatises on the Trinity; in 1699, *The Redeemer's Dominion Over the Invisible World;* and he continued writing till 1705, when he published *Patience in Expectation of Future Blessedness.* He died in London, April 2, 1705. His works have been several times reprinted. For his life, consult: Rogers (London, 1879), and Horton (ib., 1896).

HOWE, Joseph (1804-73). A Canadian statesman, born at Halifax, N. S. He was the son of John Howe, a Boston printer and Loyalist, who settled at Halifax on the outbreak of the Revolution. From the printer's office the son pushed his way into journalism, becoming in 1828 proprietor and editor of the *Nova Scotian.* To this famous newspaper he contributed remarkable sketches under the titles "Western and Eastern Rambles" and "The Club," and the no less remarkable papers called "Legislative Reviews." In his journal first appeared also T. C. Haliburton's (q.v.) "Sayings and Doings of Sam Slick." Elected to the local Parliament in 1836, Howe became the most conspicuous figure in his province. Mainly through his efforts a responsible government was won for Nova Scotia. He became a member of the Executive Council (1840), Speaker of the Assembly (1840), Secretary of State for the Dominion (1870), and Governor of Nova Scotia (1873). Consult: His *Speeches and Public Letters,* edited by Annand (Boston, 1858); and Fenety, *Life and Times of Howe* (Saint John, N. B., 1896).

HOWE, Julia (Ward) (1819—). An American poet, philanthropist, and sociological writer, active in the agitation for the legal and political rights of women. She was born in New York, of wealthy parents, and married, in 1843, Dr. S. G. Howe, a philanthropist, best known for his labors for the education of the blind. With him she edited the Boston *Commonwealth,* an anti-slavery journal, lecturing also on social subjects female suffrage, and of prison and other reforms. Her early publications, *Passion Flowers* (1854), *Words for the Hour* (1856), and *Later Lyrics* (1866), were in verse, the best known of her pieces being the once immensely popular "Battle Hymn of the Republic," which was written in 1861, and inspired by the sight of troops marching to the tune of "John Brown's Body." She wrote also during this period two dramas, *The World's Own* (acted in 1855), and *Hypolytus* (1858). The more significant of her later works are: *Sex and Education* (1874); *Modern Society* (1881); a *Life of Margaret Fuller* (1883), and valuable autobiographical *Reminiscences 1819-99* (1899). Her verse is collected in *From Sunset Ridge, Poems New and Old* (1898).

HOWE, Richard, Earl (1725-99). A British admiral. He was the second son of Emanuel Scrope, second Viscount Howe of the Irish peerage. He left school at Eton when only fourteen and went with Anson on the *Severn* to attempt a voyage around the world. He commanded the *Baltimore,* which, with the *Greyhound* and *Terrible,* fought two large French frigates off the west coast of Scotland, in 1746. The English squadron was beaten, and Howe was severely wounded. In 1747 his ship, the *Dunkirk,* captured the *Alcide* off Newfoundland. His next service was under Sir Edward Hawke, in the expedition against Rochefort. He ordered to attack the fort on the Isle of Aix with his ship, the *Magnanime,* he compelled it to surrender and achieved the only material success which attended the expedition. He was commodore of a squadron which sailed in 1758 for Saint-Malo. The troops were landed and reëmbarked without delay after destroying all the magazines and shipping in the port. In the same year he took Cherbourg and destroyed the magazines and cannon. A second attack upon Saint-Malo was repulsed with great loss of life. In 1758, after his brother, a brigadier-general, was killed at Ticonderoga, Howe succeeded to the Irish title of viscount and to the family estate. He continued his distinguished naval service to the end of the Seven Years' War.

In 1760 he was made colonel of the Chatham division of marines, and afterwards a Lord of the Admiralty and Treasurer of the Navy. In 1776 he was placed in command of the fleet on the American coast. In 1778 he held his own against a superior naval force under D'Estaing. He was made a viscount of Great Britain in 1782. The next year he set out with a fleet to relieve Gibraltar, succeeded in disembarking troops, ammunition and supplies, and then offered battle to the combined fleets of France and Spain, which declined an engagement. This achievement gave him a brilliant reputation. He was made First Lord of the Admiralty in 1783, and received an Irish earldom in 1788. When the war with France broke out in 1793, he took the command of the Channel fleet, and next year gained the victory known as that of 'the glorious first of June.' The French fleet consisted of twenty-six ships of the line, and the English of twenty-five. Howe, in his flagship, the *Queen Charlotte,* came up off Ushant, the French admiral, who, rather than an hour crowded all the sail he could carry, followed by as many of his ships as could get away. The English captured ships of 80 guns, and four 74's; and

sank immediately after she was taken possession of. London was illuminated three nights in honor of the victory; the thanks of Parliament were voted to Howe, and George III. gave him a sword and made him a Knight of the Garter. His last service was in bringing back the mutinous seamen at Portsmouth to their duty in 1797. Consult: Barrow, *Life of Richard, Earl Howe* (London, 1838); Beatron, *Naval and Military Memoirs of Great Britain* (London, 1804); Chevalier, *Histoire de la marine française* (Paris, 1900); *British Magazine and Review* (June, 1783); O'Beirne, *A Candid and Impartial Narrative of the Transactions of the Fleet Under the Command of Lord Howe from the Arrival of the Toulon Squadron, etc.* (London, 1780); Poggi, *A Narrative of the Proceedings of His Majesty's Fleet from the 2d of May to the 2d of June, 1794* (London, 1796).

HOWE, Robert (1732-85). An American patriot and soldier, born in Brunswick County, North Carolina. After serving against the Indians, he was elected to the Assembly in 1765, and the same year Governor Tryon nominated him commander of Fort Johnson on the Cape Fear River. He served in the Assembly until 1775, was a member of the Provincial Congresses of 1774 and 1775, and took a prominent part in the preparations for revolt. On September 1, 1775, he was made colonel of the second North Carolina Regiment, afterwards a part of the Continental line, and aided General Woodford in driving Lord Dunmore, the British Governor, from Virginia. He was made brigadier-general of the Continental troops March 1, 1776, and was especially excepted from the general offer of amnesty issued by Sir Henry Clinton. He was made major-general October 20, 1777, and placed in command of the Department of the South. An unsuccessful expedition to Florida resulted in the abandonment of Savannah in December, 1778, and Howe was succeeded in his command by Gen. Benjamin Lincoln. He commanded the North Carolina troops at the defense of Charleston (1780), and was in command of West Point the same year. In 1781 he was tried by court-martial for the loss of Savannah on the complaint of the Georgia Assembly, but was honorably acquitted. During this year and again in 1783 he was sent by Washington to reduce mutinous regiments, and was entirely successful. He was sent to pacify the Indians of the West in 1785, and the same year was elected to the North Carolina Legislature, but died before taking his seat.

HOWE, Samuel Gridley (1801-76). An American reformer and philanthropist, born in Boston. He graduated at Brown in 1821, and took the degree of M.D. at the Harvard Medical School in 1824. Stirred by the poems of Byron, he offered his services to the Greeks in their struggle for independence. In Greece his services were not confined to the duties of a surgeon, in which capacity he had volunteered, but were of a more military nature, and his bravery, enthusiasm, and ability as a commander, as well as his humanity and nobility of character, won for him the title of 'the Lafayette of the Greek Revolution.' He continued in the service until 1827, when he returned to America to raise funds and supplies to alleviate the famine and suffering in Greece. Through his efforts more than $60,000 was raised, besides large
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in 1843, assisted him. He
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at its close entered into the
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quire into the practicability
Santo Domingo. It is probab
say that no man ever lived
truly deserved the name ph

highest and best sense—a lover of his fellowmen; and no American certainly was ever connected with more great reforms that were brought to a successful conclusion. Consult Sanborn, *Dr. S. G. Howe, the Philanthropist* (New York, 1891).

HOWE, TIMOTHY OTIS (1816-83). An American lawyer and politician, born in Livermore, Maine. He was admitted to the bar in 1839, and in the following year became a Whig member in the Maine Legislature. In 1840 he was obliged by ill health to give up his career in Maine, and removed to Green Bay, Wis., which was his home during the rest of his life. In 1850 he was elected judge of the Circuit and Supreme courts of Wisconsin. From 1861 to 1879 he was a member of the United States Senate as a Republican, and served on the committees of Finance, Commerce, Pensions, and Claims. He declined an appointment to the vacancy in the United States Supreme Court occasioned by the death of Judge Chase. In 1881 he became Postmaster-General in President Arthur's Cabinet, and in the latter part of that year went to Paris as a United States delegate to the International Monetary Conference.

HOWE, Sir WILLIAM (1729-1814). A British soldier in the American Revolution, younger brother of Richard, Earl Howe (q.v.), whom he succeeded as fifth Viscount Howe in 1799. He was educated at Eton, was appointed a cornet in 1746, and saw service in Flanders. In 1750 he became captain, and in 1757, having attained the rank of lieutenant-colonel, he was placed in command of the Fifty-eighth Foot, and sent with it in the following year to America, where he took part in the siege and capture of Louisburg and accompanied Wolfe on his expedition to Quebec. After the capture of Montreal, in 1760, he returned to Europe, and in 1762 was adjutant-general of the expedition against Havana. After the close of the Seven Years' War he was made colonel of the Forty-sixth Foot (1764), was elected to Parliament as a Whig from Nottingham, and in 1768 was appointed Lieutenant-Governor of the Isle of Wight. He attained the rank of major-general in 1772. When the rupture with the American Colonies became imminent, Howe was pronounced in his condemnation of the Government's course. Nevertheless, in spite of this feeling, and of his dislike for General Gage, he commanded the reënforcements sent to the latter at Boston in March, 1775. He commanded the British in the battle of Bunker Hill, on June 17th following. Later he was made a lieutenant-general, and in October succeeded Gage in command of all the troops in America outside of Canada, with the local rank of general. He was besieged in Boston by Washington during the winter of 1775-76, and, being compelled to abandon the city, withdrew his troops to Halifax, and afterwards transferred his command to Staten Island, whence he moved on New York, winning the battle of Long Island on August 27, 1776, and occupying the city on September 15th. On October 28th he defeated Washington at White Plains, and afterwards captured Forts Washington and Lee, after which he settled down in New York for the winter. It was not until June, 1777, that he again took the field. Wishing to reach Philadelphia, and finding that he had not a sufficiently large force to advance across New Jersey in the face of Washington's army, he embarked his troops, and sailed down the coast and up the Chesapeake Bay as far as Elkton, where he landed his forces on August 28th. Marching northward, he encountered and defeated Washington at the Brandywine on September 11th, and on September 27th occupied Philadelphia. On October 4th the Americans were repulsed at Germantown. After hearing the news of Burgoyne's surrender at Saratoga on October 17th, Howe made arrangements to stay in Philadelphia during the winter, while Washington went into winter quarters at Valley Forge. Howe had sent in his resignation shortly after taking Philadelphia, but it was not accepted until May, 1778, when Sir Henry Clinton was appointed to succeed him. Before leaving Philadelphia his officers gave him a farewell entertainment in the shape of a mock tournament, which they named the 'Mischianza' (q.v.). He was severely criticised for his inactivity at Philadelphia, and in 1779, after his return to England, his conduct was the subject of a Parliamentary inquiry; but the examining committee reached no definite decision in the matter. In 1782 he became lieutenant-general of ordnance, and attained the rank of full general in the following year. During the remainder of his life he held various commands in England.

HOWELL. A village and the county-seat of Livingston County, Mich., 34 miles east by south of Lansing, on the Ann Arbor and the Pere Marquette railroads (Map: Michigan, K 6). It has manufactures of flour, condensed milk, sash and doors, etc. Population, in 1890, 2387; in 1900, 2518.

HOWELL, JAMES (c.1594-1666). An English author, born in Wales. He graduated B.A. from Jesus College, Oxford (1613); traveled extensively on the Continent as agent of a London glass house, and afterwards as a representative of the Government. He was imprisoned for a time during the Civil War, but after the Restoration he was appointed historiographer royal of England. Howell wrote with ease and grace many books, of which the best is *Epistolæ Hoelianæ; Familiar Letters, Domestic and Foreign, Divided into Sundry Sections, Partly Historical, Political, and Philosophical* (vol. i. 1645; vol. ii. 1647; together with a third vol. 1653). By 1737 this book had passed through ten editions. Consult: reprint of the tenth edition by J. Jacobs (London, 1890); and for a popular edition, the "Temple Classics Series."

HOWELL, JOHN CUMMING (1819-92). An American naval officer, born in Philadelphia, Pa., and educated at Washington College, Pennsylvania. He was appointed a midshipman in the United States Navy in 1836; saw some service in the naval operations of the Mexican War; became commander in 1862, and participated in many engagements during the Civil War, with especial distinction in the battle of Hatteras Inlet and in the two attacks upon Fort Fisher. He served as fleet captain of the European station in 1869-70; was commandant of the League Island Navy-Yard at Philadelphia in 1871-72, and of the Portsmouth Navy-Yard from 1872 to 1874. From 1874 to 1879 he was chief of the Bureau of Yards and Docks, at times acting as Secretary of the Navy; was in command of the European squadron from 1879 to 1881, and on

November 24, 1881, was retired with the rank of rear-admiral.

HOWELL, WILLIAM HENRY (1860—). An American physiologist. He was born in Baltimore and graduated in 1881 at Johns Hopkins, where he became associate professor of physiology (1888), and in 1893, after teaching in the University of Michigan and for one year at Harvard, was promoted to a professorship. He was made dean of the Medical School in 1899. Dr. Howell contributed to the London *Journal of Physiology*, the *Transactions of the Royal Society*, the *Johns Hopkins Biological Studies*, the *Journal of Morphology*, and the *Journal of Experimental Medicine*. In 1896 he edited *An American Text-Book of Physiology*. He contributed articles on physiology to the *New International Encyclopædia*.

HOWELLS, WILLIAM DEAN (1837—). An American novelist, editor, poet, and critic, born at Martin's Ferry, Ohio, March 1, 1837, of well-to-do Welsh-Quaker ancestry. Howells spent his youth among books. He began making verses almost as soon as he could read, serving a literary apprenticeship in his father's printing-office, afterwards as compositor on the *Ohio State Journal* and other newspapers, and still later as correspondent and editor. He first attracted marked attention by poems published in the *Atlantic Monthly*. In 1860 he published *Poems of Two Friends* with John J. Piatt (q.v.), and in the same year wrote a campaign *Life of Lincoln*, in recognition of which he received the Venetian consulate (1861-65), as a fruit of which we have *Venetian Life* (1866), a work of vivid realism, flexible style, and genuine charm, which was followed by *Italian Journeys* (1867). On his return to America Howells was connected editorially with the *Tribune*, the *Times*, and the *Nation* of New York, and, from 1866 to 1881, the *Atlantic Monthly* of Boston, of which he was the editor from 1871. *Their Wedding Journey* (1871), his first attempt at fiction, was followed, during his Boston residence, by *A Chance Acquaintance* (1872); *A Foregone Conclusion* (1874); *Out of the Question* (1876); *A Counterfeit Presentment* (1877); *The Lady of the Aroostook* (1878); and *The Undiscovered Country* (1880). *A Fearful Responsibility* (1882); *Dr. Breen's Practice* (1883); *A Modern Instance* (1883); *A Woman's Reason* (1884); *Three Villages* (1885); and *The Rise of Silas Lapham* (1885) were written during a residence in England and Italy. On his return in 1886 Howells assumed an editorial function for *Harper's Magazine*, developing strong critical powers, and steadily opposing the romantic or pseudo-historic in modern fiction, though he is himself given to fanciful thoughts. He was also for a short time editor of the *Cosmopolitan Magazine*. The more noteworthy volumes of fiction in this period are: *The Minister's Charge* (1886); *Indian Summer* (1886); *April Hopes* (1888); *Annie Kilburn* (1888); *A Hazard of New Fortunes* (1889); *The World of Chance* (1893); *The Coast of Bohemia* (1893); *The Story of a Play* (1899); *Ragged Lady* (1899); *Their Silver Wedding Journey* (1899); *A Pair of Patient Lovers* (short stories, 1901); *Heroines of Fiction* (1901); *The Flight of Pony Baker* (1902); and *The Kentons* (1902). Howells has written also many farces, of which *The Sleeping-Car*, *The Mouse-Trap*, *The Elevator*, and *Out of the Question*, are characteristic. Noteworthy also are *Tuscan Cities* (1885); *Modern Italian Poets* (1887); *Criticism and Fiction* (essays); *A Boy's Town* (1890); *A Traveler from Altruria* (1894); *Impressions and Experiences* (1896); and *Literary Friends and Acquaintance* (1900).

His poems were collected in 1873 and 1886, and a volume under the title *Stops of Various Quills* appeared in 1895. Perhaps of all the books named above, *The Rise of Silas Lapham* and *A Hazard of New Fortunes* represent their author at his best. He is the founder of the school of American realists who derive through the Russians from Balzac, and has little sympathy with any other form of fiction, although full of encouragement for new writers in whom he discovers a fresh note. His style is admirable, and his knowledge of the details of life accurate and minute. Like all innovators, he has probably had in full measure the defects of his qualities, and has in consequence alienated many readers; but it can hardly be doubted that his has been the most influential work done in American fiction during the last quarter of a century.

HOWELL'S STATE TRIALS. See STATE TRIALS.

HOWISON, GEORGE HOLMES (1834—). An American scholar, born in Montgomery County, Md. He graduated at Marietta College in 1852 and at the Lane Theological Seminary in 1855. After holding positions at Harvard and other universities, he was appointed Mills professor of philosophy at the University of California in 1884. His publications include: *Treatise on Analytic Geometry* (1869); and *The Conception of God* (1897).

HOWITT, WILLIAM (1792-1879) and MARY (1799-1888). Two English authors, who may well be treated together. William Howitt was born at Heanor, Derbyshire. His parents were Quakers. Though he attended several schools, he educated himself mostly by reading. From his youth he was fond of outdoor sports, and he celebrated in verse the scenery with which he was familiar. In 1821 he married Mary Botham, daughter of a prosperous Quaker of Uttoxeter, Staffordshire. After living for a year in Staffordshire, they settled in Nottingham, where William set up as a druggist. Here they remained for twelve years. They subsequently lived at Esher in Surrey, London, Heidelberg, and Rome. William spent two years in Australia (1852-54). Somewhat after middle life they became spiritualists. Both died in Rome and were buried there. Soon after their marriage they began to write in collaboration, and then independently. Among their joint works are contributions in verse and prose to annuals and periodicals; *The Forest Minstrel* (1823); *The Desolation of Eyam, and Other Poems* (1827); *Literature and Romances of Northern Europe* (1852); and *Ruined Abbeys and Castles of Great Britain* (1862). Among William's independent works are: *Book of Seasons, or Calendar of Nature* (1831); *Popular History of Priestcraft* (1833); *Pantika, or Traditions of the Most Ancient Times* (1835); *Rural Life of England* (1838); *Visits to Remarkable Places* (1st series, 1839; 2d series, 1841); *Boys' Country Book* (1839); *Rural and Domestic Life of Germany* (1842); *Popular History of England*

(1856-62); and *The Mad War Planet, and Other Poems* (1871). Among Mary's independent publications, numbering 110 distinct works, are translations from Fredrika Bremer and Hans Andersen; *Sketches of Natural History* (1834); *Popular History of the United States* (1859); a novel called *The Cost of Caergwyn* (1864); *Tales in Prose for Young People* (1864); *Tales in Verse for Young People* (1865); and *Tales for All Seasons* (1881). From these lists it may be seen that the Howitts did much for their generation by diffusing knowledge. On the other hand, they wrote little or nothing of permanent value. Consult *Mary Howitt: An Autobiography*, edited by her daughter, Margaret Howitt (London, 1889).

HOWITZER (from *howitz*, from Ger. *Haubitze*, formerly *Haubnitze*, from Boh. *haufnice*, *haufenice*, howitzer, sling for casting stones). A type of artillery. Although a short cannon, it differs from the mortar (q.v.), in that the latter is used for vertical fire, while the howitzer discharges its shells in a horizontal direction. It is one of the oldest forms of artillery, and was used in Europe as early as the fifteenth century, and in America it was the first type of cannon to be manufactured. It is now one of the most important types of modern ordnance, howitzer batteries forming a part of the artillery corps of all the great nations of the world. The special value of the howitzer is in indirect fire when high trajectories are necessary, and when nothing but a large angle of descent of the projectile can be effective in attack. It has been found in recent military operations that the howitzer is of supreme importance in supplementing the gun in field and mountain artillery batteries, owing to the fact that the field gun with its flat trajectory fire prevents the enemy from exposing himself, and if the latter is strongly intrenched, he can hold his position until attacked by infantry. The curved fire of the howitzer, on the other hand, will clear the enemy's trenches, and compel resistance or a change of position. Many European authorities now advocate the addition of a howitzer gun to every battery of field and mountain artillery. In the frontier defense of Austria, the howitzer plays an important part. The pieces are of 24 centimeters (almost 10 inches) calibre, and fire a shell weighing 300 pounds, containing a heavy bursting charge of high explosive. Although not originally designed for field work, they can be moved and brought into position and fired in twenty minutes' time after arrival at the desired point. See ARTILLERY; ORDNANCE.

HOW'LAND, ALFRED CORNELIUS (1838—). An American painter, born at Walpole, N. H. He studied under Schultz and Eppindale in Boston, and afterwards went to Düsseldorf and later to Paris, where he became a pupil of Lambinet. His works in genre and landscape are: "Sunlit Path" (1871); "Ford's Glen" (1878); "Monday Morning" (1879); "The Gossips" (1880); "Rendezvous of the Veterans" (1884); and "The Coming Circus" (1886).

HOWLER, or STENTOR. An American monkey of the genus Mycetes, remarkable for the dilatation of the hyoid bone into a hollow drum, which communicates with the larynx, makes a conspicuous external swelling of the throat, and gives prodigious power to the voice, enabling these animals to emit hideous sounds, which are heard miles away, and to which all their names refer. There are two, and sometimes four, other resonators connected with the larynx, besides the one in the hyoid. The howlers live chiefly among the branches of trees, and make extraordinary leaps from one to another, taking hold by the tail as readily as by the hands, and often swinging by it alone. They are the largest monkeys in the New World. About seven species are known, occurring from Central America southward to the Rio Grande do Sul. They are sometimes kept in captivity, but are always sullen and untamed. Their habits and brain-structure both show that their position is properly among the lowest monkeys. The best known forms are those of southern Brazil, such as the very black shaggy howler, or 'guereba' (*Mycetes caraya*), of which the females and young are dingy white, and the brown 'araguata' or ursine howler (*Mycetes ursinus*). The red howler (*Mycetes seniculus*) belongs to the Orinoco region, and is distinguished by its bright chestnut color and the ridge of upright red hair across the top of its head. This one is said to furnish the principal animal food used by the natives of the eastern slopes of the Andes, but they are obtained only in the lowlands. Still another species, abundant along the lower Amazon, is the yellowish 'arabata' (*Mycetes belzebul*). See MONKEY; and Plate of AMERICAN MONKEYS.

HO-WO, hō'wō'. See FUNG-HWANG.

HOWORTH, hou'ẽrth, Sir HENRY HOYLE (1842—). An English scientific writer and politician, member of the Royal Society. He was born at Lisbon, was educated at Rossall School, and was admitted to the bar, though he practiced law very little, but devoted himself to Lancashire politics and to literature. He was elected to the House of Commons as a Conservative in 1886. He is member of many geographical and anthropological societies, and in 1899 was made a trustee of the British Museum. Howorth's writings, besides letters to the *Times* and contributions to the *Quarterly* and the *Edinburgh*, are on geological, archæological, ethnological, and historical subjects. Among these are: *History of the Mongols* (1876-78); *The Vicars of Rochdale* (1883); and *The Mammoth and the Flood* (1887).

HOWRAH, hou'rȧ. A town of Bengal, India, on the right bank of the Hugli, opposite Calcutta (q.v.), of which it is the most important suburb (Map: India, E 4). Population, in 1891, 116,600; in 1901, 157,900.

HOW'SON, JOHN SAUL (1816-85). An English clergyman and author. He graduated at Trinity, Cambridge, in 1837; was classical master and later principal of the Liverpool Collegiate Institution (1845-65), and from 1867 until his death was Dean of Chester. During the latter period he practically restored the cathedral, raising nearly £100,000 for the purpose. He is best known for his *Life and Epistles of Saint Paul* (1852), written in conjunction with Rev. W. J. Conybeare. He also published: *The Character of Saint Paul* (1862); *The Metaphors of Saint Paul* (1868); and other religious works, including commentaries.

HOWTH. A picturesque peninsula, forming the north shore of Dublin Bay, Ireland. It is about two and one-half miles long by two miles

broad, and terminates in a cliff 563 feet high, at the foot of which is Howth village, an important fishing station.

HOY. One of the Orkney Islands (q.v.), in latitude 58° 50′ N., longitude 3° 20′ W., two miles southwest of Mainland (Map: Scotland, F 2). It is 14 miles long and 6 miles broad, and rises abruptly from the sea, with precipitous cliffs 1000 feet in height fronting the west. Ward Hill, 1555 feet high, commands a fine panoramic view of the islands. Population, in 1891, 1320.

HOY (Flem. *hui*, Dutch *heu*, *heude*, of uncertain etymology). A small vessel, usually sloop-rigged, formerly used in large harbors and rivers and to some extent as a coaster. The term is now obsolete except as applied to *powder-hoys*, *anchor-hoys*, and similar heavy-built barges (sailing or steam) used for carrying ammunition, anchors, or other heavy weights.

HOYDEN, Miss. The lively, romping daughter of Sir Tunbelly Clumsy, in Vanbrugh's comedy *The Relapse*. The rôle, a great favorite, has been played by Mrs. Clive, Mrs. Jordan, and Miss Nellie Farren. In Sheridan's *Trip to Scarborough*, she is married to Tom Fashion, who passes himself off as Lord Toppington. Robert Buchanan adapted *The Relapse*, rechristening it, after the personality of this character, *Miss Tomboy* (1890).

HOY'LAND NETHER. A manufacturing town in the West Riding of Yorkshire, England, three and one-half miles south-southeast of Barnsley (Map: England, E 3). Population, in 1891, 11,000; in 1901, 12,500.

HOYLE, Edmond (1672-1769). An English writer on games. Of his early life nothing is definitely known, although it is asserted that he was educated for the law. For many years he lived in London, writing upon, and giving instruction in, games; and in 1742 he published the *Short Treatise on Whist*, which reached a thirteenth edition in 1763, and became the world's authority. See Whist.

HOYT, Albert Harrison (1826—). An American editor and author, born in Sandwich, N. H. After completing his law studies in Portsmouth, N. H., he began to practice there, and held various civil offices. He was a paymaster of the army during the Civil War, rose to be lieutenant-colonel, and after the peace was editor of the *New England Historical and Genealogical Register* (1868-76), and of *Memorial Biographies*, vol. iv. (1885). His other works include: *Necrology of the New England Colleges* (1869-70); *Captain Francis Goelet's Visit to Boston, etc., in 1745-50* (1870); *Letters of Sir William Pepperrell, Bart.* (1874); and *The Name Columbia* (1886).

HOYT, Charles Hale (1860-1900). An American dramatist, born in Concord, N. H. He studied law, was connected for a time with the Saint Albans (Vt.) *Advertiser*, became musical and dramatic critic of the Boston *Post*, turned playwright, and wrote a series of farcical comedies, which netted the author a fortune, and contain some character-studies of more or less cleverness. The greatest success of these was called *A Trip to Chinatown* (1890). *A Midnight Bell* (1887) was his one serious attempt. He was twice a member of the New Hampshire Legislature.

HOYT, John Wesley (1831—). An American educator and administrator, born near Worthington, Ohio. He graduated at Ohio Wesleyan University (1849), and studied law and medicine. In 1857 he removed to Madison, Wis., and there edited and published the *Wisconsin Farmer*. In 1862 Hoyt was appointed State Commissioner to the London Exposition, and he was United States Commissioner at the Paris Exposition of 1867. To the Vienna Exposition of 1873 he was sent as executive commissioner, and was president of the international jury for education and science. In 1873-74, as chairman of the Wisconsin State Board of Railway Commissioners, he was instrumental in settling the Granger War. He was special representative for foreign affairs at the Columbian Exposition of 1893. Hoyt reorganized the University of Wisconsin; suggested and framed a bill for the establishment of a national university, and was appointed chairman of a committee of four hundred thereon, and from 1878 to 1883 was Governor of the Territory of Wyoming. He was president of Wyoming University from 1887 to 1891. In 1897, acting as a commissioner of the king of Korea, he procured the admission of that country to the Universal Postal Union. His publications include: *University Progress* (1869); *Of Appointment and Removal* (1885); and *History of University Education* (1903).

HRABANUS MAURUS, rä-bä'nōōs mou'rōōs. See Rabanus Maurus.

HRDLICKA, dlich'kä, Ales (1869—). An American anthropologist, born at Humpoletz, in Bohemia. After he had finished his secondary and academic studies he went to New York City, where he studied at the Eclectic College and the Homœopathic College. Hrdlicka made special studies of the insane; accompanied anthropological expeditions to Mexico and the Southwestern States (1898-1900), and in 1899 became director of the anthropological section of the Hyde Expedition. He became connected with the American Museum of Natural History in New York, and wrote: *Report on Anthropological Work in the State Institution for Feeble-Minded Children, Syracuse, N. Y.* (1898); *Anthropological Investigation on One Thousand White and Colored Children* (1899); besides contributions to periodicals.

HRODBERT, rōd'bĕrt, Saint. See Rupert, Saint.

HROLF, or **ROLF,** rōlf, The Ganger. The conqueror of Normandy. See Rollo.

HROSWITHA, hrōs'vē-tä. See Roswitha.

HUACA, hwä'kä, or **GUACA.** See Peruvian Antiquities.

HUAINA CAPAC, wä-ē'nä kä'pak. A Peruvian Inca. See Huayna Capac.

HUALAPAI, wä'lä-pī. An Indian tribe in Arizona. See Walapi.

HUALLAGA, wä-lyä'gä. See Amazon.

HUAMBISA, wäm-bē'sä. A savage tribe of the Jivaroan linguistic stock dwelling about the junction of the Santiago and Marañon-Amazon rivers, at the head of Amazon navigation, on the Peru-Ecuador boundary. They joined the Jivaro (q.v.) group in their revolt against the Spanish authority in 1599, and took part in the sack of Sevilla del Oro, when seven thousand Spanish women were carried off by the victors,

Evidence of this admixture remains to-day, the Huambisa as well as the Jivaro and several other tribes of the region being fair-skinned and bearded. They are implacably hostile, both to the whites and to the neighboring Indians, whom they are gradually driving from the region of the Upper Marañon.

HUAMEL. A bad spelling for guemal (q.v.).

HUANACO, hwä-nä'kō. See GUANACO.

HUANCAVELICA, wän'kä-vä-lē'kä. A department of Peru, bounded by the departments of Lima and Junin on the north, Ayacucho on the east, Ica on the south, and Lima on the west (Map: Peru, B 6). Area, 9251 square miles. It belongs entirely to the region of the Cordilleras, and contains only a very small portion of land fit for agriculture. The mountains are rich in minerals, but little mining is carried on, since the roads are so poor that transportation is rendered extremely difficult. Population, in 1896, 223,796. The capital, Huancavelica, is situated in the northern part of the department at an altitude of over 12,000 feet, and has a population of about 3000.

HUANCAYO, wän-kī'ō. A town in the Peruvian Department of Junin, situated on the river Mantaro, at an altitude of over 10,000 feet (Map: Peru, C 6). The Constitution promulgated by a congress which assembled here in 1839 remained in force till 1860. Population, about 5000.

HUÁNUCO, wä'nų-kō. A department of Peru, bounded by the Department of Loreto on the north and east, Junin on the south, and Ancachs on the west. Area, 14,024 square miles (Map: Peru, B 5). It is exceedingly mountainous in the western part, with a general eastern slope toward the Ucayali River. It is watered by several streams, among which are the headwaters of the Amazon, and is covered to a large extent with thick forests. The climate is hot and moist in the east, and cold in the mountainous regions of the west. The mountains are supposed to contain rich deposits of gold, silver, and quicksilver, but the lack of good roads prevents their exploitation. The population was estimated, in 1896, at 145,309. Capital, Huánuco (q.v.).

HUÁNUCO. The capital of the Peruvian department of the same name, situated at an altitude of nearly 6000 feet, near the river Huallaga, 170 miles northeast of Lima (Map: Peru, B 5). It is the seat of a bishopric, and was, until 1855, the capital of the Department of Junin. It was founded about 1543. About 35 miles west lies the town Huánuco Viejo, an Inca town settled by the Spaniards in 1535, and now almost abandoned. Population of Huánuco, about 7500.

HUARAZ, or **HUARAS,** wä'räs. Capital of the Peruvian Department of Ancachs, situated on the Huaraz River, and connected by rail with the coast (Map: Peru, B 5). It has a cool and uniform climate; its streets are narrow and its houses plain; and the only buildings noteworthy are the Government building, a hospital, a school, and two churches. Set in the wall of its cemetery is a very interesting collection of stones sculptured by the ancient Peruvians, and collected from the surrounding country. Population, about 17,000.

HUARTE, wär'tä, JUAN DE DIOS (c.1520-c.1600). A Spanish physician and philosopher, born in Navarre. He wrote a curious book on phrenology, *Exámen de ingenios para las sciencias* (1578). This volume was extremely popular, and was translated into several European languages—into English as *A Trial of Wits.* Some of his theories on education are very enlightened for the time, while others are fantastic in the extreme.

HUASCAR, wäs'kär (c.1495-1533). A Peruvian Inca, born in Cuzco. He was the legitimate heir of Huayna Capac, but his father allowed him to inherit only half the kingdom, leaving the other half to a younger brother, Atahualpa, of a more fierce and warlike character, who coveted the whole. A battle between the rival claimants took place near Mount Chimborazo (1532), and Huascar was defeated, falling afterwards into the hands of his half-brother, who compelled him to look on while the women of the royal household were tortured to death. The landing of the Spaniards in the same year was the beginning of the end for Atahualpa, whose dread that they might reinstate his brother caused him to condemn Huascar to be secretly drowned in the river of Andamarca.

HUASTECS, wäs'täks. A detached tribe of Mayan stock (q.v.), on the shores of the Gulf of Mexico along the Pánuco in the States of Vera Cruz and San Luis Potosí. The language contains more archaic forms than any other of the stock, bearing out the traditional and other evidences that the Huastecs are a tribe left behind in the southward migration of the Maya people.

HUAYNA CAPAC, wä-ē'nä kä'päk (?-1523). A Peruvian Inca, born in Cuzco. His reign began in 1483, and being by that time an experienced soldier, he waged war against his neighbors till he had conquered the country as far north as Quito, including Puná Island, Ecuador, and as far south as Atacama, Chile. A ferocious warrior, he cultivated also the peaceful art of road-making (notably the highway between Tumbez, Pachacamac, and Cuzco), while it was the magnificence of the palaces he had built which so impressed the first Spanish invaders. Huayna Capac had a harem of more than 600 members, and it was his decree that his legitimate heir should share with a younger brother the huge kingdom he was to inherit which led to its partition and the internal dissensions that made it fall an easy prey to Francisco Pizarro.

HU'BALD. See HUCBALD.

HUBAY, hōō'bō-I, JENÖ (1858—). An Hungarian violinist, born at Budapest. He studied the violin with Joachim in Berlin, and in 1876 began to give concerts in Hungary, and later in Paris. He was chief violin professor at the Brussels Conservatory (1882), and at the Budapest Conservatory (1886), succeeding his father, Charles Hubay, who was also a well-known violinist. As a composer he ranks high, his operas *Der Geigenmacher von Cremona* (1893), *Alienor* (1892), and the Hungarian *A fulu rózsa* (1896) being especially noteworthy.

HUBBARD, ELBERT (1850—). An American writer, and maker of fine books, born in Bloomington, Ill. He made himself widely known as

the originator and proprietor of the Roycroft Shop, in East Aurora, N. Y., founded for the avowed purpose of reviving the old handicrafts, particularly that of artistic book-making. He also originated the *Philistine*, a periodical devoted to expressing a curious jumble of shrewd but generally kindly philosophy which is sometimes marred by vulgarity and personal vilification. His other literary work includes a series of biographical sketches published under the caption, *Little Journeys;* several pamphlets, such as *A Message to Garcia* (1898), which is a vigorous arraignment of the careless employee and of which about half a million copies were circulated, and *Time and Chance* (1901), a graphic sketch of John Brown's career.

HUBBARD, Joseph Stillman (1823-63). An American astronomer, born in New Haven, Conn. He graduated at Yale College in 1843, and the next year went to Philadelphia, where he acted as assistant to Sears Cook Walker, who some years before had built the observatory of the Philadelphia High School. A few months later he accepted a position offered him by General Frémont, then a lieutenant, as computer of the observations for latitude and longitude made during the explorer's journey across the continent. On May 7, 1845, he was appointed to fill a vacancy in the corps of professors of mathematics in the Navy, and was assigned to duty at the Washington Observatory, where he remained during the rest of his life. He contributed frequently to the *Astronomical Journal* and twice, for long periods, was its editor. During his connection with the Washington Observatory he made a number of cometary investigations and important computations. He was a member of the National Academy of Sciences and of various other scientific societies.

HUBBARD, Lucius Frederick (1836—). An American soldier, Senator, and railway manager. He was born in Troy, N. Y., went to school in Granville, N. Y., learned the trade of a tinsmith, and followed it for three years in Chicago. In 1857 he started a newspaper in Red Wing, Minn., and afterwards served in the Civil War, conducting himself gallantly and becoming brigadier-general. Afterwards he engaged in railroad building and milling. He was a State Senator (1872-76), Governor of Minnesota (1882-87), and in the Spanish-American War commanded a volunteer brigade.

HUBBARD, Oliver Payson (1809—). An American chemist, born at Pomfret, Conn. He was educated at Hamilton College, where he studied in 1825-26, and at Yale, where he graduated in 1828, was assistant at Yale to Benjamin Silliman, and from 1836 to 1866 occupied the chair of chemistry, pharmacy, mineralogy, and geology at Dartmouth College. From 1866 to 1871 he was a general lecturer on those subjects, and from 1871 until his retirement as professor emeritus in 1883 was again connected with the faculty of Dartmouth, holding the professorship of chemistry and pharmacy. In 1832 he made investigations in the Eastern United States in connection with the examination conducted by Silliman for the Secretary of the Treasury in regard to the cultivation of the sugar-cane. He was a member of the New Hampshire State Legislature in 1863-64, and a secretary of the American Association of Geologists and Naturalists in 1844. His publications include a *Lecture Introductory to the Eighty-third Course of the New Hampshire Medical Institute at Dartmouth College* (1879), and a *History of Dartmouth Medical College* (1880), besides contributions to the *American Journal of Science* on "Observations Made During an Excursion to the White Mountains" (1838), "Geological Surveys of New York, Ohio, Indiana, and Michigan" (1840-41), "Condition of Trap Dikes in New Hampshire" (1850), and other subjects.

HUBBARD, Richard William (1817—). An American painter, born at Middletown, Conn. He studied under Daniel Huntingdon, and in France. His landscapes include: "Meadows Near Utica" (1869); "Vermont Hills" (1874); "Autumn, Lake George"; "Connecticut Pastoral" (1880); "Lake in the Adirondacks" (1883); and "Down in the Meadows" (1885).

HUBBARD, William (1621-1704). An American clergyman and historian, born in England. As a child he was brought by his parents to New England, graduated at Harvard (1642), was ordained, and became assistant and afterwards pastor of the Congregational church at Ipswich, Mass., a post which he resigned but a year before his death. He wrote, at the order of the Colonial Government, which paid him fifty pounds for it, a *History of New England*, mainly compilation, which barely escaped destruction by fire when Gov. Thomas Hutchinson's house was mobbed in 1765. The Massachusetts Historical Society printed it in 1815. He wrote also *A Narrative of Troubles with the Indians* (1677), which was for years popular in New England, and was even reprinted at the beginning of the nineteenth century at Worcester, Mass., 1801, and Roxbury, Mass., 1805. It is full of errors, but valuable especially as illustrating what was regarded by the writer's contemporaries as an elegant prose style. Minor works are a volume of sermons (1684), and *Testimony of the Order of the Gospel in Churches* (1701).

HUBBARDTON. A town in Rutland County, Vt., 18 miles northwest of Rutland (Map: Vermont, A 7). It was the scene of a sharp conflict on July 7, 1777, between the rear-guard of General Saint Clair's army, retreating from Ticonderoga, and a British and Hessian force under Generals Fraser and Riedesel. The Americans under Colonels Warner and Francis were defeated, with a total loss in killed, wounded, and prisoners of 324 men, nearly one-third their number, while the British loss was only 183. A monument commemorates the battle. Population, in 1890, 506; in 1900, 488.

HUBE, hōō'be, Romuald (1803-90). A Polish jurist, born at Warsaw, and educated there, at Cracow, and in Berlin. From 1826 to 1832 he was professor of criminal law at Warsaw, then became head of a committee on revision of the laws of Poland, and was for a time professor at Saint Petersburg. In 1846, and again in 1867, he went with Count Bludoff on diplomatic missions to Rome. He died at Warsaw after thirteen years' service in the Russian Council of State. His works include: treatises on penal law (1828); on Polish criminalists (1830); *Antiquissimæ Constitutiones Synodales Provinciæ Gnesnensis* (1856); *Loi Salique* (1867); *Histoire de la formation de la loi Bourguignonne* (1867); *Droit romain et gréco-byzantin chez les peuples*

slaves (1880); and on Polish law in the thirteenth (1874) and fourteenth (1881) centuries.

HUBER, ụ'bâr', FRANÇOIS (1750-1831). A Swiss naturalist. He was born in Geneva, inherited a love of nature, as well as keen powers of observation from his father, studied physics under Saussure and chemistry with a relative. At fifteen he began to lose his sight. Before he became totally blind he married a Mlle. Lullin. Her devotion, his father's wealth, and the keen eyes of his man servant, Burnens, made it possible for him to carry out his pioneer researches of the life and habits of bees. In 1792 he published at Geneva, under the title *Nouvelles observations sur les abeilles,* letters to Bonnet. In later works, especially on the origin of wax and the construction of cells, Huber was assisted by his son. Among his more important discoveries were the aërial impregnation of the queen bee (see BEES); the killing of the male by the workers; the rivalry of the queens; the use of the antennæ; the origin of the propolis; and the ventilation of the hives which supplies fresh oxygen.

HUBER, hōō'bĕr, HANS (1852—). A Swiss dramatic composer, born at Schönewerd, near Olten. He studied at the Leipzig Conservatory, and became well known as a music-teacher, being appointed in 1896 director of the music school at Basel. His operas *Weltfrühling* (1894) and *Gudrun* (1896) were successfully produced at Basel, and his instrumental pieces are universally popular. Of especial excellence are his violin and piano concertos.

HUBER, JOHANNES (1830-79). A German theologian and philosopher, leader of the Old Catholics. He was born in Munich; was educated there, and became professor of philosophy in the university in 1859, and a fearless opponent of the Ultramontanes. His work *Die Philosophie der Kirchenväter* (1859) was put on the Index Expurgatorius. He actively opposed the dogma of infallibility, and played a conspicuous part at the first general congress of the Old Catholics at Munich, in September, 1871. With Döllinger he wrote the famous *Der Papst und das Konzil von Janus* (1869). Among his other works are: *Johannes Scotus Erigena* (1861); *Die Freiheiten der französischen Kirche* (1870); *Das Papsttum und der Staat* (1870); *Der Jesuitenorden* (1873); and *Der Pessimismus* (1876). Consult Zirngiebl, *Johannes Huber* (Gotha, 1881).

HUBER, VICTOR AIMÉ (1800-69). A German critic and social reformer, born at Stuttgart. He studied medicine and modern languages at Würzburg and Göttingen; taught at Bremen, was appointed professor of the history of literature and of modern history at Rostock in 1833, of the languages of Western Europe at Marburg in 1836, and in 1843 at Berlin. From 1851 to 1869 he lived in retirement in the Harz Mountains. His writings on Spanish, French, and English literature include: *Die Geschichte des Cid* (1829); *Crónica del Cid* (1844); *De Primitiva Cantilenarum Popularium Epicarum (vulgo Romances) apud Hispanos Forma* (1844); *Skizzen aus Spanien* (1828 sq.); *Die neuromantische Poesie in Frankreich* (1833); and *Die englischen Universitäten* (1839-40). He was for a time a Conservative in politics, and founded the journal *Janus;* but later became a Socialist. Consult: Elvers, *Victor Aimé Huber* (Bremen, 1872-74); Jäger, *Victor Aimé Huber, ein Vorkämpfer der sozialen Reform* (Berlin, 1879).

HUBERT, hū'bĕrt. The custodian of Arthur, in Shakespeare's *King John.* The character is taken from that of Sir Hubert de Burgh, who died in 1243.

HUBERT, ụ'bâr', SAINT (?-728). A French bishop, founder of Liège. There are numerous legends concerning him, but there seems no doubt that he was of noble birth and was married to a lady of rank. It is related that the apparition of a crucifix upon the head of a stag which he was chasing one day turned him to the religious life. He became Bishop of Maestricht, and made so many converts in the district that he was called the Apostle of the Ardennes. He is the patron saint of the hunter, and his anniversary is made the occasion of curious ceremonies in French rural districts. Saint Hubert received from heaven a wonderful stole that is said to have retained its miraculous healing properties until the present day.

HU'BERT DE BURGH (?-1243). An English statesman. He held office under Richard the Lion-Hearted, and about 1202 was made, by King John, castellan of Falaise and guardian of Arthur of Brittany, the young son of John's elder brother, Geoffrey. The story of his refusal to obey the King's orders to blind the young prince, incorporated by Shakespeare in his *King John,* is unauthentic. In the struggle between John and the barons he sided with the King, but is mentioned as one of those by whose advice Magna Charta was granted. In the same year he was made justiciar of England. He held Dover Castle against the Dauphin Louis in 1216, and on August 24th of the following year gained a notable naval victory over a French fleet which was bringing in reënforcements to Louis. After 1219, Hubert, with Stephen Langton, Archbishop of Canterbury, carried on the government for the young Henry III. He was a bitter opponent of the foreign party headed by Peter des Roches, Bishop of Winchester, and attempted to put an end to the system by which the wealth of the English clergy was being taxed for the benefit of the Papal Court. His policy in general was dictated by a twofold desire to strengthen the power of the Crown and to further his own fortunes. During his terms of office he amassed vast riches through prudent marriages, as well as by arrogating to himself lucrative offices and the guardianship of wealthy heirs. Members of his family were advanced to high positions in the Church. His ill success against the Welsh about the year 1228 afforded his enemies an opportunity for undermining his influence with the King. He was dismissed from office in 1232, and charged with malfeasance, murder, and treason. Though restored to the King's favor for a short period, he never again exercised any influence in the Government. He died in London, May 12, 1243. Consult Stubbs, *Constitutional History of England,* vol. ii. (4th ed., Oxford, 1896).

HUBERTI, ụ'bâr'tē', LÉON GUSTAVE (1843—). A Belgian composer, born at Brussels. He won the Prix de Rome (1865) at the Brussels Conservatory, and from 1874 to 1878 was director of the Mons Conservatory. He was inspector of singing in the Antwerp schools (1880-89), becoming later a professor at the Brussels Conservatory, and director of the music school of St.

poem *Verlichting*, for organ, orchestra, soli, and chorus; a *Symphonie funèbre*, a romantic suite, many songs, piano pieces, and instrumental numbers.

HUBERTUSBURG, hụ-bĕr'tụs-bo͝orĸ, or **HUBERTSBURG** (Ger., Hubert's castle). A royal hunting-seat, not far from Leipzig, built in 1721 by Augustus the Strong (Frederick Augustus I.) of Saxony. Here, on February 15, 1763, was signed the treaty of peace between Austria, Prussia, and Saxony, marking the conclusion of the Seven Years' War (q.v.).

HUBLI, or **HOOBLY**, ho͝o'blĭ. A town and railway junction in the Dharwar District, Bombay, British India, 90 miles southwest of Karwar on the Malabar coast (Map: India, C 5). It is one of the principal cotton marts in that section of India, and has manufactures of copper ware, silks, etc. The chief objects of interest in the town and vicinity are numerous ancient Jain temples. Population, in 1891, 52,600; in 1901, 58,150.

HÜBNER, hụb'nĕr, ALEXANDER, Count (1811-92). An Austrian author and diplomat, born in Vienna. He held various minor diplomatic positions in Paris, Lisbon, and Leipzig, and was then sent to Paris as Minister Plenipotentiary (1849). He held this post under the Republic, and under Napoleon III. until 1859. After this he was Minister of Police in his own country, but did not keep that portfolio long. From 1865 to 1867 he was Ambassador to Rome, and then made a tour of the world, described in *Ein Spaziergang um die Welt* (1875). His best-known work is *Sixtus V.* (1870).

HÜBNER, EMIL (1834-1901). A distinguished German classical philologist, born at Düsseldorf. He was professor at the University of Berlin from 1870 until his death. His contributions to classical learning, above all in the field of Latin epigraphy, were very numerous. To his influence was due an awakening of interest in classical studies in general, and especially in epigraphy in Spain, which he made a favorite field of study. Among his publications the most important are: *De Senatus Populique Romani Actis* (1859); *Epigraphische Reiseberichte aus Spanien und Portugal* (1861); *Die antiken Bildwerke in Madrid* (1862); *Inscriptiones Hispaniæ Latinæ* (1869, supplementary volume 1892); *Inscriptiones Hispaniæ Christianæ* (1871, supplementary volume 1900); *Inscriptiones Britanniæ Latinæ* (1873); *Inscriptiones Britanniæ Christianæ* (1876); *Exempla Scripturæ Epigraphicæ Latinæ* (1885); *Monumenta Linguæ Ibericæ* (1893); *Ueber mechanische Copien von Inschriften* (1881); *Grundriss zu Vorlesungen über die römische Litteraturgeschichte* (4th ed. 1878); *Grundriss zu Vorlesungen über lateinische Grammatik* (2d ed. 1880); *Bibliographie der klassischen Altertumswissenschaft* (2d ed. 1889); *La arqueología de España* (1888); *Römische Herrschaft in Westeuropa* (1890). Hübner was also co-editor of *Hermes*, 1866-81, and of the *Archäologische Zeitung* (1868-73).

HÜBNER, JULIUS (1806-82). A German historical painter of the Düsseldorf school. He traveled in Italy, and resided for the most part at Düsseldorf until 1839. In that year he settled at Dresden, becoming a professor in the Academy of Arts in 1841, and director of the Gallery of Paintings in 1871. He obtained the great gold medal at Brussels in 1851. Among the works of his first period are "The Fisherman" (1828), after Goethe's ballad; "Ruth and Naomi" (1833), in the National Gallery, Berlin; "Christ and the Evangelists" (1835); "Job and His Friends" (1838), in the Gallery of Frankfort; "Consider the Lilies" (1839); and the portrait of Frederick III., in the Kaiserhalle, Frankfort. To his second or Dresden period belong the "Golden Age" and "Dispute Between Luther and Dr. Eck" (1866), in the Dresden Gallery; "Charles V. at San Yuste," "Last Days of Frederick the Great," "Cupid in Winter," and others. He was also known as a poet.

HÜBNER, KARL (1814-79). A German genre painter, born at Königsberg. He was a pupil of the Düsseldorf Academy. His works were especially popular in Holland and in America, where he went in 1874, and was received with enthusiasm. His genre subjects include: "The Silesian Weavers" (1844); "The Sleeping Wood-Thief" (1845); "The Abandoned" (1846); "The Seizure for Debt" (1848, Königsberg Museum); "The Sinner at the Church Door" (1874, National Gallery, Berlin); "Consolation in Prayer" (1875, Düsseldorf Gallery); and "The Recovery," in the Pennsylvania Academy of Fine Arts.

HUB OF THE UNIVERSE. A name jestingly given by Oliver Wendell Holmes in one of his essays to the State House in Boston as the centre of a self-satisfied community. The term is frequently applied to the city itself, which is popularly supposed to boast of its superior wisdom and culture.

HÜBSCHMANN, hụpsh'mȧn, JOHANN HEINRICH (1848—). A German philologist, born at Erfurt. He studied Oriental philosophy at Jena, Tübingen, Leipzig, and Munich; in 1876 became professor of Iranian languages at Leipzig, and in 1877 professor of comparative linguistics at Strassburg. His principal works are: *Zur Casuslehre* (1875); *Armenische Studien* (1883); *Das indo-germanische Vokalsystem* (1885); *Etymologie und Lautlehre der ossetischen Sprache* (1887); *Persische Studien* (1895); and *Armenische Grammatik* (1895 sq.).

HUC, ụk, ÉVARISTE RÉGIS (1813-60). A French Roman Catholic missionary and traveler. He was born in Toulouse; joined the Lazarist fathers in 1839, and at once went to China. After spending a few years in missionary labor in Northern China, in 1844 he set out for Tibet. With his two companions he spent several months in a Tatar monastery, learning the Tibetan language, and then made his way over the desert and glaciers to Lhasa, arriving in January, 1846. Within a few weeks, however, he was compelled to return, the Chinese ambassador having successfully used his influence to that end. Such was the strain on Father Huc's health that he was forced to come back to France in 1849. He published: *Souvenirs d'un voyage dans la Tartarie, le Thibet et la Chine pendant les années 1844-46* (2

lated into English. The strangeness of the things described caused them to be received with incredulity, but later travelers have established their truth. Father Huc's health was never fully restored, and he died at the age of forty-six.

HUC'BALD, or **HUBAL'DUS** (c.840-c.930). A Benedictine monk, author, and musician. He was noted for his piety and learning. He lived most of his life in the Monastery of Saint-Amand, near Tournay. His writings include some lives of the saints, but he is best known by his treatises on music. The authorship of these is disputed, excepting *Harmonica Institutio*, a criticism of a work by Reginon de Prum. The most celebrated of them is *Musica Enchiriadis*, now believed to be by an unknown writer of the end of the tenth century. It illustrates rules by practical examples, and is a valuable aid to the understanding of certain early systems of notation. Other works attributed to him are *Alia Musica* and *Commemoratio Brevis de Tonis et Psalmis Modulandis*.

HUCHO, hū'kō. A Western salmon. See TROUT.

HUCKABACK (probably from LGer. *hukkebak*, pickaback, from *huken*, to crouch + *bak*, back). A coarse kind of linen or cotton cloth, figured somewhat like damask; it is usually employed for toweling.

HUCKLEBERRY (probably a corruption of *hurtleberry*, *whurtleberry*, *whortleberry*, probably from AS. *wyrtil*, OHG. *wurzala*, Ger. *Wurzel*, root + *berry;* apparently confused with AS. *heortberge*, *heorotberge*, hartberry, from *heort*, *heorot*, stag, hart + *berge*, berry). A term now

HUCKLEBERRY.

applied indiscriminately to various small, hardy shrubs of the genus Vaccinum (order Vacciniaceæ). The flowers of these plants have a four or five toothed calyx, four or five cleft bell-shaped corolla, with the limb bent back, and eight to ten stamens with two-horned anthers. The fruit is a four to five celled, many-sided berry. The numerous representatives of the genus, mostly confined to the Northern Hemisphere, are common in the north of Great Britain, variations in size of fruits and productiveness, the wonder is that so attractive a native plant should have existed so long apparently unheeded. The plants range in size from six inches in Vaccinum Pennsylvanicum, to five to ten feet high in Vaccinum corymbosum, and bear fruits from one-eighth inch up to five-eighths inch in diameter. In color they are equally variable, showing all shades from waxen black, blue, and white, to red in one species, Vaccinum Vitas-Idæa, which is often called cranberry because of the likeness of its acid fruit to that of the cranberry.

While the huckleberry has been successfully transplanted to gardens, grown from seeds and grafted, it has nowhere been cultivated in a commercial way. In certain portions of the United States wild plants are protected and cared for in order that the fruit may be secured for the canneries or markets. The "blueberry barrens" of Maine, an area of some 150,000 acres in extent, is a notable example of the preservation of a native product from which is derived a large annual income. The annual pack from this region alone is about 30,000 cases of 24 cans each, valued at $57,000. Besides forming a valuable commercial product when canned, the huckleberry is extensively gathered and marketed for dessert purposes. Although naturally a dry, rather seedy fruit, the larger specimens are juicy, and possess a most agreeable flavor. The huckleberry is also used for preserves and jellies, as well as for making wine and distilled liquors. In America, however, its chief value is as a dessert fruit, both in a fresh state and when canned.

HUCKNALL TORKARD, hŭk'nal tôr'kērd. A town in Nottinghamshire, England, five miles north of Nottingham (Map: England, E 3). It has coal-mining industries. Lord Byron is buried in the old parish church. Population, in 1891, 11,000; in 1901, 15,250.

HUDDE, hūd'de, ANDREAS (c.1600-63). A Dutch commander in New Netherland after 1629. As one of the four councilors of Wouter van Twiller, director-general in America for the Dutch West India Company (1633), Hudde obtained a large grant of land upon Long Island, and in 1642 he was surveyor of Manhattan. Four years later, when trouble had arisen between the Dutch and Swedish settlers on the South, or Delaware River, he was sent to guard the Dutch West India Company's interests there, and at once entered into strife with the governor of the Swedes, who tried to stir up the Indians against him. But Hudde held his own until 1655, when the Dutch authorities sent ships to help him, and he conquered the Swedish rulers. He continued to enjoy the company's confidence, and was made commander of Forts Altona and New Gottenburg (1657), as well as colonial surveyor and parish clerk. That he was a well-educated man is evidenced by the quality of his literary remains in the Albany archives.

HUD'DERSFIELD. A manufacturing and market town in the West Riding of Yorkshire, England, on the Colne, 16 miles southwest of Leeds. It has excellent facilities for intercommunication by railway and canal with all important commercial centres, and is the chief seat of the English cloth and woolen manufac-

ture (Map: England, E 3). Coal-mining and stone-quarrying are also profitable industries. The town is well built, with spacious thoroughfares, and fine ecclesiastical, public, and commercial buildings. The town hall and market hall are noteworthy. It has a proprietary college affiliated to the London University, a collegiate school, and other educational institutions. Its municipal government is of a high order and the corporation has been a pioneer in several economic features. Artisans' dwellings were established in 1853 for married couples, and for single women as well as for bachelors. Huddersfield was the first to own and work its tramways; it owns its gas, water, and electric works, and several beautiful parks; maintains free public libraries, an art gallery, public baths and wash-houses, slaughter-house, markets, technical schools, fire brigade, a hospital, cemeteries, and a modern system of refuse and sewage disposal. It was the first town to adopt an eight-hour labor day. It is the seat of a United States consulate. Although a town mentioned in the Domesday Book, its importance dates only from the establishment of the woolen manufacture in the eighteenth century. Population, in 1891, 95,400; in 1901, 95,000.

HU'DIBRAS. See BUTLER, SAMUEL.

HUDIBRAS, SIR. A foolhardy and pessimistic character, the suitor of Perissa, in Spenser's *Faerie Queene*, probably meant to represent Puritanism.

HUD'SON. A town in Middlesex County, Mass., 28 miles west of Boston; on Assabet River, and on the Fitchburg and the Boston and Maine railroads (Map: Massachusetts, D 3). It has a public library. There are manufactures of leather, leather and rubber shoes, rubber gossamer clothing, rubber goring and webbing, and wooden and paper boxes. The government is administered by town meetings. The water-works and electric-light plant are owned and operated by the town. Population, in 1890, 4670; in 1900, 5454.

HUDSON. A city and the county-seat of Columbia County, N. Y., 28 miles south of Albany; on the east bank of the Hudson River, and on the New York Central and Hudson River, the Boston and Albany, and other railroads (Map: New York, G 3). It is finely situated on the slope of Prospect Hill, and has a number of noteworthy buildings, the State House of Refuge for Women, State Volunteer Firemen's Home, Hudson Orphan Asylum, State Armory, and the court-house, city hall, and city hospital. Public Square and Franklin Square parks, and Promenade and Reservoir hills are also of interest. There are extensive manufactures of knit goods, car-wheels, ale, lumber, tobacco, iron, machinery, stoves, furnaces, etc. Under a charter of 1895, the government is administered by a mayor, elected biennially, and a city council. The water-works are owned and operated by the municipality. Population, in 1890, 9970; in 1900, 9528. Hudson was settled as Claverack Landing by New Englanders in 1783; its present name was adopted in 1784, and a city charter was received in 1785. For some years the city carried on an extensive foreign trade, and was an important whaling port, but its shipping was almost completely destroyed in the War of 1812.

HUDSON. A city and the county-seat of Saint Croix County, Wis., 19 miles east of Saint Paul, Minn.; on Lake Saint Croix, an expansion of the Saint Croix River, and on the Chicago, Saint Paul, Minneapolis and Omaha Railroad (Map: Wisconsin, A 4). It has saw and flour mills, box, furniture, and broom factories, breweries, railroad car and machine shops, and also a large cold-storage plant, the city being the centre of a region that is interested in raising vegetables, small fruits, poultry, etc., for shipment. There is a well-equipped sanatorium. The water-works and electric-light plant for street lighting are owned by the municipality. Population, in 1890, 2885; in 1900, 3259.

HUDSON, CHARLES (1795-1881). An American clergyman, politician, and author, born in Lexington, Mass. He was educated for the Church, which he entered as a Universalist in 1819, and he presided over a congregation in Westminster, Mass., until 1839. Beginning his political career in the House of Representatives in his own State, he afterwards went to Congress (1841-49), and then was made naval officer at the port of Boston, a position he retained four years, and then exchanged it for others in the public service. Besides editing a Boston daily newspaper, he wrote much upon historical and political topics for the periodical press. His books include: *Letters to Rev. Hosea Ballou* (1827); *History of Westminster* (1832); and a *History of Lexington* (1868), with a genealogical register of its families.

HUDSON, ERASMUS DARWIN (1843-87). An American physician, born in Massachusetts. He graduated at the College of the City of New York in 1864, and at the College of Physicians and Surgeons, New York City, in 1867. During 1867-68 he was house surgeon at Bellevue Hospital. In 1869-70 he was health inspector of New York City; in 1870 was attending physician to the class for diseases of the eye in the out-door department of Bellevue Hospital; was attending physician at Northwestern Dispensary in 1870-72, and attending physician to Trinity Chapel parish and Trinity Home in 1870-75. He was appointed professor of principles and practice of medicine at the Woman's Medical College of the New York Infirmary in 1872, and held that position for ten years; and from 1882 until his death was professor of general medicine and diseases of the chest in the New York Polyclinic. He was the author of the following professional works: "Report of Pulse and Respiration of Infants," in Eliot's *Obstetric Clinic* (1872); *Doctors, Hygiene and Therapeutics* (1877); *Methods of Examining Weak Chests* (1885); *Limitations of the Diagnosis of Malaria* (1885); *Home Treatment of Consumptives* (1886); and *Physical Diagnosis of Thoracic Diseases* (2d ed. 1887).

HUDSON, FREDERIC (1819-75). An American journalist, born in Quincy, Mass. After a common-school education he went to New York City in 1836, and became attached to the New York *Herald*, of which he soon became managing editor, which position he held until 1866. His long experience and diligence in collecting gave him abundant material for his *Record of Journalism in the United States from 1690 to 1872*, published in 1873, which is perhaps the most accurate and interesting history yet published of

the rise and development of the American newspaper.

HUDSON, George (1800-71). An English speculator, known as the 'railway king.' He acquired a fortune as a linen-draper, and at the age of twenty-seven inherited £30,000. Investing in railways, he soon carried out large schemes of annexation and extension, crushing roads and buying up embarrassed lines. He was three times elected Lord Mayor of York, and was sent to Parliament. In 1847 the value of railway property fell rapidly, and it was found on investigation that Hudson was paying dividends out of capital, and appropriating large sums to his personal use. He spent his last twenty years in contesting lawsuits.

HUDSON, Henry (?-1611). An English navigator. He is first mentioned as the commander of the ship *Hopeful*, sent in May, 1607, by the Muscovy Company in quest of a northeast passage to the Spice Islands. After a voyage of four and a half months, during which he touched the coasts of Greenland and Spitzbergen, and sailed as far north as 80° 23′, he returned to England. The next year he sailed again under the auspices of the Muscovy Company, and reached Nova Zembla, attempting in vain to force a passage through the Vaigatch or Kara Strait, in the expectation of finding himself within easy reach of the Pacific. This voyage proved as unsuccessful as the first. His next undertaking was made in behalf of the Dutch East India Company. In their employ he sailed from Amsterdam on March 25, 1609, with two ships, the *Good Hope* and the *Half Moon*. He made Nova Zembla, intending to try again the passage of the Vaigatch, but his crew rebelled, and the *Good Hope* returned to Holland. Hudson, in the *Half Moon*, crossed the Atlantic, and sighted land in the latitude of Nova Scotia. He then sailed south as far as latitude 35°, and again turning north, carefully examined the coast up to Sandy Hook, which he reached on September 12th. A month was spent in exploring the Hudson River, which the *Half Moon* ascended to the present site of Albany. He reached England on November 7th, having satisfied himself that the story of a great strait leading through the continent somewhere in the latitude of 40° was false. In 1610 he set out once more, this time to search for a northwest passage under the patronage of an association of English gentlemen. He left England in April, and by June 10th had reached the strait which now bears his name. Passing into the bay beyond (Hudson Bay), he spent three months in exploring its coasts and islands. Early in November his vessel was frozen in. The winter seems to have been one of great suffering. Provisions were scarce, and dissensions arose among the sailors. Late in June, 1611, a part of the crew mutinied, seized and bound Hudson, his son, and seven others of the ship's company, and putting them into the small boat, set them adrift. They were never seen again. A few wretched survivors from among those on board the ship reached England. For an account of Hudson, consult the introduction to Asher, *Henry Hudson, the Navigator*, edited for the Hakluyt Society (London, 1860). The volume includes reprints of the earliest accounts of his voyages, both English and Dutch.

HUDSON, Henry Norman (1814-86). An American Shakespearean scholar and editor, born at Cornwall, Addison Co., Vt. In early life he worked as a baker and a wheelwright. He graduated from Middlebury College, Vermont, in 1840, and then taught school in Kentucky and Alabama. He presently became an authority of considerable note on Shakespeare, lectured widely on his works, and was appointed a professor in Boston University. Among his works in this field are: *Lectures on Shakespeare* (2 vols., 1848); a valuable annotated edition (11 vols., 1851-56); and *Shakespeare: His Life, Art, and Characters* (2 vols., 1872). Having entered the priesthood of the Protestant Episcopal Church, he was for some years editor of the *Churchman;* was rector at Litchfield, Conn., 1859-60, and served as chaplain in the Union Army during the Civil War. On his return he published *A Chaplain's Campaign with General Butler* (1865). He was author also of *Sermons* (1874); *Studies in Wordsworth* (1884); *Essays in Education* (1884); and other works.

HUDSON, William (c.1730-93). An English botanist, born at Kendal. He became an apothecary, but devoted much time to botany, entomology, and other natural sciences. He is chiefly noted for his adaptation of the Linnæan system of plant classification to the flora of Britain, which he published under the title, *Flora Anglica* (1762). A second and greatly enlarged edition appeared in 1778. The genus Hudsonia was named by Linnæus in his honor.

HUDSON, William Henry (1863—). An English author and professor of English literature, born in London, and educated by private tutors. He was private secretary to Herbert Spencer, librarian of Sion College, London (1885-86), and later of the London City Liberal Club (1889-90), and of Cornell University (1891-92). From 1892 to 1901 he was professor of English literature at Leland Stanford, Jr., University. His principal works, besides contributions to magazines, are: *The Church and the Stage* (1886); *An Introduction to the Study of Herbert Spencer* (1893); *Studies in Interpretation* (1896); *Idle Hours in a Library* (1897); *The Study of English Literature* (1898); *Sir Walter Scott* (1900); *The Sphinx, and Other Poems* (1900); *The Satan of Theology* (1901); and editions of Goldsmith's *Vicar of Wakefield* (1898) and of the *Roger de Coverley Papers* (1899).

HUDSON BAY. A spacious landlocked gulf in the northeastern section of Canada, which may be regarded as an arm at once of the Arctic and the Atlantic oceans (Map: North America, K 3). It communicates with the Atlantic by means of Hudson Strait, and with the Arctic by Fox Channel and various passages to the north and west, which, notwithstanding the comparative lowness of their latitude, have proved less practicable for navigation than the Arctic Ocean itself. Hudson Bay extends from about latitude 51° to about 64° N., a distance of about 900 miles. Its area is about 400,000 square miles. Its depth is about 70 fathoms; on the west coast there is an average rise and fall of 11 to 12 feet at spring tides. The southern prolongation of Hudson Bay bears the name of James Bay. Hudson Bay contains several islands, in addition to the large Southampton Island at its north end, but no rocks or shoals, and the region is

THE HUDSON RIVER

LOOKING NORTH FROM WEST POINT

bergs of ice, which render navigation difficult for sailing vessels. Steamships can make the voyage up the bay and reach land from about the middle of June to the end of October. The west shore lies low, but the east shore is bold and rocky. Thirty rivers of considerable magnitude flow into the bay, the Nelson River being the most important. The Churchill and the Severn come next, the former having a deep though comparatively narrow mouth, which can be entered with ease by the largest ships at all tides. Though the land lying south and west of James Bay is suitable for dairy farming, and though ironstone, manganiferous iron ore, galena, and plumbago are found in other portions of the surrounding territory, neither the soil, timber, nor minerals have been to any extent drawn upon. Whale, walrus, seal, and salmon abound in the waters of Hudson Bay, and steam whalers visit it during the summer; but the only business which has been developed lucratively is the fur trade by the Hudson's Bay Company. This may be accounted for by the severity of the long winter on the shores of the bay. The few summer months are marked by a genial and bracing climate. The bay was discovered in 1610 by Henry Hudson (q.v.).

HUDSONIAN CURLEW, GODWIT, etc. See CURLEW, GODWIT, etc.

HUDSON RIVER, or NORTH RIVER. The principal river of New York State, and the most important waterway in the Eastern United States (Map: New York, G 3). It rises in the Adirondack Mountains in the northern part of the State, receiving the waters of most of the lakes in the southeastern half of the Adirondack region, and having its ultimate source in a small lake near the outlet of Long Lake in the northeastern part of Hamilton County. After passing through these mountains in a number of windings, it flows almost due south until it empties into the Atlantic Ocean through New York Bay at New York City. Throughout its course it receives only three considerable tributaries, the Sacondaga, Mohawk, and Wallkill, all from the west. The scenery along the Hudson is of remarkable beauty and grandeur, and with the number of places on its shores celebrated in history and literature, the river justly merits the title of the 'Rhine of America.' Like the other Atlantic rivers, it breaks transversely through the Appalachian ridges instead of following what would now be the natural course along the great longitudinal valleys. (See APPALACHIANS, especially under the sub-head *Drainage Development.*) Accordingly, its valley is in places very narrow, and its banks lined with high and steep hills or mountains, notable among which are the Highlands, 1500 feet in elevation, through which the river winds in a highly picturesque gorge, narrowed at one point to about 1600 feet. Farther down, near the mouth, its western shore, for about 18 miles, is formed by a great dike of trap rock, the famous Palisades (q.v.), rising perpendicularly from the water's edge to a height of 300 to 500 feet. The Catskill Mountains, west of the Hudson, about 100 miles from the sea, approach to within 8 miles of the river.

The Hudson differs from the other Atlantic rivers in the fact that, owing to the consider- miles beyond the gorge of the Highlands as far as Albany. Below this point the so-called river is really an estuary or fiord, its volume being far out of proportion to its drainage area, though, owing to the narrowness of its valley, it still retains the aspect of a river, except for a stretch of about 20 miles between the Highlands and the Palisades, where it expands into Haverstraw Bay and Tappan Sea, the latter over 3 miles wide. Above Albany and Troy the river is really a small stream, obstructed by falls and rapids. It is this drowning of the Hudson Valley which is one of the principal causes of the commercial supremacy of New York City, as it has made this river the only deep-water passage cutting entirely through the Appalachian system. The connection of the Atlantic with the North Central States is completed by the Erie Canal (see CANAL), which extends from Troy to Buffalo on Lake Erie. The Hudson Fiord, as it may be called, is a majestic waterway, from one-half to nearly one and one-half miles wide, with the exceptions noted above. It is navigated by a large number of vessels of all kinds, and elegant passenger steamers ply upon its waters. The principal places on the river are Glens Falls, Cohoes, Troy, Albany, Hudson, Catskill, Kingston, Poughkeepsie (where is the only bridge between Albany and the sea), Newburgh, West Point (seat of the United States Military Academy), Peekskill, Haverstraw, Ossining (Sing Sing), Nyack, Tarrytown, Yonkers, and at the mouth of the river, New York, Hoboken, and Jersey City. The sailing craft, however, whose numbers formerly added so much to the picturesqueness of the river, have to a great extent disappeared. The enormous traffic is further facilitated by the New York Central and Hudson River and the West Shore railroads, which run along either shore of the Hudson and the Mohawk. The navigable length of the Hudson from New York to Troy is 150 miles, and the entire length of the river is about 300 miles. It was discovered by Verrazzani in 1524, but first explored by Henry Hudson in 1609. It was called North River to distinguish it from the Delaware, or South River, but the English named it in honor of its explorer. Its Indian name was Shatemuc. The Hudson figured prominently in the Revolutionary War (see STONY POINT; WEST POINT), and it was on this river that steam navigation was first successfully introduced by Robert Fulton in 1807.

HUDSON RIVER SCHOOL OF PAINTING. So called from the work produced by a number of American artists who found their subjects largely in the neighborhood of the Hudson River. Some of them lived on its banks, and the father of this group of painters was probably Cole (q.v.), who lived at Catskill. The Hudson certainly furnished charming subjects for the landscape painter's brush; but as it was exploited in art rather early in the art development of our country, it seemed to have been regarded by artists of the day as offering pictorial opportunities, rather than any grand and dramatic expressions of nature. This latter, however, it does at times present, but these phases have not been made much of by the 'school,' those painting along its shores prefer-

ring rather the gentle and idyllic charms where haze and sunshine and autumnal coloring have softened its landscape to an almost cloying sweetness. For this reason, a later and more robust set of painters have been disposed to use the term as one of gentle reproach, and indicating that scant justice has as yet been done this noble river. Among those who have invested this class of subject with considerable charm may be mentioned J. F. Kensett, Sanford R. Gifford, J. B. Bristol, Worthington Whittredge, J. R. Brevoort, and J. F. Cropsey. The influence of the school has not been lasting.

HUDSON RIVER SERIES. See ORDOVICIAN SYSTEM.

HUDSON'S BAY COMPANY. An English chartered company. It was incorporated in 1670, by Charles II., who granted to a number of 'adventurers,' with Prince Rupert at their head, the sole right to trade with the native tribes on the shores of Hudson Bay. The company had power to establish laws and impose penalties, to erect forts, maintain ships of war, and "make peace and war with any prince or people not Christian." It started with a capital of about £110,000, and for a long time it maintained its monopoly intact. The progress made was not rapid, and by the middle of the eighteenth century the company had no more than 120 people in its employ; but nevertheless three or four ships were sent out annually with a cargo of coarse English goods, which were sold to natives for furs and skins at rates which brought the proprietors a handsome profit. Conflicts soon arose with the French, who laid claim to the territory on the ground of an expedition made in 1656 by Jean Bourdon, who, according to Charlevoix, *Histoire de la Nouvelle France*, vol. i. (Paris, 1744), traveled from Quebec to Hudson Bay and took formal possession of the country inclosing James Bay. There is no doubt, however, that the Hudson basin had been visited by English navigators long before 1656. In 1682 a trading post on the coast was surprised by the French, and in 1686 four more of the company's forts were taken. During the war of 1689-97 the same forts changed hands more than once, and by the terms of the Peace of Ryswick some of them were given to the French. It was not until the Treaty of Utrecht, in 1713, that the latter finally resigned all claims to the Hudson Bay territory. From 1713 to 1763 the company enjoyed a peaceful and prosperous, but far from dazzling, career. It imported annually into England about 30,000 skins, and its dividends were 8 to 10 per cent. The conquest of New France was the turning-point in the company's history. When Canada became English, the vast territory of the Hudson's Bay Company became accessible from the south as well as from the sea. Trade increased tremendously, and in the next French war (1778-83), when its factories were surprised by a French squadron under Lapérouse, the company was strong enough to bear a loss of £500,000.

So profitable a monopoly could not be long enjoyed. Not only private trappers, but rival companies, entered the field, on the principle of free and open trade guaranteed to all British subjects in the Declaration of Rights. Such a competitor was the famous Northwest Company, which, after years of strife amounting at times to actual war, was merged (1821) with its opponent under the name 'Adventurers of England Trading into Hudson's Bay,' for a period of twenty-one years. The territories of the company had been gradually extended until they reached to the Arctic on the north and the Pacific on the west. In 1859 the trade monopoly was abolished, but the claims of vested interests and property rights remained unsettled until 1869, when, in return for an indemnity of £300,000, together with a land grant of 7,000,000 acres made by the Dominion Government, the company gave up all its ancient privileges, and took its place on a footing with other business corporations, retaining, however, its forts or trading stations. The company's influence with the Indians has always been very great, and it has been served by a corps of well-trained agents who still in large measure administer justice and preserve order among the native tribes. Information regarding the Hudson's Bay Company may be found in Cawston and Keane, *Early Chartered Companies* (London, 1896). Consult also: Bryce, *History of the Hudson Bay Company* (London, 1900); Willson, *The Great Company* (London, 1900); Bradley, *Fight with France for North America* (New York, 1901). An account of the Northwest Company is given in Washington Irving's *Astoria*.

HUDSON STRAIT. See HUDSON BAY.

HUÉ, hōō-ā'. Capital of the Kingdom of Annam, situated on the left bank of the Truong River, about 10 miles above its entrance into the sea, about latitude 16° 29′ N., and longitude 107° 38′ E. (Map: French Indo-China, E 3). It is a walled city, fortified in the beginning of the nineteenth century by French engineers after the style of Vauban. Hué consists of two parts, the city proper and the suburbs, the former being in the middle of a square island separated from the suburbs on three sides by the river and on one side by a canal. The walls, which have a circumference of about 8000 yards, are of brick and very high, and the citadel has eight gates. The royal palace has yellow tiles on the roof; those of the nobles have red tiles. The wall inclosing the royal palaces has three gates, the centre one being in the form of a pagoda, elaborately carved and gilded; but most of the public buildings and nearly all the houses are comparatively mean and in bad repair. Population about 100,000, of whom 800 are Chinese and 350 Europeans, the latter consisting for the most part of the French Resident, his staff and military guards. The forts at the river mouth were taken by the French in 1883.

HUE, ü, GEORGES ADOLPHE (1858—). A French dramatic composer. He was born at Versailles, and gave early evidence of his musical gift. When twenty-one years of age he won the Grand Prix de Rome, and two years later the Prix Cressent. During his period of study at the Paris Conservatory he was the pupil of Reber and Paladilhe. His compositions include the following operas: *Les Pantins* (1881); *La belle au bois dormant* (1894); *Vazanta;* and *Le roi de Paris.* Among his orchestral works are the symphonic legend, in three parts, *Rübezahl,* and a dramatic sacred episode, *Resurrection.* He also wrote much chamber music, and numerous pieces for individual instruments. He was one of the most successful teachers in Paris.

HUE AND CRY. A phrase, derived from the old process of pursuit with horn and voice, used in English law to describe the pursuit of felons. Whoever arrested the person pursued was so far protected that he required no warrant to justify the arrest; and even if the party turned out to be no felon, no action could be brought if the arrest was bona fide. But it was not only a ground of action, but an offense subject to fine and imprisonment, maliciously and wantonly to raise the hue and cry against a person. It was the duty of all persons to join in a hue and cry, and if a person who had been robbed, or knew of a robbery, failed to raise the hue and cry, he was liable to fine or imprisonment, or, according to some authors, to indictment. Hue and cry is now regulated in England by the Sheriffs Act, 1887 (50 and 51 Vict., c. 55). Consult: the *Commentaries* of Blackstone; Pollock and Maitland, *History of English Law* (2d ed., London and Boston, 1899).

HUEFFER, hụf'fẽr, FRANCIS (1843-89). An English musical writer and librettist, born in Münster, Germany. He studied in England and on the Continent, and afterwards settled in London, and became musical critic of the *Times* in 1878. He furnished the libretto for the operas *Columbia* and *The Troubadour* of Mackenzie, and *The Sleeping Beauty* of Cowen. His works include an edition of the works of the troubadour Guillem de Cabestant (1868); *Richard Wagner and the Music of the Future* (1874); *The Troubadours: A History of Provençal Life and Literature in the Middle Ages* (1878); *Musical Studies* (1880), a collection of articles originally written for the *Times* and other newspapers, translated into Italian by Visetti (1883); and a translation into English of the correspondence of Wagner and Liszt. He was one of the first to advocate the cause of national English opera.

HUELEN, wā'lân (c.1540-1603). A Chilean patriot, native of Angol. In 1599 he was at the head of the forces of Araucania, mustered to repel the Spaniards, and by copying their methods and teaching his followers to ride the horses the invaders had brought to South America, was enabled to wage successful warfare against them, though no longer a young man. He was victorious at Valdivia (1599), near Concepción (1601), near Bio-Bio (1602), against the enemy with firearms and coats of mail; but his siege of Osorno failed, and he died of old wounds and new before he had succeeded in capturing the fort.

HUELVA, wâl'vâ. The capital of the Spanish province of the same name, situated on the deep and navigable estuary of the Odiel River, 10 miles from its mouth in the Gulf of Cadiz (Map: Spain, B 4). It is a well-developed town, with a good harbor, and is a railroad centre. Among its buildings is a fine hotel built in 1883 by an English company. There are also several notable churches, that of San Pedro having formerly been a Moorish mosque. The Roman aqueduct has been restored, and after centuries of disuse, again supplies the city with water. The industries and commerce of the city have become very important, through the exploitation on a large scale of the copper-mines of the province. The mining companies have built two large iron piers at the harbor, one of them costing $780,000. The city has also large machine-shops and shipyards, as well as various other industries. The United States is represented by a consular agent. Population, in 1900, 20,927.

HUENE, hụ'ne, KARL, Baron von Hoiningen (1837-1900). A German politician, born in Cologne, and educated in Berlin. He entered the army, and after serving in the wars of 1864, 1866, and 1870-71, became a member of the Prussian House of Deputies (1877). In 1884 he was elected to the Reichstag, where he rose to prominence as a leader of the Centre, and author (1885) of the *Lex Huene*, rescinded in 1893, by the terms of which all taxes on cereals and cattle, save 15,000,000 marks, were divided among the various parochial governments of Prussia. In 1893 he lost his leadership of the Clericals by his compromise with the Administration on the military budget, and failed of reëlection in that year, and again in 1895. But until his death he remained a member of the Prussian Council of State, to which he had been appointed in 1890.

HUEPPE, hụp'pe, FERDINAND (1852—). A German bacteriologist, born at Heddesdorf, and educated in Berlin. In 1890 he was appointed professor of hygiene in the German University at Prague. He established the fact that subterraneous water is free from germs, and contended that the source of infection from bacteria is the decayed organism on which the bacillus feeds. Hueppe did much to simplify disinfection and to promote inoculation with 'benign' bacteria. He first advanced the theory that the power of 'nitrifying' microbes to absorb carbonic oxide, even in the dark, is due to the oxidation accompanying the ammoniacal preparation of saltpetre. He wrote: *Die Formen der Bakterien* (1886); *Ueber die Beziehungen der Fäulnis zu den Infektionskrankheiten* (1887); *Ueber den Kampf gegen die Infektionskrankheiten* (1889); *Die Methoden der Bakterienforschung* (5th ed. 1891); *Die Choleraepidemie in Hamburg, 1892* (1893); *Ueber die Ursachen der Gärungen und Infektionskrankheiten* (1893); *Naturwissenschaftliche Einführung in die Bakteriologie* (1896); *Zur Rassen- und Socialhygieine der Griechen* (1897); and *Handbuch der Hygieine* (1899).

HUÉRCAL-OVERA, wâr'kâl ô-vā'râ. A town of Southeastern Spain, in the Province of Almeria, situated in a broad and fertile valley surrounded by mountains, 16 miles from the Mediterranean coast (Map: Spain, D 4). It has straight and wide streets and several plazas, on one of which stands a handsome church. The town is connected by rail with Murcia, and between it and the coast are the silver and copper mines of the Sierra de Almagrera. Population, in 1900, 15,774.

HUERTA, wâr'tâ, VICENTE GARCÍA DE LA (1734-87). A Spanish poet and critic. He was born at Zafra, in Estremadura, and spent the greater part of his life in Madrid, where he held the office of principal librarian of the Royal Library, and where he died. He early distinguished himself by his poetic talent. His tragedy *Raquel*, founded upon the story of the love of King Alfonso VIII. for the Jewish Rachel, was received with great enthusiasm when first produced in 1778, and is still considered a work of some merit. Huerta was a most zealous, but not always a wise or skillful, defender of the ancient Spanish national taste against the Gal-

dramatists and lyric poets inaugurated as a result of Luzan's crusade. As a lyric and dramatic poet he shows great command of language and versification. His poems were published in two volumes, *Obras poéticas* (1778-79); they are accessible in the *Biblioteca de autores españoles*, vol. lxi. (Madrid, 1869). Huerta edited the *Teatro español* (17 vols., Madrid, 1784-85), a collection of the best works of the older Spanish dramatists.

HUESCA, wā'skä (Lat. *Osca*). The capital of the Spanish province of the same name, situated in a fertile plain on the River Isuela, 45 miles northeast by rail from Saragossa (Map: Spain, E 1). It is an old town, retaining its mediæval aspect, surrounded by the ruins of its double line of ancient walls. It has a celebrated Gothic cathedral dating from the fifteenth century, in which is a magnificent alabaster tablet, representing the Passion; and an old Romanesque church dating from the twelfth century. There are also several old monasteries in the neighborhood, that of Monte Aragón containing in its crypt the tomb of Alfonso I. The institute for secondary education occupies the building of the old university, founded in 1354, and removed to Saragossa in 1845. In one of the vaults of this building the famous 'Bell of Huesca' is said to have been constructed from the sixteen heads, including one as the clapper, of as many insurgent nobles, who were executed by command of King Ramiro II. Population, in 1887, 13,041; in 1900, 11,976. Under the Romans Osca was a place of considerable importance, having a number of Greek and Latin schools and a college founded by Sertorius, who here met his death at the hands of Perpenna in B.C. 72. The Moors strongly fortified Huesca; after being taken by Pedro I. in 1096 it became the capital of Aragon, but was superseded by Saragossa in 1118.

HUÉSCAR, wā'skär. A city in the Province of Granada, Spain, situated 75 miles northeast of the city of that name (Map: Spain, D 4). It has manufactures of flour, paper, linen, and woolen goods. Population, in 1900, 7917.

HUET, ụ'ā', PAUL (1804-69). A French landscape painter, born in Paris. He was a pupil of the Ecole des Beaux-Arts (1820-24), and of Gros and Guérin, and was himself the founder of the new school of romantic painting (1831), which opened the way for Dupré and Rousseau. Many of his pictures are owned by the French museums—the Luxembourg possesses two of them, "Une matinée dans la fôret" (1835) and "La vallée de la Touque." His other works include: "Le Château d'Arques" (1840); "Le coup de vent;" "Vue de Naples;" "Les ruines du château de Pierrefonds;" and "Vue de Rouen" (1833). His landscapes are treated in the romantic manner, with stormy sombre skies, and intense coloring. Consult Burty, *Paul Huet* (Paris, 1869).

HUET, PIERRE DANIEL (1630-1721). A French Roman Catholic scholar. He was born at Caen, February 8, 1630, and was educated in the Jesuit School there. He was a zealous follower of Descartes and a pupil of Bochart, and accompanied the latter on his visit to Stockholm in 1652. On his return to Caen he gave

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Hülshoff und ihre
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marck (1800).

HUG, hōōg, JOHANN LEONHARD (1765-1846). A Roman Catholic scholar. He was born at Constance, June 1, 1765, studied at Freiburg, and in 1789 entered into priest's orders. In 1791 he was appointed professor of Oriental languages and of the Old Testament at Freiburg, and in 1792 of the New Testament also. The most important fruit of his biblical researches was his *Introduction to the New Testament* (1808; 4th ed. 1847; Eng. trans., London, 1827, New York, 1830). His great eminence as a biblical scholar led to his being called on to take part in the arrangement of the newly organized studies of several German universities, as at Breslau, in 1811; at Bonn, in 1816; at Tübingen, in 1817; and again at Bonn, 1818, and 1831. He died March 11, 1846. Among his untranslated works are *De Antiquitate Codicis Vaticanæ Commentatio* (1810); *Das hohe Lied* (1813); *De Pentateuchi Versione Alexandrina Commentatio* (1818); *Gutachten über das Leben Jesu, kritisch bearbeitet von D. Fr. Strauss* (1835); and several on subjects of classical criticism, especially an interesting work on the ancient mythologies (1812). Consult A. Maier, *Gedächtnisrede auf Hug* (Freiburg, 1847).

HÜGEL, hü'gel, KARL ALEXANDER ANSELM, Freiherr von (1796-1870). An Austrian soldier, traveler, and naturalist, born at Regensburg. He visited Greece, Crete, and Cyprus, examined the ruins of Palmyra and Baalbek, made numerous journeys through Syria and Palestine, and arrived at Bombay in 1832. Thereupon he traversed the greater part of the Deccan, ascended the Nil-Gherria range, undertook thorough geographical researches in Ceylon, and in 1833 shipped from Madras to Australia (then New Holland). He returned to India (Calcutta) by way of the Philippines, penetrated through Bengal to the Tibetan frontier, and reached Vienna early in 1837. He contributed papers regarding his expedition to Austrian scientific publications and to the *Journal* of the Royal Geographical Society of London, and wrote also: *Kaschmir und das Reich der Siek* (4 vols., 1840-42); *Das Kabulbecken* (2 vols., 1850-52); and *Der Stille Ozean und die spanischen Besitzungen im ostindischen Archipel* (1860). Other scholars, among them Endlicher, Heckel, Fenzl, and Schott, also prepared the results of his scientific collections. He obtained a European reputation as a horticulturist, and founded and became president of the Austrian Horticultural Society.

HUGER, ū-jē', BENJAMIN (1805-77). An American soldier, prominent on the Confederate side in the Civil War. He was born in Charleston, S. C.; graduated at West Point in 1825; and served in topographical and ordnance duty until the Mexican War, in which he was chief of ordnance in General Scott's army. For his services he was brevetted successively major, lieutenant-colonel, and colonel. From 1848 until 1860 he commanded various arsenals. Soon after the obtbreak of the Civil War he entered the Confederate service as a brigadier-general, and was soon promoted to be a major-general, in which capacity he commanded a division in the Seven Days' Battles against McClellan, but was relieved from his command for his failure to intercept the Federal army after the battle of Malvern Hill. He subsequently served in the ordnance department in the Trans-Mississippi district.

HUGER, ISAAC (1742-97). An American soldier in the Revolution, born on Limerick Plantation, S. C., of French Huguenot ancestry. He was sent to France to be educated, and on his return to America served in 1760 as a lieutenant of a volunteer militia company, in a campaign against the Cherokees. With his four brothers, he entered enthusiastically into the revolutionary movement. He served first as colonel in the South Carolina militia organization, and in January, 1779, was commissioned brigadier-general in the Continental Army. He took part in all the campaigns in the South, was especially relied upon by General Greene, to whom he was second in command in his North Carolina campaign against Cornwallis in the early months of 1781, and was wounded at the battle of Guilford Court House.

HUGGINS, Sir WILLIAM (1824—). An English astronomer, born in London. He devoted himself to the study of astronomy, and in 1856 built an observatory at his residence in Upper Tulse Hill, London, in which he mounted a telescope of eight-inch aperture, and made careful drawings of Mars, Jupiter, and Saturn. His attention was first engaged in observations on double stars, but afterwards he took up spectrum analysis. His first discovery in this line was presented to the Royal Society in a paper on the "Lines of Some of the Fixed Stars." He found also that some of the nebulæ gave a spectrum of a few bright lines only, which showed that the light had emanated from heated matter in the state of gas; and, further, that one of the principal constituents of the gaseous nebulæ is hydrogen. He concluded, therefore, that the nebulæ are not simply clusters of stars too distant to be separately distinguished, but relics of the mass of glowing gas from which the solar system is supposed to have been formed by condensation. (See NEBULÆ.) He has also examined the spectra of comets, and has found that part of the light of these objects is different from the solar light. He also proved the existence of carbon in comets. Huggins was the first to apply Doppler's principle (q.v.) to the measurement of stellar velocities toward the solar system or away from it. This important kind of observation has since been carried on by many astronomers, and promises to throw entirely new light on the constitution of the sidereal universe.

He also made innovations along other lines. He introduced photography into astronomy, which, however, was of limited use till about 1875, when the invention of the gelatin dry plate enabled the astronomer by long exposure to accumulate sufficient amount of light to obtain good pictures of celestial objects, too faint to be seen even with the most powerful telescope. Huggins also invented a spectroscopic method for studying the red prominences of the sun, and proved, through a laboratory experiment, the existence of calcium in the solar prominences and chromosphere. In all his various researches Huggins has been ably assisted by his wife. In recognition of his services to science, a number of honors were bestowed upon Huggins by various scientific bodies. He was president of the Royal Astronomical Society from 1876 to 1878, of the British Association for the Advancement of Science in 1891. He was chosen president of the Royal Society in 1900, and has at different

final papers, he published, jointly with Lady Huggins, *An Atlas of Representative Stellar Spectra* (1900), which received the Actonian Prize of the Royal Institution.

HUGH, hū (?-947). King of Provence and Italy. He was the son of Lothair, Count of Arles, and after the death of Louis the Blind (923) became ruler of Provence. In 926 he was crowned King of Italy at Paris, by the subjects of Rudolph, who were in revolt. His attempts to make himself Emperor involved him in constant war. Lombardy was invaded by the Hungarians, and Berengar finally drove him into Provence, where he died.

HUGH, SAINT (c.1135-1200). Bishop of Lincoln. He was born at Avalon, near Pontcharra, Burgundy, on the border of Savoy, about 1135. His father was Lord of Avalon, but renounced the world when Hugh was eight years old and took his son with him into a monastery near Grenoble. In 1160 Hugh became a Carthusian monk at the Grand Chartreuse, and won such high repute that he was called in 1175 by Henry II. of England to put in order a monastery of the Order at Witham, Somerset. His great success led to his election as Bishop of Lincoln in 1186. Every year he spent a little time in retreat in Witham Monastery, but the rest of his time he lived the life of a busy and most efficient bishop. His moral courage made him fearless in resisting unjust demands from King or peasant, and a charity which was boundless endeared him to the people. So while he lived he was held in universal esteem, and when he died in London, November 16, 1200, he was not forgotten, and his tomb in Lincoln Cathedral became a place of pilgrimage. Consult his life in Latin edited by Dimock (London, 1864); in English by Perry (ib., 1879); Thurston (ib., 1898); Bramley (1901), in connection with memorial sermons on the 700th anniversary of his death (Lincoln, 1901); and by Charles Marson (London, 1901).

HUGH CAPET, hū kā'pĕt, Fr. **HUGUES CAPET**, ụg kā'pā' (939-96). King of France from 987 to 996. He was a son of Hugh the Great, Count of Paris, and Hedwig, a sister of Otho the Great of Germany. Hugh Capet succeeded his father as Count of Paris in 956, and became thereby the real ruler of the country, though the title of King still belonged to the Carolingians. When, in 987, Louis V., the last Carolingian King of France, died without heirs, Charles, Duke of Lorraine, claimed the throne by descent, but at a meeting of the nobles and prelates of the realm at Senlis it was declared that the crown was elective, and thereupon Hugh was chosen, and became the founder of the Capetian dynasty (q.v.). Charles of Lorraine was easily defeated in the contest which ensued. The rest of Hugh's life was passed in a kind of border warfare against the great feudatories whose territories surrounded the royal domain. In 988 he had his son Robert elected and crowned as his successor.

HUGHENDEN, hū'ĕn-dĕn (*Hitchendon*). A parish of Buckinghamshire, England, among the Chiltern Hills, north of High Wycombe (Map: England, F 5). It is noted for Hughenden Manor, long the residence of Benjamin Disraeli, Earl of Beaconsfield. Earl and Lady Beaconsfield are buried in the parish church. Population, 1800.

HUGHES, hūz, BALL (1806-68). An American sculptor. He was born in London, studied seven years with Edward H. Bailey, and won several important prizes at the Royal Academy. He also executed a bust and a statuette of George IV. In 1829 he came to New York and made a marble statue of Alexander Hamilton for the Merchants' Exchange. It was destroyed in the fire of 1835. He also made the high relief of Bishop Hobart, now in Trinity Church, New York City. Among his later works are a bronze statue of Dr. Nathaniel Bowditch, in Mount Auburn Cemetery, near Boston, a statuette of Gen. Joseph Warren, a bust of Washington Irving, and a model for an equestrian statue of Washington.

HUGHES, DAVID EDWARD (1831-1900). An English-American inventor. He was born in London, but was early brought by his parents to the United States, where he subsequently received his education at Bardstown College, Kentucky. In 1850 he was made professor of music, and later of natural philosophy at that college. In 1855 he took out a patent for his first important invention—the printing telegraph, which bears his name. After his telegraph was adopted in the United States, he went to Europe (1857), where the instrument was successively adopted by France, Italy, England, Russia, Germany, Austria, Turkey, Holland, Belgium, Switzerland, and Spain. Among his other inventions and discoveries may be mentioned the microphone (1878) and the induction balance (1879). In recognition of the great value of his services to commerce and the arts, medals and numerous titles of honor were bestowed upon him by various scientific bodies, and by the governments of nearly all the European States. His publications comprise a number of papers on electricity and magnetism, presented to the Royal Society (of which he was a fellow), and to other societies.

HUGHES, HUGH PRICE (1847-1902). A British minister of the Wesleyan Church. He was born at Carmarthen, South Wales, and was educated at University College, London, and the theological school in Richmond, Surrey. Obliged by the laws of his Church to move every three years, he left the charge he had taken at Dover in 1869 for Brighton, and was afterwards at Oxford, and in three different London churches before he became stationary in the metropolis as superintendent of the West London Mission and editor of the *Methodist Times* (1885). He refused to accept from the mission a salary greater than $1500, and during the last year of his life, having received a small legacy, served gratuitously. His publications include: *Social Christianity* (1889); *The Atheist Shoemaker* (1889); *The Philanthropy of God* (1890); and *Ethical Christianity* (1892). Consult *Hugh Price Hughes as We Knew Him* (London, 1902).

HUGHES, JOHN (1797-1864). An American prelate, first Archbishop of New York; born in Annaloghan, County Tyrone, Ireland. Brought up in the northern or Protestant section of his native land, where Orange societies were rife, he early became imbued with the combative spirit which ever afterwards characterized him. His parents were poor, and could give him little

schooling, but he educated himself, and at the age of twenty emigrated to the United States, where he worked as a day laborer in Maryland and Pennsylvania for three years, until he gained admission to the Roman Catholic College of Mount Saint Mary, Emmittsburg, Md. There he earned distinction as a debater and also as a collector of funds for the rebuilding of the college after it was burned down. He was ordained a priest in 1826, and the same year the first of his controversial pamphlets was published, *An Answer to Nine Objections Made by an Anonymous Writer Against the Catholic Religion.* After being assistant at the Church of Saint Augustine, Philadelphia, he went to Bedford, Pa., thence returned to Philadelphia (1827), to take charge of Saint Joseph's Church, afterwards took charge of Saint Mary's, and was the founder of Saint John's Orphan Asylum (1829). From 1833 to 1835 he published in the *Catholic Herald* his replies to his Presbyterian antagonist, Dr. Breckenridge. In 1838 he was appointed coadjutor of the Bishop of New York, four years afterwards became a bishop himself, and continued his controversies upon educational, political, and religious affairs, in which his oratorical powers exerted a potent influence. One of Bishop Hughes's first undertakings was the establishment of a short-lived theological seminary at Lafargeville, Jefferson County, which was reopened at Fordham under the name of Saint John's College in 1841. In 1850 he was made an archbishop, and in 1861 was sent on a special embassy to gain the friendship of France for the North in the Civil War, extending his influence in the same cause both to Ireland and Italy. Two volumes of his writings, edited by Lawrence Kehoe, were published in 1865 after his death. Consult: Hassard, *Life of John Hughes* (New York, 1866); and Brann, *John Hughes* (New York, 1892), in the "Makers of America Series."

HUGHES, THOMAS (1823-96). An English author and politician, second son of John Hughes, of Donington Priory, Newbury, Berkshire, born at Uffington, Berks. He was educated at Rugby under the celebrated Dr. Arnold; graduated B.A. from Oriel College, Oxford, in 1845; was called to the bar at Lincoln's Inn in 1848, and became a member of the chancery bar. In 1856 he gave to the world *Tom Brown's School Days*—a picture of life at a public school, evidently written from the author's own personal experience, and recording the vivid and enduring impressions he brought with him from Rugby. It was followed, in 1858, by *The Scouring of the White Horse;* in 1861, by *Tom Brown at Oxford,* in which the mental history of his hero is continued, with sketches of college life and incidents; and in 1869, by *Alfred the Great.* Hughes pursued meanwhile the study and practice of the law; and was appointed Queen's Counsel in 1869. He gained the confidence and good-will of the working classes by endeavoring to promote a better understanding between masters and men, and by teaching the latter the value of coöperation as a means of social elevation. At the general election for Lambeth in 1865, he was placed at the head of the poll, the workingmen being especially enthusiastic in securing his return. In 1868 he was returned for Frome, which he continued to represent till 1874, and always took a prominent part in debates relating to the combinations of trades-unions, and the of master and servant. I part in the socialistic sett Hughes also wrote: *Memo Vacation Rambles* (189 works.

HUGH OF LINCOLN is the hero of a mediæva told variously in the chro cording to one version, playing ball. Sir Hugh the ball through the win ticed into the castle by th dered, and thrown into addressed his mother m disclosed the crime. T the belief that the Jews m dren, is found throughout of mediæval Europe. It artistic treatment in Cha Consult Child, *English and lads,* part v. (Boston, 18

HUGH OF LUSIGNA name of several counts of the best known is Hugh his father's life King John him of his bride, Isabella John's death he married Is self countess-queen. He p sade against Damietta minority of Louis IX. he w nobles who revolted agains of Castile, but was comp 1241 he insulted his ove Saint Louis. The latter s doned him.

HUGH THE GREAT Paris (called also THE WHI 923 of his father, Robert I., King of France in opposi Simple, he could have tak but instead permitted it to law, Rudolph of Burgundy. course after the death, in 9 was succeeded by Louis d'Ou of Charles the Simple. M amassed large estates, and thing but a docile King, Hu the assistance of his brot Great of Germany, in the w King was captured and rele to his conqueror the city mediately renewed the stru was victorious. Peace was Four years afterwards Hug portunity to make himsel death (954), but he favo Lothair, and in reward for vested with the duchies of gundy. It was his son, H ceded the throne thirty yea

HUGH THE GREAT (1 Vermandois, the third son of He joined the First Crusad taken prisoner. Rescued by he continued to fight in the H there from the effects of a w Nicæa. There seems to ha for his being called 'The Grea was the customary sobriquet tians.

HUGLI, or **HOOGLY**, hōōg'li. The westernmost and principal deltaic channel of the Ganges, British India, formed by the junction of three offsets of the Ganges, the Bhagirathi, the Jalangi, and the Churni, known as the Nadiya rivers (Map: India, E 4). It is 125 miles long, the estuary, as far as Saugor Roads, measuring 35 miles more. It is the most available for navigation of all the channels by which the Ganges reaches the sea. In the dry season the tide is felt as high as Chandernagar, 17 miles above Calcutta. During the southwest monsoon the Hugli is subject to a bore seven feet high, often ascending at the rate of 22 miles an hour. Ships drawing 26 feet of water can ascend to the port of Calcutta. The entrance of the river is much incumbered with shoals, and dredgers are constantly employed in maintaining a clear channel.

HUGLI, or **HOOGLY**. A city and river port of Bengal, British India, capital of a district of the same name, on the right or western bank of the river Hugli, 27 miles north of Calcutta, in latitude 22° 54′ N., and longitude 88° 22′ E., on the Calcutta and Allahabad Railway (Map: India, E 4). The city was founded by the Portuguese in 1547. Chinsura (q.v.), which now forms a part of it, was founded by the Dutch. It contains several important educational institutions, including the Hugli College, and is also the seat of an extensive military cantonment. Population, in 1891, 33,060; in 1901, 29,383.

HUGO, hōō'gō, Gustav von (1764-1844). A German jurist, born at Lörrach, Baden, and educated at Göttingen. After acting as tutor to the Prince of Anhalt-Dessau (1786), he became professor of law at Göttingen (1788). In 1819 he was made Privy Councilor. He made important investigations of the sources of Roman law. He was, together with Savigny and Haubold, one of the founders of the historical method in jurisprudence. He edited: *Ulpiani Fragmenta* (1788); translated Gibbon's chapter on Roman law as *Uebericht des römischen Rechts* (1789); *Pauli Sententiæ Receptæ* (1796); and *Jus Civile Ante-Justinianum* (1815). But his most important labor was his own book, *Lehrbuch eines civilistischen Kursus* (1792), and his *Civilistisches Magazin* (1814-37), with its supplement, *Beiträge zur civilistischen Bücherkenntnis der letzten vierzig Jahre* (1828-45). Consult Eyssenhardt, *Zur Erinnerung an Gustav Hugo* (Berlin, 1845).

HUGO, ụ'gō', Victor Marie (1802-85). The greatest French poet of his century, a distinguished dramatist, novelist, essayist, and politician. His first volume appeared in 1822. For nearly two-thirds of the century he was a leader in French literature, for the greater part of that time preëminently the leader. He represents the supreme reach of an individualistic and romantic movement. Besançon, his birthplace, had once been a Spanish city—a significant fact, for his work often shows Spanish influence. His father was a distinguished officer of the Republic and Empire, his mother the daughter of a sea captain of Nantes, of royalist and Catholic sympathies. With her the child lived in Paris till 1811, when General Hugo summoned his family to join him in Madrid, whence he was constrained to send them back in 1812, as King Joseph's cause was growing desperate. The impressions of this year left deep marks on many of Victor's works, notably *Bug Jargal* (1826), *Hernani*, *Ruy Blas*, and *Torquemada*. Then, till the fall of the Empire, he was once more with his mother in Paris in the abandoned Convent of Les Feuillantines, which appears prominently in *Les Misérables*. Set at technological studies by his father, he aspired at fourteen 'to be Chateaubriand or nothing,' wrote a Miltonic *Deluge*, and planned dramas, epics, and operas. At fifteen he competed for an Academic prize, winning honorable mention and some minor literary patronage. Two years later (1819) he won three prizes at the poetic competition (*Jeux Floraux*) of Toulouse. He also wrote at this time, though he did not publish it in this form till his old age, a novel, *Bug Jargal*, a story of Haiti, of great promise and weird power. An extended revision of this was printed in 1825. In 1819 he founded a fortnightly literary journal, *Le Conservateur Littéraire*, the failure of which, with the withdrawal of his allowance from his father, reduced him to a poverty that gave materials for the Marius episodes in *Les Misérables*. His brother, Abel, generously helped him to print *Odes et poésies diverses* (1822), which paid him 700 francs, and caused King Louis XVIII. to grant him a pension of 1500 francs, increased later to 3000. On the strength of this he married (October, 1822), and thereafter enjoyed a happy domestic life. These verses, in their brilliant rhetoric and richness of rhythmic melody, had been approached in that generation only by Lamartine's *Méditations*. They show an ardent royalism, a perfunctory and sonorous religiosity, and an intense political passion, on which Napoleon was already beginning to exercise a fascination that declared itself openly in the superb *Ode on the Vendôme Column* (1827).

The next few years were occupied with an extravagantly romantic novel, *Han d'Islande* (1823), and with literary journalism. In 1826 appeared *Nouvelles odes et ballades*, whose preface was a sort of literary manifesto of Romanticism, and of the first *Cénacle* (q.v.). Versification and rhythm here begin to show an aggressive individuality, and several poems indicate that sympathetic study of the mediæval mind which is associated with French Romanticism. Hugo was recognized as the Romantic leader, and asserted and confirmed that position by *Cromwell* (1827). As early as 1826 the Odéon Theatre had offered hospitality to an English company, in which were Charles Kemble and Miss Smithson. This company played *Othello*, *Romeo and Juliet*, and *Hamlet*, all of which were enthusiastically greeted by the new French school. Indeed, Kemble and his companions did not leave the Odéon till July, 1828. *Cromwell* begins with an elaborate preface full of dramaturgic observations, more opportune than new; but they now become the rallying-point of a school who thought "the drama the only complete poetry of our time, the only poetry with a national character." This school demanded for the drama an unconventional vocabulary and a mingling of tragic and comic, to show more fully the irony of destiny, thus unconsciously following Diderot (q.v.), while attempting to follow nature. In all Hugo's dramas the lyric element tends to delay the dramatic effect. *Hernani* and *Ruy Blas* alone are still played in France.

Cromwell was followed by a drama taken from

VICTOR HUGO
FROM A PHOTOGRAPH

Scott's *Kenilworth*—*Amy Robsart* (1829), a failure—and *Marion Delorme*, which the censorship forbade the stage till 1831. In 1829 Hugo published *Les Orientales*, a collection of poems containing some of the most striking pieces of metrical art in the world. They were followed by the long-contested triumph of *Hernani* and of Romanticism on the French stage (1830), after Hugo had vainly tried to bring about the performance of *Marion Delorme*. For nearly a hundred days, from February 26th to June 5th, the battle raged nightly at the Théâtre Français, but no further organized effort was made to resist the retrograde evolution of the Romantic drama till it collapsed with Hugo's *Les Burgraves* in 1843. The situation in *Hernani* is strained and dramatically unreal, the sentiment is mawkish, the oratory grandiloquent; but a throbbing life and intensely expressed emotion maintain the interest, though this is a lyric rather than a dramatic one. The same qualities and the same defects, with more strained antithesis of grotesque and sublime, tragic and comic, foul and fair, characterize *Marion Delorme* (1830). They characterize also *Le roi s'amuse* (1832); the prose dramas, *Lucrèce Borgia* (1833); *Marie Tudor* (1833); *Angelo, tyran de Pedoue* (1835). They reach their height in *Ruy Blas* (1838), and become most conspicuous in *Les Burgraves* (1843). Hugo's conceptions were too grandiose to be reconcilable with the limitations of the drama. He gave up the effort and turned to politics. But these sixteen mainly dramatic years had produced work of great value in other fields, the novel *Notre-Dame de Paris* (1831), with its Gothic intensity of pathos and its marvelous reproduction of the Paris of Louis XI.; the Quixotic but eloquent *Claude Gueux* (1834), a plea against capital punishment; the *Feuilles d'automne* (1831); *Chants du crépuscule* (1835); *Voix intérieures* (1837); *Les rayons et les ombres* (1840); four collections of poems that show growing democratic sympathies and satiric power, a deepening communion with nature, and a generous warmth of universal sympathy, a little shallow in its breadth, that was to give the keynote to his political activity of the next decade.

The ten years from 1843 to 1853, from *Les Burgraves* to *Les châtiments*, count no literary work of import, but they mark a vital change in the mind of Hugo that affects all the work to follow. Till 1843 drama had taken the first place. From 1853 fiction becomes more prominent, poetry intermittent, with occasional political writings. Hugo sees that his power is essentially lyric, and gives this a dominant place even in prose fiction. Through all there is a new earnestness, born in part of the death of his daughter, Leopoldine, and her young husband (1843), in part of a vague yet intense enthusiasm for the socialistic ideas of Fourier and Proudhon which drew him into a political whirlpool and made him a revolutionary member of the Constituent Assembly of 1848. As a practical politician, then and always, Hugo was a failure. He favored the ambition of Louis Napoleon, till Louis ceased to favor his own advancement; he was an advocate of several hopelessly unpractical schemes, and an unconscious convert to the caressing flattery of Emile de Girardin. Napoleon's coup d'état of 1851 saved Hugo from himself. It made a martyr and hero out of a visionary who was distrusted as a turncoat. In his eloquent *Histoire d'un crime* (finished in 1852 and published in 1877), he shows unconsciously how his efforts to organize resistance to the usurper were distrusted by his fellow Republicans. He fled to Brussels, whence he was urgently requested to move on to England, and resided first in Jersey, then in Guernsey, as near France as possible, consistently scorning every offer of amnesty till the collapse of the Second Empire brought him back to share the darkest days of the Terrible Year (1870-71).

These years of exile steeled his mind, and his genius was fired by what seemed his country's shame. In 1852 appeared the fierce and scurrilous *Napoléon le Petit*, a foretaste of the *Les châtiments* (1853) in which the satiric unites with the lyric genius to produce a classic that will survive for generations the Empire that fired Hugo to a white heat. To calmer hours we owe *Les contemplations* (1856), a collection of lyrics closing in a noble strain, and the first of four volumes of *La légende des siècles* (1859, 1877, 1883), the high-water mark of his achievement in lyrical epic. In 1862 the long-heralded *Les Misérables* appeared on the same day in ten languages—an event till then unparalleled in the annals of letters. The ten volumes of this vast romance reveal Hugo, no longer as in *Notre-Dame*, an evoker of the past, but with eyes on the present and heart in the future. It lacks continuity and proportion. It is a chaos of eloquent special pleading, political reminiscences, socialistic prophecies, bad psychology, grotesque situations, false pathos, and descriptions wonderfully vivid and absorbing. In the hurly-burly of this lyric-epic novel we find most of the virtues and all the intellectual vices of Hugo. Its value lies not in its thought, but in its emotion, its lyric cry, and its epic power of description. On the development of fiction it had no influence, for it belonged to a type already outworn. The same may be said of *Les travailleurs de la mer* (1866), in which the descriptions are superb, and the subject petty. *L'homme qui rit* (1869), an historical phantasmagoria of the English Court of Elizabeth and an unmitigated failure, closes the fiction of the exile. Meanwhile Hugo's poetic muse had had her Indian summer in *Chansons des rues et des bois* (1865). But as the Empire tottered to its fall, his inauspicious interest in politics became once more dominant. He wrote much for *Le Rappel*, a radical journal, founded by his sons and son-in-law, but revealed once more, in 1870, the hopelessly unpractical nature of his political ideas, alike as a prophet of the people and as a member of the National Assembly at Bordeaux in 1871. He resigned his seat in March and went to Brussels, where he barely escaped being mobbed, owing to his defense of the Paris Commune. He was expelled from Belgium, and soon after returned to Paris. Here he failed signally in the elections of 1872, though he was elected life Senator in 1876. But if he might not be a tribune, he was already the poet laureate of the Third Republic. Of the *Les châtiments* 100,000 copies were sold within a year, several plays, notably *Ruy Blas*, were revived with success, and he rose to the new occasion in *L'année terrible* (1872), a noble volume of patriotic verse that made a French critic exclaim, with just pride, that Germany had no such poet to sing her victory as France to glorify even her disaster.

to speak of his decline. He could pose as old, indeed, in the poems of *L'art d'être grandpère* (1877); but *Quatre-vingt-treize* (1874) is the most virile of his novels, with more intensity of action and a truer tragic catastrophe than *Notre-Dame* or *Les Misérables*, though by no means without their faults and its own. The second part of *La légende des siècles*, if inferior to the first, is still grand; there are passages of primary quality in *Les quatre vents de l'esprit* (1881), *La pitié supreme*, and even in the *Philosophic Poems* (*Le pape, Religions et religion, L'âne*, 1878-80); the drama *Torquemada* (1882) is vigorous at least by starts, and in the posthumous volumes (*La théâtre en liberti, La fin de Satan, Toute la lyre*) one comes constantly on verses that bear his unmistakable mint-stamp.

He died in Paris, May 22, 1885. His great age, reaching out into a new generation from an epoch that had passed away, and was indeed more foreign to that day than to our own, could not but impress popular imagination, the more so as his talent, his manner, and his personal physique had something of the monumental and grandiose. Thus his death stirred an unparalleled wave of popular feeling. His body lay in state beneath the Arc de Triomphe. His funeral became a pageant that royalty might envy, and could not equal. The relics of Saint Geneviève, the patron saint of Paris, were removed from the Pantheon that it might receive the popular hero.

Despite his own belief, Victor Hugo had no new or deep theories of life. He was the confidant of his century, "the sonorous echo in the middle of things." Personally he was vain, and rather ignorant, if we compare his knowledge with his pretensions. But he is Olympian in his defects—Zeus, Apollo, and Haphæstion turned into one. His convictions are not important. He thinks to proclaim an oracle and reiterates a commonplace. But he is perhaps the greatest compeller and gatherer of words, the greatest master of language that we know; a great writer, rather than a great author, and therefore the more sure of an enduring democratic fame. He has formed the rhetorical and poetic taste of three generations of French youth. All schools of French verse that have arisen in the last half-century have united to call him their father.

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HUGO OF FLAVIGNY, flā'vē'nyē' (1064-?). A Franco-German monk and scholar, born in Verdunois. He was educated in the Monastery of Saint Vannes, and afterwards went to Dijon, where, about 1090, he began his *Chronicle*. In 1095 he went to England, and a year afterwards became Abbot of Flavigny. He was obliged to leave his abbey in 1099, and though reinstated in 1100, was again forced to leave it by the hostility of Norgaud, Bishop of Autun, and retired to Dijon. His *Chronicle* is of value for its account of the last years of the eleventh century, and extends from the birth of Christ to 1102. The original manuscript was in the possession of the late Sir Thomas Phillipps, the antiquary, and was one of the great Meerman collection, before he bought it. It was published by P. Labbe in *Bibliotheca Manuscriptorum Nova*, and in the *Monumenta Germaniæ Historica*.

HUGO OF SAINT VICTOR (c.1097-1141). A French monk and theologian, born probably in Lorraine. He was educated in the Monastery of Hamersleben in Saxony, and became monk in the Abbey of Saint Victor, near Paris. Until the middle of the thirteenth century his works were very popular. In his treatment of most of the general questions of theology he kept to the beaten path, but his views on psychological questions were original. There has been much discussion as to the authenticity of certain writings attributed to him. In *Les œuvres de Hugues de Saint Victor* (1886) M. Hauréau gives a list of those about which there seems little doubt, and disregards many theretofore considered his. Hugo's most famous book is *De Sacramentis Christianæ Fidei*. An excellent edition of his works was published at Venice in 1588.

HUGUENOTS, hū'gē-nōts, *Fr. pron.* ụg'nō' (derivation unknown, possibly corrupted through *Ignots, Iguenots*, from Ger. *Eidgenossen*, confederates; according to others, a diminutive of *Hugo, Hugues*, Hugh). The name borne by the Protestants of France from about the year 1560 till their extinction as a political party in the seventeenth century; in a more general sense, the adherents of the Reformed religion before the French Revolution. Lutheran Protestantism invaded France as early, probably, as 1520, and its principles were warmly embraced by large numbers of the learned classes and the nobility. The followers of the new religion enjoyed the special protection of Margaret of Angoulême, Queen of Navarre and sister of Francis I. The work of John Calvin (q.v.), himself a Frenchman, gave energy and cohesion to French Protestantism; but its strength always remained in the nobility and the middle classes, and it never appealed to the masses of the people as in Northern Germany.

Toward the end of his reign Francis I. opposed the Huguenots with great severity, and caused many to be burned. During the reign of Henry II. the persecution assumed a still severer character, the *Chambre Ardente* (q.v.) being erected in 1547 for the trial of heretics. Nevertheless the Protestants increased in numbers, and strengthened their organization. The first national synod on May 23, 1559, adopted a Calvinistic code of eighty articles which became the constitution of French Protestantism. The influence of the Guise family, who began to come into power in the reign of Francis I., now showed itself in bitter warfare upon the Huguenots, whose cause was supported by the powerful Bourbon family, the great rivals of the Guises. In 1560 the extremists among the Huguenots, headed by La Rénaudie, a nobleman of Périgord, conceived the plan of seizing the person of the young King, Francis II., and placing him under the guardianship of the Bourbon princes. The plot, however, known as the conspiracy of Amboise, was betrayed, the King was made secure in the castle of Amboise, and the Duke of Guise was appointed Governor-General. Numerous executions and reprisals followed, and Condé was imprisoned. The Edict of Romorantin, in May, 1560, took the prosecution of heretics out of the hands of the Parlements and put it into those of the bishops. By the Assembly of Notables in August, it was resolved that the whole matter of religion should rest until the next assembly of the States-General. Francis II. died on December 5, 1560, and Charles IX., a boy of ten, ascended the throne. The Queen-mother, Catharine de' Medici (q.v.), being determined to take the power into her own hands, was compelled to seek Huguenot support against the Guises. In July, 1561, appeared an edict which freed dissenters from the penalty of death. For the complete termination of strife, the Court caused a religious conference to be held at Poissy in September, 1561, between the representatives of the two religious parties. The chief disputants were the Cardinal of Lorraine on the one side, and Theodore Beza (q.v.) on the other. The effect of the discussion was merely to widen the breach between the Catholics and the adherents of the new confession, but it served to unite and embolden the Huguenots, with whom the machinations of the Guises forced Catharine into closer alliance. On January 17, 1562, appeared an edict, giving noblemen the right of the free exercise of their religion on their own estates. This was followed by the recourse to arms on the part of the Guise faction.

Violence and reprisals were perpetrated on both sides. On March 1, 1562, a company of Protestants meeting in a barn at Vassy for religious exercises, was attacked, and many of them were massacred by the followers of the Duke of Guise. Condé raised the Protestant standard at Orleans, while the Guises seized the person of the King and proclaimed the Huguenots rebels. This was the beginning of the First Civil War. The Huguenots were at first successful, overran the southwestern part of the country, and were joined by 4000 soldiers from Germany. At Dreux, however, December 19, 1562, the Protestants were defeated. The Duke of Guise was assassinated before Orleans in February, 1563, and on March 19th the Queen-mother concluded the Peace of Amboise, which granted a large measure of religious freedom to the nobles, but set aside one town only in every bailiwick as a place of worship for the Huguenots. The terms of the treaty were disadvantageous when compared with the provisions of the edict of January, 1562, and were accepted by Condé against the vehement remonstrances of Coligny (q.v.). Catharine hated the new faith, and formed a close alliance with the Spaniards for the extirpation of heresy, retrenched the privileges of the Protestants, and made attempts upon the liberty and life of Condé and of Admiral Coligny. These leaders then determined to take possession of the King's person in September, 1567. The Court took refuge in Paris, which Condé invested; on November 10, 1567, an indecisive battle was fought at Saint-Denis between Condé and a much superior force under the Constable Montmorency (q.v.), and soon after Condé fell back into Lorraine, where he effected a junction with an auxiliary force of 10,000 men from Germany, and again threatened Paris; upon which Catharine determined to conclude peace, and the Second Civil War was terminated by the Treaty of Longjumeau on March 23, 1568, which confirmed the terms of the Treaty of Amboise. Catharine, however, had consented to the treaty only to gain time, and had no intention of acting up to its terms. Plots were formed against the lives of Condé and Coligny, who fled to La Rochelle, where they were joined by Jeanne d'Albret, Queen of Navarre, and her young son Henry. With reënforcements from Germany and England, the Huguenots began the Third Civil War, but at Jarnac, March 13, 1569, they were defeated by the royal troops under the nominal command of the Duke of Anjou, afterwards Henry III., and Condé was slain after he had rendered himself prisoner. These misfortunes greatly dispirited the Protestants. Jeanne d'Albret endeavored to reanimate them in an assembly at Cognac, and set up her son, then but fifteen years of age, as the head of the Protestant cause. Coligny became their military leader, and having received a further accession of troops from Germany, laid siege to Poitiers, but was again defeated by the Duke of Anjou at Moncontour, October 3d. Fresh reënforcements from England, Switzerland, and Germany enabled Coligny to take Nîmes in 1569, and to relieve La Rochelle, while La Noue obtained a victory over the royal troops at Luçon. Catharine and her son now sought for peace, to which the Protestants, weary of the hard contest, consented. The treaty, concluded at Saint-Germain-en-Laye on August 8, 1570, gave to the Protestants the free exercise of their religion everywhere except in Paris, and the possession of a number of strongholds.

Catharine, having failed to overthrow the Protestant cause in the open field, sought to accomplish her object by treachery. She entered into friendly relations with the Huguenots, partly, it is true, out of fear of the Guise family. After September, 1571, Admiral Coligny exercised great influence at Court, and was received with much show of affection by the young King and the queen-mother. The marriage of Henry of Navarre, who had just succeeded his mother in his little kingdom, to Margaret of Valois, sister of Charles IX., seemed to promise an end to the period of civil strife. Then came the mas-

sacre of Saint Bartholomew's Day, August 24, 1572, when two thousand Huguenots, among them Coligny, perished. So far from effecting its intended purpose, this detestable deed only roused the Huguenots to take up arms again. The Duke of Anjou lost his army before La Rochelle, and on June 24, 1573, concluded a peace at that place by which the Protestants obtained complete freedom in the exercise of their religion in the three towns of Montauban, Nîmes, and La Rochelle, which were exempted also from the obligation of receiving a royal garrison. Everywhere else the Huguenots were promised freedom from molestation on condition that they should not hold assemblies of more than three persons at a time. A section of the Roman Catholic nobility, at whose head was the Duke of Alençon, the youngest son of Catharine, from purely political motives, united with the Huguenots, and their cause was strengthened by the support of the Politiques (q.v.), the party of compromise and peace. The accession of Henry III., in 1574, was followed by the outbreak of the Fifth Civil War. Henry of Navarre, who, since Saint Bartholomew's Day, had remained a virtual prisoner at the French Court, succeeded in making his escape in February, 1576, and, placing himself at the head of the Huguenot forces in the south, achieved a number of successes in Guienne. This led to the conclusion of the Treaty of Beaulieu, May 6, 1576, by which the Huguenots were granted an increased number of places of security and partial representation in the Provincial Parlements. This was regarded by the Catholics as a surrender to heretics and traitors who had not hesitated to call in foreign aid against their sovereign. The Duke of Alencon was won back to the support of the Court, and under the auspices of Henry, Duke of Guise, the Catholic League was organized for the defense of the Church, the extirpation of heresy, and the maintenance of the honor and authority of the King. Although there were certain ulterior motives which made the League dangerous to the House of Valois, Henry III. for the time put himself at the head of the movement, and at the close of 1576 assembled the States General at Blois. The severe measures enacted by this body against the Huguenots kindled the Sixth Civil War (1577), which was marked by no important engagement. Peace was concluded at Bergerac on September 17, 1577, and confirmed by the Edict of Poitiers, which guaranteed the preservation of the *status quo*. The Seventh Civil War (the Guerre des Amoureux) broke out in November, 1579, with little cause, and was terminated by the Peace of Fleix in November, 1580, with little result.

There was now a comparatively long interval of repose till 1584, when, by the death of the Duke of Anjou (formerly Alençon), Henry of Navarre became heir to the throne of France. Hereupon, Henry, Duke of Guise, exerted himself for the revival of the League, entered into an alliance with Spain and the Pope for the extirpation of heresy, declared the Cardinal of Bourbon heir to the throne, and began hostilities against the Huguenots. The results of twenty-five years of warfare were destroyed by the Edict of Nemours (July 7, 1585), which annulled all previous edicts of toleration. This was followed by the outbreak of the Eighth Civil War, known as the War of the Three Henrys (Henry III. of France, Henry of Navarre, Henry of Guise). The Catholic League and the King put no less than seven armies into the field, while the Huguenots received large reënforcements from Germany. At Coutras, October 20, 1587, Henry of Navarre defeated the Catholic Army, but this was offset by the victory of Guise over the German auxiliaries at Vimory and Auneau. So contemptible had Henry III. become in the eyes of the people of Paris, that the entrance of the victorious Duke of Guise into the city on May 9, 1588, was followed by an insurrection in his favor. While the Duke was negotiating with the Queen-mother, Henry III. fled from Paris, but at Rouen in July, 1588, acceded to all the demands made by Guise, the extermination of heresy in the kingdom, the convocation of the States-General, and the appointment of Guise to the post of lieutenant-general of France. At Blois, on December 23, 1588, Henry III. caused the Duke of Guise to be murdered, and summoned to his aid Henry of Navarre. In less than a year the King himself was assassinated by Jacques Clément, and Henry of Navarre succeeded to the throne. The League, however, now under the leadership of the Duke of Mayenne, the brother of Henry of Guise, set up the Cardinal of Bourbon as a rival King, and, with the aid of Spanish troops, held its own in Paris. On July 25, 1593, Henry of Navarre formally embraced Catholicism, and in the following year gained possession of the capital. The civil wars in France were brought to an end by the Peace of Vervins between Henry and the Spanish King, May 2, 1598. On April 13th of the same year, the King, in the Edict of Nantes, guaranteed the Huguenots full liberty of conscience and the preservation of their religious and civil condition. See HENRY IV.

Though Henry IV., convinced that the French were a Catholic people and would never accept a Protestant sovereign, abjured his faith on political grounds, his reign was one of broad toleration, and his great Minister, Sully, was a Huguenot. But when, during the minority of Louis XIII., Maria de' Medici, the Queen of Henry IV., assumed the reins of government, the many privileges enjoyed by the Huguenots were found to have created a strong party that stood in the way of absolutism. The King took an oath in 1614 to maintain the Edict of Nantes, but the marriage treaties with the Spanish Court excited the apprehensions of the Huguenots to such a degree that, in November, 1615, they made common cause with the Prince of Condé, who had set up the standard of rebellion. This was contrary to the advice of the most sagacious of their own party. Although by the Treaty of Loudun, May 4, 1616, they obtained a new confirmation of their freedom of worship, the Court now only waited for an opportunity of breaking at least their political power. In June, 1617, a royal edict commanded the entire suppression at once of the Protestant Church and of political privileges, in the Province of Béarn; but the Provincial Court at Pau refused to register the edict, and the matter lay over until 1620, when, urged by his adviser that the time was opportune to strike decisively, the King carried the edict into full effect by force of arms. The Protestants throughout all France took alarm, and hostilities again broke out in May, 1621. At the head of the Protestants were the two brothers,

most all the Protestant towns fell into the hands of the King, force, stratagem, and bribery being equally employed. By the Treaty of Montpellier, October 19, 1622, the Huguenots lost a number of their strongholds and the right of assembly without permission of the King. The Court, however, paid little attention to the stipulations of the treaty, and when the Government was involved in difficulties in Italy, the Protestants took the opportunity again to rise in arms (1625). Soubise, with a fleet furnished by the town of La Rochelle, more than once defeated the weak royal navy. Cardinal Richelieu, who had assumed control of the affairs of State in 1624, was a believer in absolutism. He sought to overthrow the Huguenots as a political force, and pursued this end relentlessly. He took charge himself of the siege of La Rochelle, the Huguenot stronghold, which was taken after an heroic resistance, October 28, 1628. The fall of La Rochelle was speedily followed by that of Nîmes, Montauban, and all the other Protestant strongholds. The Peace of Alais, June 27, 1629, put an end once for all to the Huguenots as a political party. Richelieu was a great statesman and politician, and when the political power of the Huguenots was broken, he endeavored by conciliation to attach to the State these people, of whom some were the best and most useful in France. This policy was not changed under Mazarin, and Colbert during his years of power restrained Louis XIV. from persecution. After Colbert's death, the King entered upon a rigorous policy of repression, under the influence of Madame de Maintenon. Political motives, however, may have served to determine the policy of Louis XIV.; for the presence of a powerful element in the country differing in belief and to some extent in political theory from the generally accepted doctrines, must have clashed with the Grand Monarch's ideal of a nation dwelling in peaceful uniformity under the wing of a benevolent autocracy. The Huguenots were deprived of civil rights, and in the southern provinces, where Protestantism was strong, recourse was had to severer measures. To force them into the bosom of the Church, the people were handed over to the mercies of a licentious soldiery. Detachments of troops were quartered on the inhabitants, while bodies of cavalry patrolled the country, demolishing the places of worship, and in some cases putting the Huguenot preachers to death. (See DRAGONADE.) Hundreds of thousands of Protestants fled to Switzerland, the Netherlands, England, Germany, and the West Indies, as well as to South Carolina, New York, Massachusetts, and other North American Colonies. The climax of this persecution was the revocation, October 22, 1685, of the Edict of Nantes, which deprived the Huguenots of their last defense, and gave a new impulse to the emigration which took the best blood of France to strengthen her rivals. Thousands betook themselves to the mountains of the Cévennes, and continued the exercise of their religion in secret. Among these and the mountaineers of the Cévennes, a remarkable fanatical enthusiasm displayed itself, and under the name of Camisards (q.v.) they maintained for a number of years a wonderfully successful opposition to the forces of the great monarchy. The War of the Cévennes, or Camisard War, be-1710. The suppression of the local rebellion was attended with circumstances of great cruelty. France, after the Edict of Nantes, lost more than 50,000 of her population, among them many of wealth and position, besides a number of the middle classes engaged in mechanical pursuits, the total emigration being variously estimated from two hundred thousand to a million; while, notwithstanding the many persecutions, about one million remained.

The partial repose which the Protestants enjoyed for more than ten years was attended by a revival of their worship, especially in Provence and Dauphiné. In 1724, therefore, Louis XV., at the instigation of the Jesuits, issued a severe edict against them. The spirit of the age, however, now began to be opposed to persecution. An edict in 1752 declared marriages and baptisms by Huguenot ministers to be null, and required the repetition of them by the Roman Catholic clergy. But when, upon this, many began again to flee from their country, the disgust of the Roman Catholics themselves was so much excited that the Court recalled the edict. Montesquieu and Voltaire successfully advocated the cause of toleration.

FRENCH PROTESTANTISM IN THE NINETEENTH CENTURY. The first movement toward toleration of Protestantism after the revocation of the Edict of Nantes was the edict of Louis XVI., in 1787, legalizing Protestant marriages. By the concordat concluded between Napoleon and Pope Pius VII., in 1801, Protestantism (Calvinist and Lutheran) and Judaism became, with Catholicism, established religions, with equal protection and a proportional measure of State support, but subject at the same time to the strictest Government control. By the concordat religion became a part of government, and religious liberty was lost. No Church was permitted to make converts from any other, though this law soon became a dead letter with regard to the Roman Catholic Church. The Protestant General Synod was put down; particular synods could be convened only by Government; undue ecclesiastical power was given to consistories (elected presbyterial committees), tending to the disintegration of the Church and opening the way for later divisions. The parishes were few in number, most of them very extensive, and more than half of them (100 out of 171) without pastors. Under these circumstances religion became a mere form, or simply the expression of a political idea. The confirmation of the young, irrespective of religious experience, was a measure of self-preservation. Brilliant exponents of Protestantism at this time were Madame de Staël and Benjamin Constant.

A revival of French Protestantism from its depleted condition after the Revolutionary period and the subsequent political turmoil, during which it suffered greatly, took place under the Scottish Haldanes (see HALDANE, JAMES, ALEXANDER, and ROBERT) and the English Methodist Cook (see COOK, CHARLES) in the early twenties. To the revival the formation of the Bible Society in 1819 contributed. During this period Samuel Vincent introduced German Protestant theology into France, and created a liberal movement against the narrow orthodoxy of the revival. Aggressive working being forbidden by law, there

ing embraced Protestantism. Debarred thus from normal activity, the awakened Church turned to benevolent work, and the second third of the century saw the rise of a great number of strong benevolent and religious societies. The Evangelical Society was founded in 1833, the Central Society in 1847, for the building of churches. Orphanages, refuges for the blind, the deaf, for neglected, criminal, and crippled children sprang up in great profusion. Educational interests took a prominent place. In 1829 the Society for the Encouragement of Primary Instruction among Protestants was founded. In 1833 the Protestant Guizot secured the passage of the common-school law. In 1840 there were 677 Protestant schools, from primary to normal. There are two theological faculties—at Montauban, and, since Strassburg was lost, in Paris.

From this period dates also the foreign-mission work of the Protestant Church, a history of almost unparalleled zeal and self-sacrifice. The Society of Evangelical Missions was founded in 1822; the first missionaries went to South Africa in 1829. The mission-fields are now seven in number, in Africa, the Society Islands, and Madagascar. In 1901 the expenditures of the society were over 2,000,000 francs.

Protestant journalism also dates from the revival. *Le Semeur*, founded in 1831, enjoyed the collaboration of Vinet. *Le Lien* was founded in 1840 by the elder Athanase Coquerel (q.v.), to counteract the growing tendency to disintegration—a vain effort, as it proved. The narrow if profound evangelicalism of the revival produced a reaction, fostered by the liberal teachings of the theological school at Strassburg, which ended in the scission of 1842 between the orthodox and liberal wings of the Reformed Church, still held together by their relation to the State. The question of the relations between the Church and the State became a capital one; Vinet wrote a book advocating separation, and would have headed such a movement but for the powerful opposition of Guizot. The learned of that day strongly advocated it; in 1847 Lamartine declared that separation would not be too dearly purchased by a revolution. The next year (1848) the Count de Gasparin (see Gasparin, Agenor Etienne) and Frédéric Monod headed the Free Church movement. In 1849 the Union of Free Evangelical Churches of France was formed, based quite as much upon individual religious experience, in opposition to the formalism of the Reformed Church, as upon the separation of Church and State. This movement, never numerically important, barely reaching the number of fifty churches in all France, has yet been notable for the ability of its leaders—Pressensé, Bersier, Hollard, the Monods—and for its support to the orthodox, as against the liberal, wing of the Reformed Church.

The year 1852 saw a new impulse in the Church. The Sunday-School Union and the French Protestant Historical Society date from this year, and celebrated their jubilees in the summer of 1902. From this year dates also the movement toward the restoration of the synodal organization of the Reformation days, which appears now (1903) to have almost reached fruition. In 1859 the celebration of the tercentenary of the first synod of the Reformed

During all this time the liberal ferment was working in the Church, a spirit not so much of *unorthodoxy* as of *freedom*. The attempt of the elder Coquerel to draw the two wings together proved sadly abortive when, in 1864, after a conflict of several years, the younger Athanase Coquerel was tried for heresy, under the leadership of Guizot, for having hailed Renan's *Life of Jesus* as a sign of revived interest in religious studies, while combating his views as to the person of Christ. Coquerel defended himself nobly, but was condemned, by 12 voices to 3, in the Consistory of Paris, and in spite of the protest of 8000 church members of that city he was deposed from the ministry, the State not interfering, as he was suffragant, not titular, pastor. He continued to preach, however, being supported by the Protestant Liberal Union (founded in 1860). Guizot's victory in this case nearly cost him his seat in the consistory. At the next election he was returned only by a majority of 8 in a vote of 2600.

In the Franco-Prussian War many Protestant pastors rendered distinguished service. At its close the Reformed Church took up the question of reorganization, the Lutheran that of the inroads caused by the loss of Alsace, which robbed it of 38 consistories and 191 parishes, while the Reformed Churches had lost 5 consistories and 26 parishes.

The twenty-ninth General Synod of the Reformed Churches had been held in 1659. Six synods held in 'the Desert' during the century of persecution had not been of national extent. The thirtieth synod was convoked by President Thiers in 1872, at the instance of Guizot. The synod memorialized President Thiers in favor of disestablishment, but in vain. A strong but vain effort was made to bring together the two wings of the Church. Since that time, no official synod of the whole Church being possible, the orthodox wing has met triennially in 'officious' synod, the liberal wing in fraternal assembly, both bodies electing representatives to the Permanent Committee, which alone is recognized by Government.

Of late years, in view of the anti-Protestant movement of the ultramontane party in the Catholic Church, and of the rapid spread of atheistic socialism, both wings of the Church have recognized the importance of union, and have earnestly sought a common doctrinal basis. Failing in this effort, in 1899 delegates from both bodies met in Lyons and formed a practical union for work in the League for the Moral and Social Improvement of the Country. This league was immediately joined by the Free and Lutheran churches, and by the Methodist and Baptist missionary churches. At the officious synod at Anduze, in May, 1902, the serious effort to find a basis of doctrinal agreement again failed, but was prophetic of union in the near future. At this synod the unanimous adoption of a resolution asking for disestablishment placed the Reformed Church in line with the advocates of Church disestablishment in France.

The establishment of the Third Republic had been the signal for a forward evangelistic movement, to which the founding of the *Mission Populaire Evangélique* in 1871 by the Rev. Robert McAll, of England, contributed much. (See Mc-

ly occupied the attention of Protestants. E. de Pressensé, pastor, historian, Senator, led the movement for the purification of the press, a movement which in 1902 took on new life under the energetic action of Pastor Wilfred Monod, of Rouen. Charles Robert introduced and advocated profit-sharing. Jules Siegfried headed the movement for improved workingmen's dwellings; Gide and Boyer that for business coöperation; Léon Say that for Sunday rest; Richard Waddington that for labor unions. Dr. Legrain has been prominent in the temperance movement; Pastor Robin in that for prison reform and 'assistance by work;' Pastor Arbourg in that for benefit associations; Pastor Fallot in that for public morality. Protestant pastors have a league for the study of social questions. A large proportion of the younger pastors, led by Elie Gounelle, of Roubaix, and Wilfred Monod, with many of the younger laymen, are actively promoting the movement for social Christianity, which seems better adapted than any other movement to make a stand against the rapidly growing anti-religious socialism. Among the activities of these Social Christians is the founding of 'solidarities'—social settlements distinguished not only by their evangelistic character, but by the prominence given to 'mutuality,' to works of economic betterment, and 'get-together' methods of bringing class into normal relations with class.

The latest figures for French Protestantism (census of 1893) put the number at 700,000, a gain of 176,000 over the census of 1806. Of these about 560,000 are in the Reformed (Calvinistic) Church, 80,000 in the Lutheran, 70,000 in the Free churches, and 4000 each in the Methodist and Baptist churches. The number of pastors in the Reformed Church has increased from 72 to about 1200.

The great service of Protestantism to France has been in maintaining the inviolable principle of religious liberty. Though a very small minority, it has always been resolute in defending its rights. By its loyalty to the cause of education it has been able to serve the country in public office to a degree far beyond its numerical proportion. In education, law, finance, reform, Protestants have been prominent, and many great public works—the founding of savings banks, the abolition of the slave trade, the revival of various industries—are due to Protestant initiative.

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HUGUENOTS, ụ'g'-nŏ', LES. An opera in five acts by Meyerbeer, with words by Scribe, first produced in Paris in 1836. It is the first of the historical, as distinguished from the purely romantic operas. The plot deals with the persecutions of the French Huguenots in the seventeenth century.

HUGUENOT SOCIETY OF AMERICA, THE. An hereditary patriotic society, organized in New York City on April 12, 1883, and incorporated on June 12, 1885. Its objects are to perpetuate the memory and to foster and promote the principles and virtues of the Huguenots; to publicly commemorate at stated times the principal events in the history of the Huguenots; and to collect and preserve all existing documents, monuments, etc., relating to the genealogy or history of the Huguenots of America. Membership is extended to descendants of Huguenot families which emigrated to America or to other countries prior to the promulgation of the Edict of Toleration, November 28, 1787, as well as to writers who have made the history of the Huguenots a special subject of study. The insignia of the society consists of a badge, pendent from a gold dove with spreading wings surmounted by a rising sun, and worn on a watered-silk ribbon of white, bordered with red, white, and blue. The badge itself is of gold, surrounded by a wavy, ornamental border, and bearing on the obverse the device of Marguerite de Valois, a marigold turning toward the sun, and a ribbon with the motto, "Non Inferiora Secutus," while on the reverse is the name of the society, as well as the name of the member and number of the insignia. This society has its headquarters in New York City, where a valuable library, consisting of Huguenot books, manuscripts, etc., has been collected. There are branch societies in several States and cities, notably in Virginia, Pennsylvania, South Carolina, and New Jersey. Its publications are known as *Collections of the Huguenot Society of America.* In 1898 it celebrated the tercentenary anniversary of the promulgation of the Edict of Nantes, at which delegates from societies abroad were present, and a memorial volume containing a full account of the exercises was published in 1900.

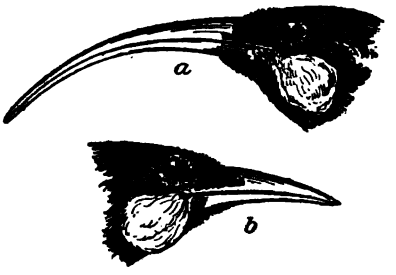
HUGUENOT SOCIETY OF LONDON, THE. An organization established in 1885, by descendants of the Huguenot refugees. Its objects are the collection and publishing of knowledge relating to the history of the Huguenots. The society consists of an unlimited number of fellows and twenty honorary fellows, and meets four times a year, with a summer conference at some place of historic interest. The society issues annual volumes of "Proceedings," and has also published fifteen volumes of church registers, lists of aliens, and letters and dispatches.

HUGUES, ụg, DOMINIQUE JEAN BAPTISTE (1849—). A French sculptor, born at Marseilles. He studied under Dumont and Bonnassieux at the Ecole des Beaux-Arts, and made his first suc-

cess with a bas-relief of Homer, in 1875. His works have frequently appeared in the Salon, such as "Le baptême du Christ" (1878); "Œdipe à Colone" (1882); and "Jeune Romaine" (1889); and he contributed "L'Asie" (1886) to the decoration of the Paris Hôtel de Ville.

HUHNE, hu'ne, BERNHARD (1547-1611). A German navigator in the service of Spain. He was born in Heidelberg, and by 1599 was head pilot of the Spanish colonies of North America, whence he embarked on the Pacific with Juan Fernandez (1600), to discover an outlet into Bering Sea, as California was then considered an island. The first voyage resulted merely in strife with the aborigines, but the following year Hühne set out alone, and though he did not find the mythical wealthy city of Anlan, which Philip III. had bidden him seek, he explored the Gulf of California, and made charts of it most useful to later navigators.

HUIA (hōō'yȧ) **BIRD** (Maori name). A remarkable bird of New Zealand (*Heterolocha Gouldi*), now considered one of the starling family, and approaching extinction, because it is



HEADS OF HUIA.
a, female; *b*, male.

confined to the limited forests of certain mountain ranges, and is constantly pursued as a cage-bird or as a curiosity, and also by the natives, who regard its tail-feathers as a proper badge of mourning. It is about the size of an American thrush, and both sexes are glossy green-black, excepting a white terminal band upon the tail and the large rounded wattles at the gape, which are orange-red. Their ivory-white bills, however, differ to a degree unknown elsewhere among birds. That of the female is long, slender, curved, and hoopoe-like; that of the male only half as long and much straighter and shorter. Sir William Buller has described the species very fully (*Birds of New Zealand*, London, 2d ed. 1888). He says its favorite food is the grub of a large, timber-boring beetle. The male bird, with his short, stout bill attacks the more decayed portions of the wood and chisels out his prey, while the female, with her long, slender bill, probes the holes in the sounder part, the hardness of which resists the male's weapon; and elsewhere she obtains for him grubs beyond his reach. It is not surprising to learn, in view of this coöperative work, that the pairs are devoted companions, and when one has been captured the other is easily taken. These birds nest in hollow trees.

HUICHOL, wē-chōl' (a corruption of the native name, signifying prophet, doctor). A wild tribe of the remote Nahuatlan stock, occupying six villages in the rough mountain region of northwestern Jalisco, Mexico. Despite former missionary efforts and long continued contact with Spanish civilization, they are said to be living in the same state of barbarism as when Cortez first put foot on the Mexican soil. Their culture is that of the well-known Pueblo type, displaying a number of ceremonial rites, especially in connection with the Peyote (q.v.), which they call Hikuli. They number 4000. Consult Lumholtz, *Symbolism of the Huichol Indians* (New York).

HUI-SHEN, hwē'shĕn'. A Buddhist monk and traveler, of the fifth century. See HWEI-SANG.

HUISMAN, hois'mȧn, ROELOF. See AGRICOLA, RODOLPHUS.

HUITFELDT, hut'fĕlt, ARILD (1546-1609). A Danish historian and statesman. After studying in Germany and France he entered the diplomatic service, and finally became Chancellor of the Kingdom. He published a long series of volumes on the history of the Kings of Denmark to the death of Christian III. These were afterwards issued under the title, *Denmarks Riges Kronike* (1650-52). The work is slovenly in style and uncritical in its judgments, but preserves many valuable documents.

HULAKU KHAN, hōō-lä'kōō kän. See MONGOL DYNASTIES.

HUL'DA. In the mythology of Northern Germany, a spiritual being corresponding to the Berchta of Southern Germany and Switzerland, and the Frigga of Scandinavian mythology. As goddess of death, she goes at the head of the troops of ghosts. To her the souls of dying children betake themselves. She flies through the air with her attendants, bringing fortune to the good and misfortune to the evil. She sometimes has witches among her followers. See BERCHTA; FREYJA AND FRIGGA.

HULEH. See MEROM.

HULL. The capital of Ottawa County, Quebec, Can., on the Ottawa River, opposite the city of Ottawa, with which it is connected by a suspension bridge (Map: Ontario, H 2). Lumber industries and large pulp and paper mills occupy the inhabitants, who are mostly French Canadians. Iron is mined in the neighborhood. The town was almost totally destroyed by fire in 1900, which also wrought considerable destruction in Ottawa, 3000 buildings in all being burned. It has been rebuilt. Population in 1891, 11,264; in 1901, 13,988.

HULL, also known as KINGSTON-UPON-HULL. A seaport, Parliamentary and municipal borough, and civic county in the East Riding of Yorkshire, England, at the confluence of the Hull with the estuary of the Humber, 20 miles from the North Sea, and 41½ miles east-southeast of York by rail (Map: England, F 3). The town stands on a level plain amid uninteresting surroundings. The modern portion has spacious, regular, and well-paved streets, while the old quarter, which serves as the business section, has narrow crooked lanes, and is very crowded, forming an irregular peninsula. Among noteworthy public buildings are Trinity Church, founded 1412, a decorated and perpendicular building, one of the finest parish churches in England; the town hall, the new exchange, corn exchange, and

lishments are the grammar school, founded in 1486; the Trinity House nautical school, 1716; Cogan's charity school for girls, 1763; the Hull and East Riding College, the Royal Institution, the literary and philosophical institute, mechanics' institute, technical school, and school of art. There are numerous charitable endowments. The municipality possesses property worth $5,000,000, which exceeds the ratable value of the town. It owns the markets, tramways, electric lighting, a profitable water-supply from springs, and maintains parks, free libraries, public baths and wash-houses, fire brigade, crematorium, sanitarium, cemeteries, refuse destructor, and disinfector.

Hull is the third port of importance in the kingdom, and has an extensive coasting, fishing, and foreign trade. It has regular communication with Germany, Russia, Holland, Belgium, Scandinavia, Denmark, the United States, India, and Australia, and is the seat of a United States consul. It exports the woolen and cotton goods of the midland counties, coal, oil, machinery, and mill work, and imports cattle, grain, timber, wool, flax, hemp, tallow, pitch, etc. It has capacious docks covering 200 acres; its shipping comprises 235 sailing and 632 steam vessels, with a total of over 228,400 tons, and a fishing fleet of 500 boats. An average of 6000 vessels enter, and clear a gross tonnage of 6,160,000 annually. The average annual value of its exports during the five years ending in 1900 was $100,000,000, and of its imports, $150,000,000. Oil-mills, iron ship-building yards, engineering-works, foundries, rope and sail making, tanneries, breweries, chemical and color works, and the many industries of a large seaport, afford employment to thousands of workmen.

The town is governed by a mayor, 14 aldermen, 42 councilmen, a recorder, and a sheriff. It sends three members to Parliament. Originally consisting of Myton and Wyke, two villages, as Myton-Wyke, it developed into an important port shortly after the Conquest. In 1298, struck with its advantages as a port, Edward I. purchased it, renamed it Kingston-upon-Hull, and gave it the charter of a free borough. Its fisheries and trade prospered under the enterprise of its merchant princes, the De la Poles, and in 1339 it supplied Edward III. with 16 ships and 466 seamen for his armament against France. In 1588 it furnished Elizabeth with £600 and 800 men against the Spanish Armada. It adhered to the Parliamentary cause during the Civil Wars, and the Governor, refusing to admit King Charles, precipitated hostilities; it successfully resisted two long sieges by the Royalists. In 1534 it was made the seat of a suffragan bishop, and again in 1891. After the fifteenth century its commercial importance increased with its imports of fish from Iceland; it was one of the first ports to engage in, and until late in the nineteenth century was the headquarters of the whale fishery. Population, in 1801, 29,500; in 1851, 84,700; in 1891, 200.500; in 1901, 240,600. The annual death-rate averages 19.6 per 1000. Consult: Symons, *Hullinia, or Selections from Local History* (Hull, 1872); Sheahan, *History of Hull* (Beverley, 1864); Freeman, *English Towns* (London, 1883).

at the universities of Göttingen, Halle, and Berlin. He was appointed assistant professor of political economy at Cornell, and in 1901 professor of American history. He edited *The Economic Writings of Sir William Petty*, which were brought out by the University Press at Cambridge, England.

HULL, Isaac (1773-1843). An American naval officer. He was born at Derby, Conn., became a cabin boy on a merchant vessel at the age of fourteen, soon showed great aptitude for the handling of a ship, and before he was twenty-one was placed in command of a merchantman. In 1798 he entered the United States Navy as lieutenant, serving for several years on the *Constitution*, and becoming first lieutenant in 1801; and, after distinguishing himself against the French at Port Plate, Haiti, participated, as commander of the *Argus*, in the war with Tripoli. He became captain in 1806, and at the opening of the War of 1812 was in command of the *Constitution*. While on his way from Annapolis to New York in July, 1812, he escaped by masterly seamanship from a British squadron of five strong men-of-war, which pursued him for three days. On August 19th he fought his celebrated engagement with the *Guerrière*, a slightly weaker British frigate, which after a brief conflict was forced to surrender. (See Constitution, The.) In this battle his seamanship is pronounced by naval critics to have been almost perfect. The victory was the first obtained by the Americans over the British in this war, and aroused the greatest enthusiasm throughout the United States. Subsequently he was a member of the Naval Board, was at the head of the Boston and New York navy yards, and as commodore, was in command for a time of squadrons in the Pacific and the Mediterranean. He is regarded by naval critics as the ablest single-ship commander on either side during the War of 1812.

HULL, William (1753-1825). An American soldier. He was born in Derby, Conn., graduated at Yale in 1772, studied law at Litchfield, Conn., and was admitted to the bar in 1775. In July, 1775, soon after the outbreak of the Revolutionary War, he entered the American Army as a captain, and served thereafter until the close of the war, taking part in the battles of Trenton, Princeton, Saratoga, and Monmouth, leading a column in the assault on Stony Point, and rising (August, 1779) to the rank of lieutenant-colonel. After the war he removed to Newton, Mass., became major-general of Massachusetts militia, and was elected to the State Senate. In 1805 he was appointed, by President Jefferson, to the Governorship of the Territory of Michigan, which position he held until 1812, when he was raised to the rank of brigadier-general and placed in command of the Northwestern Army. He joined his troops at Dayton on May 25th, and led them through the wilderness to Detroit, where he arrived on July 5th, having heard three days before of the declaration of war against England. On the 12th he took the offensive and crossed over to Sandwich, Canada, but wasted time in issuing futile proclamations, and, soon becoming alarmed, recrossed to Detroit. On August 16, 1812, intimidated by the aggressive movements of the British

cry was raised against Hull, and finally, on March 26, 1814, a court-martial, assembled at Albany, N. Y., sentenced him to be shot. This sentence was approved by President Madison, who, however, remitted the punishment. There has since been much controversy over Hull's case, but it is now pretty generally agreed by historians that though he surrendered with unsoldierly alacrity, and might possibly have preserved Detroit and his army altogether, the blame for his surrender must rest fully as much with the Administration as with himself. Consult: Hull, *Defense of Brigadier-General Hull, with an Address to the People of the United States* (Boston, 1814); Forbes, *Report of the Trial of Brigadier-General Hull* (New York, 1814); and the somewhat biased *Revolutionary Services and Civil Life of Gen. William Hull, Together with the History of the Campaign of 1812, by James Freeman Clarke* (New York, 1848), by Maria Campbell, Hull's daughter.

HUL'LAH, JOHN PYKE (1812-84). An English musical composer, teacher, conductor, and lecturer. He studied the organ and piano under W. Horsley, and singing under Crivelli at the Royal Academy of Music. He was one of the most important factors in modern English musical life, and accomplished more for the cause of music among the masses than any other English musician of the century. In 1840, while pursuing his studies in Paris, he was much impressed with the French system of tuition, and upon his return to London in 1841 prevailed upon the national education committee to permit him to use a modification of it in his singing school for schoolmasters, which he inaugurated at Exeter Hall. His ideas and reforms met with determined opposition from the very beginning, but notwithstanding it is recorded that in the twenty years from 1840 to 1860 over 25,000 people availed themselves of the advantage of his classes. In 1847 his pupils and friends built and presented to him a building known as Saint Martin's Hall, in which his pupils could give their public performances. He held appointments as professor of singing at Kings, Queens, and Bedford colleges, and succeeded Horsley, in 1858, as organist of Charter House. From 1870 to 1873 he led the Royal Academy concerts, and for several years conducted the annual concert of the metropolitan school-children, held at the Crystal Palace. In 1872 he was appointed Government inspector of training schools. Besides three operas, which have but a local significance, he was the composer of many successful and widely known part-songs, motets, anthems, and songs. His published writings cover every phase of musical art and æsthetics, and include: *A Grammar of Vocal Music* (1843); *A Grammar of Musical Harmony* (1852); *A Grammar of Counterpoint* (1864); *The History of Modern Music* (1862); *The Third or Transition Period of Musical History* (1865); *The Cultivation of the Speaking Voice* (1870); *Music in the House* (1877). He received the degree of LL.D. from Edinburgh University; was elected member of the Cecilia Society of Rome, and member of the Academy of Music in Florence. He died in London.

HULL HOUSE. A social settlement, situated at 335 South Halsted Street, Chicago. It has been a leader in the social settlement movement-house in the midst of a foreign and poverty-stricken population, was repaired, beautified, and opened as a settlement in 1889 by Miss Jane Addams (q.v.) and Miss Ellen Starr. All the usual features of a settlement are maintained; new buildings have been added, including a coffee-house, a children's building, and a gymnasium. The distinctive features are its attractive buildings, its close connection with the life of the Nineteenth Ward and with social work in Chicago, its large constituency, and the broad interests of its residents, who have held State or city offices such as factory inspectors or street inspectors, or who have been students conducting special investigations. See SOCIAL SETTLEMENTS.

HULLIN, ụ'lăN', PIERRE AUGUSTIN, Count (1758-1841). A French general of the First Empire, born in Paris. He was one of the leaders in the attack on the Bastille, and tried to rescue Delaunay. He took part in all the great days of the early Revolution; but was too moderate for some of his fellows, and was imprisoned during the Terror. On his release he entered the Italian Army, and in 1796 became Bonaparte's adjutant-general. He was appointed president of the military court which sentenced the Duke d'Enghien (1804), and he wrote, in the attempt to shift the blame on Talleyrand, *Explications offertes aux hommes impartiaux*, etc. (1823). He was made count in 1809, commanded a division under Napoleon, was one of his most trusted servants, and in 1812 was Governor of Paris. When the Emperor was sent to Elba, Hullin tried to ingratiate himself with the new régime, but failed. In 1815, during the Hundred Days, he was again Governor of Paris, but afterwards was banished to Brussels and lived for a time at Hamburg. He was pardoned in 1819, and returned to France.

HÜLLMANN, hụl'mân, KARL DIETRICH (1765-1846). A German historian, born at Erdeborn, and educated at Halle. He became in 1797 professor of history at Frankfort-an-der-Oder, and in 1808 at Königsberg. Ten years afterwards he was made the first rector of Bonn, and began his important service to that university. His principal works are: *Deutsche Finanzgeschichte des Mittelalters* (1805); *Geschichte des Ursprungs der Regalien in Deutschland* (1806); *Geschichte des Ursprungs der Stände in Deutschland* (2d ed. 1830); *Geschichte des byzantinischen Handels* (1808); *Staatsrecht des Altertums* (1820); *Das Städtewesen des Mittelalters* (1825-29), his most valuable work; *Römische Grundverfassung* (1832); *Staatsverfassung der Israeliten* (1834); *Handelsgeschichte der Griechen* (1839); *Griechische Denkwürdigkeiten* (1840); and *Geschichte des Ursprungs der deutschen Fürstenwürde* (1842).

HUL'SEAN LECTURES. A course of lectures given annually at Cambridge, founded by the Rev. John Hulse, of Elworth, in the County of Chester. He was educated at Saint John's College, Cambridge, and at his death, December 14, 1790, bequeathed the bulk of his property to his university. His will provided for the founding of two divinity scholarships in Saint John's College, the Hulsean prize, the office of Christian advocate, and that of Hulsean lecturer or Christian preacher. By a statute confirmed by the Queen in council in 1860, the office of Christian

advocate was changed into the Hulsean professorship of divinity. The office of Hulsean lecturer, or preacher, is an annual one; and the duty of the lecturer is to preach not fewer than four, nor more than six sermons before the university in the course of the year. The list of Hulsean lectures, from their beginning in 1820 down to 1893, is given in Hurst, *Literature of Theology*, pp. 32-34. To which add 1894-95: A. Barry, *The Ecclesiastical Expansion of England* (1895); 1896-97, S. Cheetham, *The Mysteries, Pagan and Christian* (1897); 1898-99, J. M. Wilson, *The Gospel of the Atonement* (1899); 1900-01, F. H. Chase, *Credibility of the Book of the Acts of the Apostles* (1902).

HULTSCH, Friedrich (1833—). A German philologist, born in Dresden. He was educated at Leipzig, where he taught in the Nikolaischule, and after several years at Zwickau became professor in the Kreuzschule of Dresden, of which he was rector from 1868 to his retirement, in 1889. Hultsch's especial study was ancient mathematics. He edited the *Scriptores Metrologici* (1864-66); *Heronis Geometrica et Stereometrica* (1864); *Polybii Historiæ* (1867-72); *Pappus* (1876-78); for a large part of the text an editio princeps), and *Autolyci de Sphæra quæ Movetur Liber* (1885); and wrote the very valuable *Griechische und römische Metrologie* (1862, 2d ed. 1882); *Die Elemente der ägyptischen Teilungsrechnung* (1895), and *Die Gewichte des Altertums* (1898).

HUMAITÁ, ōō-mä'ē-tä'. A town and fort of Paraguay, situated at the southwestern end of the country, on the river Paraguay, near its confluence with the Paraná (Map: Paraguay, F 9). During the War of the Triple Alliance it was besieged for over a year by the forces of Argentina and Brazil, and finally surrendered in 1868. The fortifications were razed at the end of the war (1868-70). The surrounding region yields rich crops of cotton, tobacco, coffee, and sugar. Population, about 4000.

HUMANE ASSOCIATION, American. A federation of societies of the United States for the prevention of cruelty to animals and children, formed at Cleveland, Ohio, in 1877, at a meeting held to consider the maltreatment of animals in transit between the East and West. It became a national organization, whose purpose was at first to deal with interstate traffic. It sent representatives to influence legislation at Washington, and its agents investigated the abuses which prevailed on lines of railways transporting cattle. It offered a prize of $5000 for the best model of a cattle-car that would make possible the feeding, watering, and resting of cattle in transit, as the result of which many improved cars were brought into use. In 1884 it won a suit in Massachusetts against two leading railroads for violation of the law, thus establishing an important precedent. For many years its purpose has been that of a federation of all local humane societies. It carries on considerable work of an educational nature. It has instituted inquiries in the United States and abroad on the subject of vivisection in the schools and colleges. Prizes were offered, in 1900, to college and medical students, for essays on vivisection, its abuses and their remedy. Its most recent undertaking is the raising of money to organize humane societies in States where they do not now exist. The secretary is Francis H. Rowley, Bro
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VENTION OF.

HUMANE SOCIET
tion for the recovery
drowned, founded in E
tains receiving houses
along the Thames, and
various parts of Lond
on Serpentine River in
given by George III., a
The seal of the Society
Lateat Scintillula Fors
perhaps lie hid').

HUMANISM (from
from Lat. *humanus*, rela
OLat. *hemo*, man; con
man, Gk. *χθών*, *chthōn*,
name applied to the li
close of the Middle Age
revival of the pagan l
tiquity. The humanis
divided into two diverge
sought to engraft the c
tree of Christianity, whi
to revive not merely th
antiquity but, through t
the ancient heathen cult
movement began in the
Italy, where the politic
ments were preparing th
from mediæval tradition
Italian States, despotic a
vored the development of
when feudalism (q.v.), st
parts of Europe, gave le
exercise of individual a
of Italian politics gave th
and the sense of personal
idly tending to looser soc
Paganism in Italy, tho
never been completely
lived on in popular legend
of race, and in countless
with the Roman Forum, t
historic monuments. Bu
ancient Rome were an i
mediæval Italian culture;
seriously influence men's
and political conditions
for the revival of classical
SANCE.) The exile of the
for nearly three-quarters
GNON) must also have a
the great check against
paganism. In the fourte
was astir with the new
shown in his homage to V
pulse. Petrarch, who ma
first Christian humanist, t
van of the new movement.
tiquity and his intoleranc
mediævalism were boundle
energy to the discovery
manuscripts, to the collecti
and other antiquities, and
tion of scholastic philosoph
medicine. But while the m
forward to an immortality
pagan humanist would be
less than an earthly imm
poetry like Vergil's and pro

became the sole model for the writer, so the spirit of antiquity, with its sensuous attitude toward life and nature, its unqualified secularity, its abandonment to the charm of things seen and temporal, controlled the humanists' thought and conduct.

A second humanistic movement—more properly called humanitarianism—came to its culmination in Comte's (q.v.) worship of humanity. It finds in man the highest and worthiest object of esteem and reverence, and is hostile to any theory which places the divine outside of the human. It is differentiated from the pagan Renaissance attitude most markedly by its placing the golden age of man's development not in the past, but in the future.

Consult: Burckhardt, *Die Cultur der Renaissance in Italien* (Basel, 1860; 3d ed. 1877-78), English translation by Middlemore (London, 1878 and 1891); Voigt, *Die Wiederbelebung des klassischen Altertums oder das erste Jahrhundert des Humanismus* (Berlin, 1859; 2d ed. 1880-81); Symond's (q.v.) works on the Renaissance, epitomized by Pearson in *A Short History of the Renaissance in Italy* (New York, 1893); Owen, *Skeptics of the Italian Renaissance* (New York, 1893); Jebb, *Humanism in Education*, Romanes Lecture (London and New York, 1899); Pastor, *History of the Popes* (London, 1891); Einstein, *The Italian Renaissance in England* (New York, 1902); Gasquet, *The Eve of the Reformation* (London, 1898).

HUMANITARIANS (from Lat. *humanitas*, humanity, from *humanus*, human). The name assigned to the several classes of anti-Trinitarians, who regard Christ as a mere man, and refuse to ascribe to Him any supernatural character, whether of origin or of nature. Theodotus of Byzantium, called the Tanner, a Monarchian (q.v.), is said to have been excluded from the Church by Victor, Roman Pontiff (189-198), because, having denied Christ in time of persecution, he afterwards defended himself by declaring that in so doing "he had denied not God, but man." A contemporary and probably an associate of Theodotus, Artemas, taught in like manner that Christ was a mere man. Theodotus and Artemas probably represent a school or sect at Rome, and were the first to formulate the doctrine, so far as known. (See SOCINUS, FAUSTUS; UNITARIANS.) The name humanitarian is also sometimes applied to the disciples of Saint-Simon (q.v.), and in general to those who look to the perfectibility of human nature as their great moral and social dogma, and ignore altogether the dependence of man upon supernatural aid, believing in the all-sufficiency of his own innate powers.

HUMANITIES. A term now employed primarily to designate the study of the classical literatures of Greece and Rome, and the various sciences which deal with them, such as grammar, classical philology, etc.; but sometimes secondarily it includes all 'culture studies' in contrast to professional studies. Cicero, Aulus Gellius, and other Latin writers used *humanitas* in the sense of culture becoming to a man and gained by the study of the great masterpieces, mostly of Greek literature, but not exclusive of Roman. The scholastics adopted the term especially in the form of *literæ humaniores* in subordination to *divinitas* (divinity or theology). This contrast gave to humanity an enlarged meaning, including all forms of secular learning. The humanistic movement (see HUMANISM) restored the word to its Ciceronian significance. But when the narrowness of humanism in regarding the study of the ancient classics as the means *par excellence* of gaining humane culture came to be appreciated, and when other sciences of liberal character arose, the term humanities began gradually to take on a larger meaning, and it is now used by some authorities to include all philological study, together with history, philosophy, political science, economics, and all other sciences which concern themselves with human civilization. In the Scotch universities, however, the singular, 'humanity,' is used to designate the study of the Latin language and literature.

HUMANN, hōō'mȧn, KARL (1839-96). A German engineer and archæologist, born at Steele. In 1861 he gave up his studies, as he was ordered south because of his health. In Samos he made successful excavations of the famous Temple of Hera. In 1862 he built Sir Henry Bulwer, English Ambassador at Constantinople, an island palace; two years later was employed by the Turkish Government to survey Palestine for a railroad from Jaffa to Jerusalem; and, after a trip to Egypt, mapped out the Eastern Balkans, after surveys ordered by Fuad Pasha. But besides the name he made for himself by these maps, and by engineering in Northern Asia, he got fame for his excavations at Pergamus (1878-86); was made honorary doctor by the University of Greifswald, director of the Museum of Berlin, and Privy Councilor (1894). His later excavations were at Senjirli, in Northern Syria, at Tralles, and Magnesia. With Conze, Bohn, and others, he published *Die Ergebnisse der Ausgrabungen zu Pergamon* (1880-88), and with Puchstein, *Reisen in Kleinasien und Nordsyrien* (1890).

HUMAYUN, hōō'mȧ-yōōn'. A Great Mogul of India, son of Baber and father of Akbar. He came to the throne in 1530, but after ten years of successful warfare was defeated by the Afghan Sher Khan and driven from India. He took refuge at the Court of Persia, and with a Persian army returned in 1555, and recovered control of Delhi and Agra. He died at Delhi, where a great mausoleum was built for him.

HUM'BER. The continuation and estuary of the rivers Ouse and Trent, between the English counties of York and Lincoln (Map: England, G 3). It is 38 miles long and from 1 to 7 miles broad, with Hull on its north shore and Great Grimsby on the south. It was the entrance for the Norse invasions of the ninth and tenth centuries.

HUMBERT I. (Ital. UMBERTO) (1844-1900). King of Italy from 1878 to 1900. He was the eldest son of Victor Emmanuel II. and Adelaide, Archduchess of Austria, and was born at Turin, March 14, 1844. At an early age he obtained an insight into political and military life under the guidance of his father, during the war of 1859, although he was then too young to take an active part in the struggle. He was more closely connected with the process of the unification of Italy which followed. In July,

1862, he visited Naples and Palermo, where he shared the popularity of Garibaldi. When the war between Prussia and Austria was imminent, Humbert was dispatched to Paris to ascertain the sentiments of the French Government in reference to the alliance between Italy and Prussia. On the outbreak of hostilities he hastened to take the field; obtained the command of a division of General Cialdini's army, with the rank of lieutenant-general; and took a gallant part in the battle of Custozza, June 24, 1866, covering the retreat of the Italians by brave and skillful tactics. In 1868 he married his cousin, the Princess Marguerite of Savoy. He succeeded to the throne on the death of his father, January 9, 1878. He showed great bravery during the cholera epidemic in 1884, and gained in popular esteem by his visit to Naples at that time. In 1887 the foreign policy of the Government resulted in the Triple Alliance between Italy, Austria-Hungary, and Germany. The colonial policy of the country was not so successful, however, as the Italian troops met with great reverses in Abyssinia in 1887, and again in 1895. In 1898 a commercial treaty was concluded with France, but throughout Humbert's reign the country suffered under financial depression and heavy taxation. Toward the end of his reign King Humbert lost some of his former popularity. An Anarchist attempted to assassinate him before the gates of Rome in 1897, but failed. Three years later, however (July 29, 1900), Humbert was shot at and mortally wounded by another Italian Anarchist, Bresci, who had come from the United States intent on this act. The King died almost immediately. Humbert was succeeded by his only son, Victor Emmanuel III. See ITALY.

HUMBERT, ēn'bâr', FERDINAND (1842—). A French painter, born in Paris. He studied with Picot, Cabanel, and Eugène Fromentin. His first appearance in the Salon was in 1865, with "La fuite de Néron." Besides portraits, he painted numerous canvases upon religious or historical subjects, such as "Le Christ à la Colonne" (1875), which is now in the Orléans Museum, and "Pro Patria," a decoration for the Panthéon (1886). He was awarded several medals, and was made an officer of the Legion of Honor.

HUMBERT, GUSTAVE AMÉDÉE (1822-94). A French jurist and politician, born at Metz. He studied law in Paris, and gave private lessons both before and after he was under-prefect of Thionville (1848-51). He was professor of Roman law at Toulouse, and thence entered politics in 1871 on his election to the Chamber of Deputies. Humbert took a prominent part in debates on legal questions, became a leader of the Republican Left in 1875, was transferred to the Senate, and in Freycinet's Cabinet (1882) was Minister of Justice. In 1890 Humbert left his post as vice-president of the Senate, and became president of the chief court of accounts. He wrote: *Essai sur les finances et la compatibilité publique chez les Romains* (1887), and *Organisation de l'empire romain* (1892). His connection with the great Humbert swindle, carried through by his son, Frédéric, and his daughter-in-law, Frédéric's wife, is problematic.

HUMBLEBEE. See BUMBLEBEE.

HUMBOLDT, hūm'bōlt. *Ger. pron.* hum'bōlt, ALEXANDER, Baron von (1769-1859). A German naturalist and traveler. He was born in Berlin, September 14, 1769. His father, who died in 1779, was a chamberlain to the King of Prussia; his mother was of Burgundian descent, and his youthful life was spent in the old Castle of Tegel, near Potsdam. He studied, in company with his brother Wilhelm (q.v.), first under private tutors, then at the universities of Frankfort-on-the-Oder, Berlin, and Göttingen. His preference for scientific studies was strongly manifested in his early years, and highly developed by the influence of Blumenbach and other university instructors. During his residence at Göttingen (1788 and 1789) he made geological examinations in the Harz Mountains and Rhine Valley, which resulted in his first important publication, *Ueber die Basalte am Rhein, nebst Untersuchungen über Syenit und Basanit der Alten* (1790). In 1790 Humboldt made a tour through France, the Netherlands, and England, in company with Georg Forster, already eminent as a scientific traveler, whose influence was strong in shaping the younger man's career; and in 1791 he entered the Academy of Mining at Freiberg, Saxony, where Werner was then professor of geology. His eight months' residence at Freiberg gave him materials for several technical papers in chemistry and physics, and for some more elaborate essays, especially those upon the cryptogamous plants of the mines (*Flora Subterranea Fribergensis*, etc.). In consequence he was soon (1792) appointed superintendent of mines in the principalities of Bayreuth and Anspach, and resided for the next three years at Bayreuth. The breadth of his interest and researches at this period is exemplified by his work and speculations on the nature of muscular and nervous force, entitled *Versuche über die gereizte Muskel- und Nervenfaser, nebst Vermutungen über den chemischen Prozess des Lebens in der Tier- und Pflanzenwelt* (1797).

The desire for larger freedom, and especially for exploratory travel, led Humboldt to resign his office in 1797. He had already in 1795 wandered about the Alps, studying geology, but further intended journeys to Sicily and up the Nile were prevented by political obstacles. The next three months were spent at Jena, in intimate association with Goethe, Schiller, and the men at the university, who then made an extraordinary circle of intellects; and here he began to plan for the great journey to Spanish America with which his fame is now most closely associated. In Paris he made the acquaintance of a talented young French botanist, Aimé Bonpland, who joined in his plans and was destined to be his principal colaborer. Meanwhile Humboldt was incessantly at work, and the years 1797-99 witnessed the publication of many notable contributions to science, among which those pertaining to the composition of the atmosphere were particularly notable. Many of these were brought together in his book *Versuche über die chemische Zerlegung des Luftkreises* (1799). At length, after spending some time in Spain and getting letters from the Government, Humboldt and Bonpland sailed in a Spanish frigate from Coruña, in June, 1799. They visited Teneriffe, ascended the peak, and made valuable observations there, as well as at sea during the voyage, which terminated at Cumana, in Venezuela.

The travelers explored the region for upward of a year, crossing over to the upper waters of the Orinoco, and establishing the connection between that stream and the Upper Amazon. The year 1801 was spent in explorations in Cuba, the basin of the Magdalena River, and in the Andes of Quito, the famous ascent of Chimborazo, to an altitude of about 19,000 feet, being accomplished in June, 1802. The explorations were then extended to Peru, where Humboldt devoted himself largely to the electrical and astronomical studies favored by the climate, but also acquired a valuable knowledge of the cinchona (quinine) plant and its culture. From Peru the two savants took ship for Mexico, landing at Acapulco in February, 1803. There they traveled for a year, Humboldt paying special attention to the determination of positions on the map and to volcanic phenomena, and then returned to Europe by way of Cuba and the United States (where several weeks were spent), reaching Bordeaux in August, 1804.

Humboldt now went to Paris, and occupied himself with Bonpland in the arrangement of their manuscripts and collections, a large part of which, however, had been lost by a shipwreck; at the same time he pursued continuous experiments in physical chemistry. Having visited his brother, then Prussian Ambassador at Rome, and returned to Berlin, he accompanied Prince Wilhelm of Prussia, in 1807, on a political mission to France, and obtained leave from the Government of his own country to remain thenceforth in Paris for the publication of the account of his travels. He enlisted the coöperation of Gay-Lussac, Cuvier, and many others of the most eminent French specialists of the day in the elaboration of his materials, and began in 1807 to publish the results in magnificent volumes (20 in folio and 10 in quarto, illustrated by 1425 copperplates). The title was *Voyage aux régions équinoxiales du Nouveau Continent fait en 1799-1804 par Alexandre de Humboldt et Aimé Bonpland.* The first 14 volumes were devoted to botany, and were actually prepared mainly by C. S. Kunth; vols. xv. and xvi. were an 'atlas pittoresque;' vols. xvii., xviii., xix., xxi., and xxii. were devoted to physical geography, geognosy, and astronomy; vol. xx. contained a 'geography of plants;' vols. xxiii. and xxiv. were zoölogical; vols. xxv. and xxvi. were devoted to a sociological account of the countries of Spanish America; and vols. xxviii., xxix., and xxx. contained Humboldt's narrative of his journey, which was left unfinished. The original of this work contains the *Essai politique sur le royaume de la Nouvelle Espagne*, the *Essai politique sur l'île de Cuba*, and the *Vues des Cordillères.* Among the minor works of the great master, the *Ansichten der Natur* (first edition, 1808) had an immediate and widespread welcome. It was translated into almost every European language, and issued in English in both London and Philadelphia. The publication of the great *Voyage* continued at irregular intervals until 1827, and the volumes or groups of volumes appeared under individual titles, by which they are more usually known. The bibliography of Bruhns's biography of Humboldt disentangles the confusion of titles and editions which resulted, and to that the curious reader is referred. After Humboldt's death an octavo edition of his principal works was published in Paris (1864-66).

The favor of Frederick William III. of Prussia, who had settled upon Humboldt a pension of 2500 thalers, and later of 5000, required him to make frequent journeys with that monarch, and at last he was summoned to reside at the Court. In 1827, then, he took up his permanent residence in Berlin, and with much discontent endeavored to carry on his investigations amid uncongenial surroundings. One of the best results of his work at this period was his success in establishing for the first time international cooperation in furtherance of scientific observations. In 1827-28 he gave a series of remarkable lectures on physiography at Berlin, which formed the basis of his subsequent *Kosmos.* In 1829, under the patronage of the Russian Government, and accompanied by Ehrenberg and Gustav Rose, he made a rapid journey as far east as the Yenisei, one of the most striking results of which was the discovery of diamonds and other precious stones in the Ural Mountains, as Humboldt had predicted would be the case from his knowledge of their geology. Many geographical positions were astronomically determined, and erroneous views as to the physical geography of the northern interior of Russia were corrected. The record of this journey was first written by Humboldt as *Fragments de géologie et de climatologie asiatique* (1831), and afterwards enlarged into *Asie centrale, recherches sur les chaines de montagnes et la climatologie comparée* (1843).

The subsequent years were spent in occasional diplomatic journeys and in the preparation of what he deemed the crowning monument of his intellectual life, his *Kosmos*, an encyclopædic account and explanation of the physical universe. Four volumes were written and published in Berlin, in 1845, 1847, 1850, and 1858. They were translated as fast as issued into many languages, and created a profound impression.

He kept health and vitality, and continued at work until the winter of 1858-59, when his strength declined. He died May 6, 1859, and was buried with royal honors at Tegel. After his death new editions of many of his works were issued, and several collections of his letters appeared.

Humboldt's influence upon scientific thought has been vast and far-reaching. "With him," says Agassiz, "ends a great period in the history of science; a period to which Cuvier, Laplace, Arago, Gay-Lussac, De Candolle, and Robert Brown belonged." His grasp of the universe as a whole was no less remarkable than his faculty of observing and explaining single phenomena. His scenic descriptions are strikingly picturesque. Humboldt has contributed to nearly every branch of science, either by direct investigation or by the accumulation of valuable material. He may be regarded as the founder of the modern science of physical geography, and he placed meteorology upon a firm basis. We can only allude to his observations on the cultivation of the soil in different climates, and its effect upon civilization; his study of the languages, the architecture, and the customs of the ancient peoples of South and Central America; his discovery of the decrease in intensity of the earth's magnetic force from the poles to the equator; his fruitful labors in chemistry with Gay-Lussac; his experiments concerning the respiration of fishes; and his con-

ALEXANDER VON HUMBOLDT

FROM AN ENGRAVING BY P. HABELMANN, AFTER A PAINTING BY EMMA RICHARDS

tributions to the science of geology (especially in the departments of petrography, vulcanology, and seismology).

Humboldt's published correspondence with some of the most distinguished men of his time, such as Goethe, Varnhagen, Pictet, Bunsen, Gauss, and Raumer, as well as with his brother Wilhelm, attests the almost unparalleled breadth of his intellectual interests.

The most complete and painstaking *Life* of Humboldt is Bruhns's (Leipzig, 1872); an English translation exists, less the very full bibliography. Klencke's shorter biography, also translated into English, is accurate but dull; and another is by R. H. Stoddard (New York, 1860), with additions by Bayard Taylor, which is far more satisfactory.

HUMBOLDT, KARL WILHELM, Baron von (1767-1835). An eminent German scholar, author, and statesman, elder brother of the preceding, born at Potsdam, Prussia, June 22, 1767. He was educated at the universities of Frankfort-on-the-Oder and Göttingen, where he was especially trained in jurisprudence, but also studied æsthetics, antiquities, and the Kantian philosophy, then newly propounded. After Continental travel, he spent some time in 1789-90 at Erfurt and at Weimar, where he met Schiller, then professor extraordinarius at Jena. In 1790 he became referendary in the Supreme Court of Judicature at Berlin, with the title of Prussian Councilor of Legation, but in 1791 resigned his appointment, and in 1794-97 was at Jena, active in scientific and literary study, and one of the Schiller circle. His interesting correspondence with Schiller, extending from 1792 to 1805, was published by him in 1830 with a "Vorerinnerung" (2d ed., by Vollmer, 1876; in the *Cotta'sche Bibliothek*, ed. by Muncker, 1893). From 1801 to 1806 he was Prussian Resident Minister at the Papal Court, and in 1806-08 Minister Plenipotentiary. At Rome he was a most liberal patron of artists, including Rauch and Thorwaldsen, made philosophical, æsthetic, philological and archæological researches, and wrote the elegy *Rom* (1806), his most ambitious poem. In 1809 he was appointed Privy Councilor of State, in charge of public worship and education. After a successful administration, which introduced many reforms, and organized and obtained endowment for the Berlin University (decreed 1807, opened 1810), he resigned the post in 1810, to accept that of Envoy Extraordinary and Minister Plenipotentiary at Vienna, with rank of Minister of State. In the political affairs of the time he took a prominent part. He was present at the Peace Congress of Prague in 1813, in 1814 was at the Congress of Châtillon and signed, with Hardenberg, the first Paris Treaty, and in 1814-15 attended the Vienna Congress as Prussia's Second Plenipotentiary. Humboldt likewise took part in the negotiations attending the conclusion of the second Paris Treaty, and was a member of the Territorial Commission at Frankfort-on-the-Main in 1816-17. As a State Councilor he strongly disagreed with Chancellor Hardenberg on certain matters of tax reform, and in consequence he was ordered to London as Ambassador. He returned in 1818 to attend the Congress of Aix-la-Chapelle, and in 1819 was appointed to the Ministry of the Interior (then divided into two branches) with the department of communal and municipal affairs. His liberal opinions soon involved him in difficulties with the Government. He demanded a new Prussian constitution which should combine the autonomy of provinces and governmental districts with a Parliament chosen by direct election; and he attacked the Carlsbad decrees, which, among various provisions, established a censorship of the press and contained measures hostile to the universities and schools. Dismissed in 1819, he was not recalled to the Council of State until 1830. In the last years of his life Humboldt devoted much attention to art matters and to the organization of the Berlin Museum. He died April 8, 1835, at Tegel.

As a statesman Wilhelm von Humboldt was enlightened and industrious; but perhaps hardly constructive. As a critical essayist he was of transient influence. Of his poetical works, besides the *Rom* above mentioned, only the translation of the *Agamemnon* is now much read (1816, 2d ed. 1857; in the *Universalbibliothek* of Reclam). But as a philologist he marks an epoch. It was he who first called the attention of scholars to the phenomenon of the Basque language, particularly in the volume *Prüfung der Untersuchungen über die Urbewohner Hispaniens vermittelst der baskischen Sprache* (1821). His chief publication, *Ueber die Kawisprache auf der Insel Java* (3 vols., 1836-40), with its noted introduction, "Ueber die Verschiedenheit des menschlichen Sprachbaues" (separately printed 1835, 3d ed. of Pott's revision, 1880), was the first on the subject. Important dissertations read before the Berlin Academy include those on the comparative study of language, the province of the historian, and the origin of grammatical forms. Humboldt was in these and other writings the first to associate the science of comparative philology with philosophy, history, and other collateral studies, and to give it a universal significance. His *Ideen zu einem Versuch, die Grenzen der Wirksamkeit des Staates zu bestimmen* (edited by Cauer 1851, in Reclam's *Universalbibliothek*), which Schiller vainly tried to get published, limits the authority of the State to the inferior task of protecting the life and property of its citizens. The collected works appeared at Berlin (7 vols.) in 1841-52. Consult also the study by Haym (Berlin, 1856); Adler, *Wilhelm von Humboldt's Linguistical Studies* (New York, 1866); Gebhardt, *Wilhelm von Humboldt als Staatsmann* (Stuttgart, 2 vols., 1896-99); and Kittel, *Wilhelm von Humboldt's geschichtliche Welt anschauung* (Leipzig, 1901).

HUMBOLDT RIVER. The longest river of Nevada. It rises in Elko County, in the northeast corner of the State, and flows 350 miles in a generally southwest direction, emptying into Humboldt Lake in Churchill County, 80 miles northeast of Carson City (Map: Nevada, E 1). The lake has no outlet, the water sometimes evaporating faster than the river can supply it; at times of high water it formerly overflowed into Carson Sink, but this is now prevented by a dam. The river is only a few yards wide, growing smaller by evaporation toward its mouth. Its water is saline, and it flows through an arid and barren region covered with sage-brush, with the exception of a few fertile alluvial plains and clumps of willows. The valley of the Humboldt is the only east and west pass through the mountains of Nevada, and it is followed throughout its course by the Central Pacific Railroad.

HUME, DAVID (1711-76). An English philosopher and historian. He was born at Edinburgh on April 26 (O. S.), 1711. His father was the laird of Ninewells in Berwickshire, but David, being the youngest son, had to make his fortune with no other assistance than an education and the influence of his family. He appears to have studied in the University of Edinburgh when twelve years of age, but his education for the most part consisted in home reading. His family designed the law to be his profession, and he submitted to the initial steps of the proper practical training, but it was not a pursuit to his liking. Deserting it, he experimented in a mercantile house in Bristol, but commerce was not more congenial to him than jurisprudence, and he gave it a very short trial. To use his own words, "I now went over to France with a view of prosecuting my studies in a country retreat, and there I laid the plan of life which I have steadily and successfully pursued. I resolved to make a very rigid frugality supply my deficiency of fortune, to maintain unimpaired my independency, and to regard every object as contemptible except the improvement of my talent in literature." He spent much of the next three years at La Flèche, in intercourse with the Jesuits, and then he wrote his *Treatise of Human Nature*, which, however, he did not publish till 1739-40. It consists of three books, "Of the Understanding," "Of the Passions," and "Of Morals." Now one of the three or four most famous philosophical productions of England, at the time of its appearance "it fell deadborn from the press without reaching such a distinction as even to excite a murmur among the zealots," as Hume himself acknowledged, much to his mortification. He now turned to political theory, and published anonymously in 1741-42 two volumes of *Essays Moral and Political*. In 1744 he was a candidate for the chair of 'ethics and pneumatic philosophy' in the University of Edinburgh, but his *Treatise* had given him a reputation for 'heresy, deism, skepticism, atheism, etc.,' and the university would have none of him. In 1746 he obtained a 'very genteel' appointment as secretary to General Saint Clair on "10 shillings a day, perquisites, and no expenses." An expedition had been planned to Canada, but an unsuccessful attack on L'Orient, in France, led to a recall of the general. Two years after Hume accompanied General Saint Clair to the Court of Turin, as secretary and aide-de-camp, and took notes of his impressions of Holland, Germany, and Italy.

In 1748, during his absence on the Continent, he published his *Enquiry Concerning Human Understanding*. The following year he returned to England; in 1751 he gave to the public the *Enquiry Concerning the Principles of Morals*, and in 1752 the *Political Discourses*, said to have been the 'cradle of political economy.' At the same time he also composed *Dialogues on Natural Religion*, which, however, were not published till after his death. By this time he had put by enough money to gain him an income of £50 a year. Besides he had "a hundred pounds' worth of books, great stores of linens and fine clothes, and near £100 in his pocket, along with order, frugality, a strong spirit of independency, good health, a contented humor, and an unabated love of study," as he himself relates. In 1751 he had removed to Edinburgh, and a year later he was elected librarian to the Faculty of Advocates at a salary of £40. In 1754 he published the first volume of the *History of Great Britain, Containing the Reign of James I., and Charles I.*; the second volume appeared two years afterwards. Then he took up the Tudors, and, working backward, finished his *History of England* in 1762. In 1757 he had published *Four Dissertations: the Natural History of Religion; of the Passions; of Tragedy; of the Standard of Taste*. In 1763 he was a member of the embassy to France under Lord Hertford, and there found himself famous. He was lionized by the frivolous society ladies, fêted by the nobles, and taken by the men of letters into their friendship. After his return he was made Under-Secretary of State (1767-69), and by 1769 had an income of £1000 a year. In 1770 he retired from public life and built a home in Edinburgh on a new street, which was jocularly called 'Saint David's Street,' after him. Here he wrote *My Own Life*, and here he died, August 25, 1776. His *History of England* became a classic as soon as it appeared; his economic writings were a fitting prelude to those of his friend Adam Smith (q.v.), while his philosophical works roused Kant "from his dogmatic slumber," gave rise by reaction to Scottish philosophy, and are the immortal text-books of skepticism and agnosticism. His philosophy was but the consistent development of Berkeley's idealism. (See BERKELEY.) Berkeley had denied the reality of matter, and had accounted for what passed for matter by making it a complex of sensations and ideas, but he still held to the reality of mind as the subject of sensations and ideas. Hume dropped out mind as Berkeley had dropped out matter, and thus left nothing to be known except 'perception' (impressions and ideas), together with certain fictions of the imagination, of which he gives no satisfactory account that can be made consistent with his general position. "All the perceptions of the human mind resolve themselves into two distinct kinds which I shall call impressions and ideas." These differ not by reason of any differences in the manner in which they are produced, but merely in priority and liveliness. Ideas are simply those perceptions which, appearing later than similar perceptions, are less forceful and vivid. Ideas are of two sorts, ideas of the memory and ideas of the imagination. Of these the former are the more lively, and retain, in great measure, the order and sequence of these original impressions, whereas ideas of the imagination are fainter and are "not restrained to the same order and form with the original impressions." Ideas are associated in accordance with certain principles, viz., "Resemblance, contiguity in time or place, and cause and effect." There are no general ideas. Ideas of space are complexes of *minima visibilia*, or colored points, disposed in a certain manner. These points are indivisible. Ideas of time are derived from the succession of our perceptions, and as these perceptions are in the last instance indivisible, time is not infinitely divisible. No perception has any proper external, objective reference. A cause is an object precedent and contiguous to another, and so united with it in the imagination that the idea of the one determines the mind to form the idea of the other, and the impression of the one to form a more lively idea of the other. "There is no substance, hence no mind except the bundle of per-

ceptions. A true skeptic will be diffident of his philosophical doubts, as well as of his philosophical convictions." In ethics, Hume was a utilitarian. (See UTILITARIANISM.) Self-love cannot be the sole basis of reasonable action. 'Crucial experiments' render such a view impossible. Sympathy is a real principle in human nature, and reflections on public interest and utility are the sole sources of the moral approbation paid to fidelity, justice, veracity, integrity. Sympathy does the work it does because it is our pleasure in other persons' pleasures and our displeasure in their pains. Thus our own pleasure and pain are the springs of action, but they are not the ends of action.

A complete edition of Hume's philosophical works was published by Green and Grose (4 vols., London, 1874-75); his *Treatise* and two *Enquiries* in two volumes by Selby-Bigge (Oxford, 1889-94); his *History* has appeared in almost innumerable editions; his autobiography was edited by Adam Smith (London, 1777). Consult also: Burton, *Life and Correspondence of David Hume* (Edinburgh, 1846); and Huxley, *David Hume* (London, 1879), containing a popular account of Hume's philosophical views. For treatment of Hume's philosophy, consult: Jodl, *David Hume's Lehre von der Erkenntnis* (Halle, 1871); Pfleiderer, *Empirismus und Skepsis in David Hume's Philosophie* (Berlin, 1874); Meinong, *Hume-Studien* (Vienna, 1877-82); Gizycki, *Die Ethik David Hume's* (Berlin, 1878); T. H. Green, *Introduction to Hume*, in Green and Grose's edition of Hume's works; also published as part of vol. ii. of Green's *Works* (London, 1885); Knight, *Hume* (London, 1886); and the various histories of modern philosophy by Ueberweg-Heinze, Falckenburg, Höffding, and Windelband.

HUME, HAMILTON (1797-1863). An Australian explorer, born in Paramatta in New South Wales. He is best known as leader with Howell of the cross-country expedition of 1824, on which, when question arose as to the part he had taken in it, he wrote: *A Brief Statement of Facts in Connexion with an Overland Expedition from Lake George to Fort Phillip, in the Year 1824* (3d ed. 1874), and, with Howell, *Journey of Discovery to Fort Phillip* (1837). He accompanied Sturt (q.v.) in his first exploration. A county in New South Wales, a mountain range in Victoria, and a river, one of the largest tributaries of the Murray, bear the name of Hume.

HUME, JOHN. See HOME, JOHN.

HUME, JOSEPH (1777-1855). A British political reformer, born January 22, 1777, at Montrose, Scotland. He was educated in the local schools of Montrose, and at the age of thirteen was apprenticed to an apothecary. He studied medicine, was admitted in 1796 a member of the College of Surgeons, Edinburgh, and became assistant surgeon in the marine service of the East India Company. He applied himself to the native languages, and during the Mahratta War, from 1802 to 1807, filled the office of Persian interpreter to the army. He also discharged duties connected with the prize agencies and the commissariat, and arrived in England in 1808, with a fortune of £30,000 or £40,000. He spent some years in travel and study, and published a blank-verse translation of Dante's *Inferno* in 1812. By purchase he entered the House of Commons in 1812 as Tory member of Parliament for the Borough of Weymouth and Melcombe Regis. In 1818 he was elected for the Aberdeen district of burghs, comprehending his native town of Montrose. In 1830 he had gained such distinction as a radical reformer that he was returned unopposed as one of the members for Middlesex, which he represented until 1837. In 1842 he was again chosen for his native burgh, Montrose, and remained until his death in the service of his fellow-townsmen. As leader of the Radical Party in the House of Commons, he usually found himself in active conflict with both Whig and Tory governments, and at first was treated with contemptuous tolerance. He discovered the widespread conspiracy of the Orange lodges to make the Duke of Cumberland King at William IV.'s death, and a tardy but sincere homage was paid to his integrity and public services by Sir Robert Peel and other political opponents. He held various public offices, was a prominent member and leader of several notable societies, and was twice elected lord rector of Aberdeen University. He died February 20, 1855.

HUME, MARTIN ANDREW SHARP (1847—). An English soldier and historian, long a resident of Spain. He was born in London, but was educated at Madrid, was made Knight of the Spanish Order of Isabella the Catholic, in 1868, and editor of the Spanish State Papers in the Public Record Office, London. He had active service with the Turks in 1878-79, and traveled widely in Africa and South America. Besides his *Chronicles of Henry VIII.* (1889), *Courtships of Queen Elizabeth* (1896), and other works on her period, he wrote *Spain, Its Greatness and Decay* (1898); *Modern Spain* (1899); and *A History of the Spanish People* (1901).

HUME, or **HOME**, Sir PATRICK (1641-1724). A Scottish statesman. Born at Polwarth, Berwickshire, he was brought up a strict Presbyterian, and after a term of law study at Paris, he represented his native county in Parliament, where he at once took a foremost place as defender of the Covenanters. He went so far as to bring imprisonment upon himself, and on being freed was suspected of complication in the Rye House Plot, so that he was forced to remain in hiding until he could escape in disguise to the Continent. There he joined the Duke of Argyll, and embarked with him on the unsuccessful expedition to Scotland (1685). Hume became a refugee with a price set upon his head, but he once more escaped abroad, lived at Utrecht under an assumed name, and returned with William of Orange at the Revolution of 1688. With estates restored, he was now a Scottish peer, Lord Polwarth; was made Lord Chancellor in 1696, and Earl of Marchmont in 1697. He strenuously opposed in Parliament the claims of the Old Pretender to the crown, and voted for the union of Scotland with England, though he was not above the suspicion of having received a reward for so doing. Too dogmatic to be popular, he did not hold office in the United Kingdom till the reign of George I., when he was given some minor charges, but shortly retired.

HUMERAL VEIL (Lat. *humerale*, covering for the shoulders, from *humerus*, *umerus*, shoulder; connected with Gk. *ὦμος*, *ōmos*, Goth. *amsa*, Skt. *aṁsa*, shoulder). An oblong veil of silk, either white or of the color prescribed for the

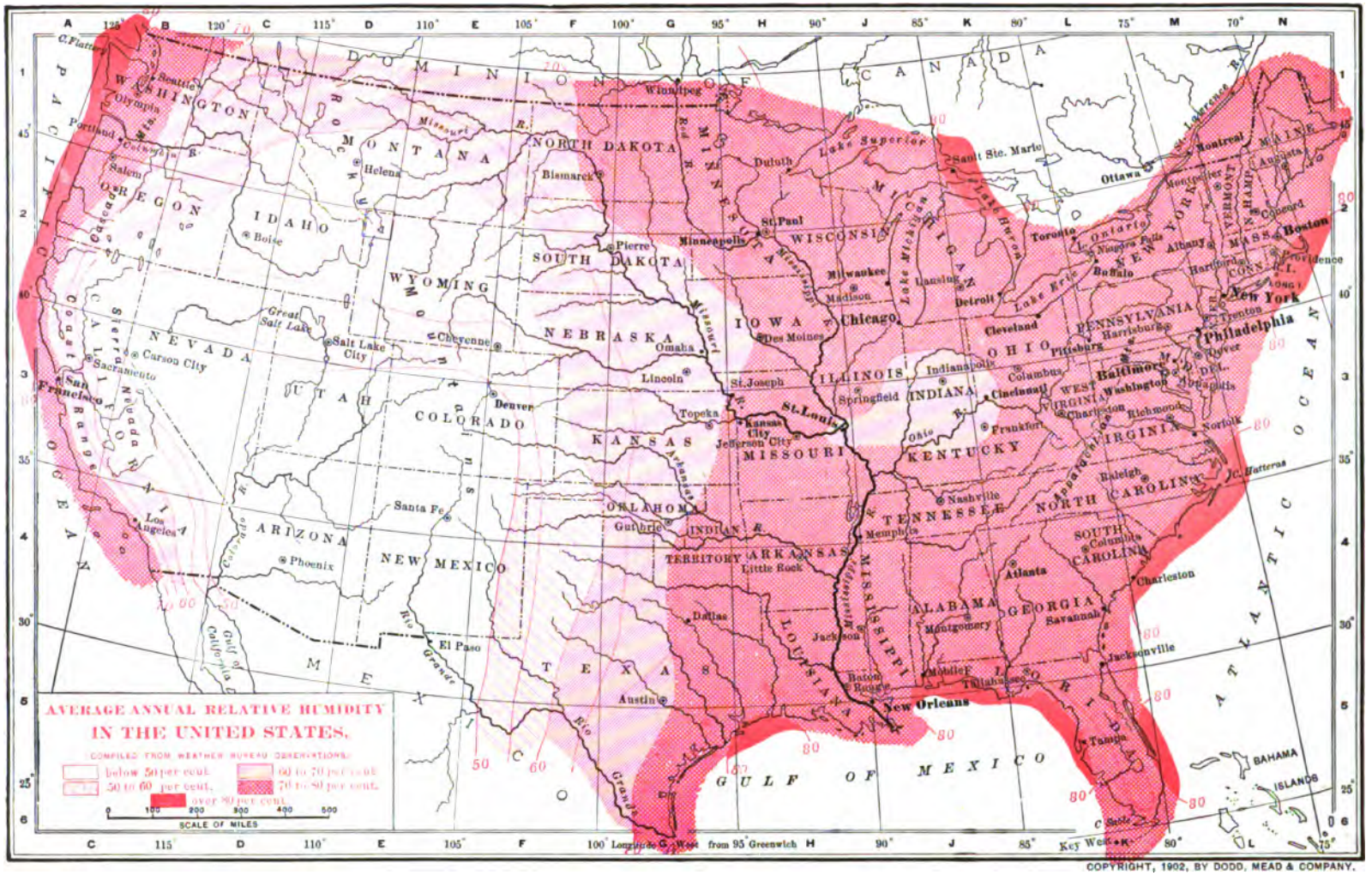
day, which is worn over the shoulders by the deacon in the mass, when he holds the paten from the offertory to the *Pater noster*, and by the priest in giving benediction or carrying the Blessed Sacrament in procession.

HU'MERUS (Lat., shoulder). The largest and longest bone of the upper extremity; the bone of the arm proper, extending from the shoulder to the elbow. It is divided anatomically into a shaft and two extremities. The upper extremity is rather the larger, and has a semi-globular head which is partially received into the shallow glenoid cavity of the scapula or shoulder-blade, forming a ball-and-socket joint. Two processes or projections of the shoulder-blade assist the glenoid cavity in completing the cavity or seat of the head of the humerus. There are three ligaments which hold the humerus to the scapula—the capsular, the coraco-humeral, and the glenoid, the relations being somewhat similar to those of the hip-joint (q.v.). The shaft of the humerus is nearly cylindrical in its upper part, but triangularly prismatic below, becoming flattened and broad at the lower extremity, where are placed the two condyles, with their articular surfaces, and the trochlea between them, which form, with the two bones of the forearm, the elbow-joint. (See ARM; SKELETON.) The broad, flat lower extremity has two depressions on the anterior aspect of the bone; one slight one on the outer side called the radial depression, which is for the reception of the anterior border of the head of the radius, when the arm is strongly flexed; the other, called the coronoid depression, for the reception of the coronoid process of the ulna during flexion of the arm. Opposite the latter depression, on the posterior surface of the bone, is a deep triangular depression, called the olecranon fossa, for the reception of the olecranon process of the ulna when the forearm is extended. The humerus forms with the scapula, as above mentioned, a ball-and-socket joint, the shoulder-joint (q.v.). The elbow-joint is a hinge joint, and, to a certain extent, in its relation to the head of the radius, a ball-and-socket joint.

HUMFREY, HUMPHREY, or **HUMPHRYS,** PELHAM (1647-74). A famous English musician, and one of the founders of modern English music. He was born in London. He was one of the children of the Chapel Royal, and while yet a boy composed considerable Church music, and in a book of *Divine Services and Anthems*, published by Clifford in 1664, there are five anthems ascribed to him. Upon the breaking of his voice he was sent by Charles II. to France for instruction under Lully. The King was so impressed with the genius of the boy Humfrey that he caused him to be supplied with £200 from the secret-service money, to pay the expense of his journey, and in the two years following (1665-66) sent him £100 and £150, respectively. Upon his return in 1667, he was appointed to the Chapel Royal, where the music he had brought back with him was greatly admired. He had become very skillful in the art of scoring, which, added to his own genius, enabled him to compose anthems which have remained ever since models of beauty in expression, and strikingly apt in the artistic blending of words and music. He was appointed Gentleman of the Chapel Royal (1666) during his absence in France; became Master of the Children in 1672, Composer in Ordinary for the Violins to His Majesty in 1673, and wrote many pieces for the King's band, an organization modeled after "Les Petits Violons" of Louis XIV. His compositions are still in use (many of them still in manuscript) in all the cathedrals and churches of England and America. They are remarkable for their expression and depth of sentiment, as well as for discoveries and departures in harmony; for instance: the sharp fifth, as a passing note, the major third and minor sixth on a bass note, a sequence of imperfect fifth and the augmented or extreme sharp sixth, and the flat third and sharp fourth, combinations new to church music, were utilized by him for the first time. It is supposed from the fact that he frequently indulged in extreme keys, such as C minor and F minor, that his violinists did not use fretted finger-boards, but tempered their scales at will. He died at Windsor and was buried in the cloisters of Westminster Abbey near the southeast door.

HUMIDITY (from Lat. *humiditas*, moisture, from *humidus*, *umidus*, moist, from *humere*, *umere*, to be moist; connected ultimately with Gk. *hygrós*, *hygros*, Icel. *vökr*, moist), ATMOSPHERIC. The moisture or aqueous vapor in the atmosphere. This vapor is really an invisible gas, and is the most important component of the atmosphere as to quantity next after nitrogen and oxygen. When this invisible vapor becomes visible it is called dew, fog, mist, haze, cloud, rain, hail, snow, frostwork, or frost, according to the size of the drops of water or the method in which the vapor condenses. Water and ice are not included under the term 'atmospheric humidity,' that term being strictly confined to the invisible vapor.

The aqueous vapor in the air is perpetually falling to the earth as rain or snow, and is renewed by evaporation from the ocean, the lakes and rivers, and the soil itself. The quantity of aqueous vapor in a cubic foot of air varies greatly with temperature and locality on the earth's surface. Thus in the air of Arizona and New Mexico there is oftentimes only from 3 to 10 per cent. of the amount that could be held in case the air was saturated. The quantity that can be held in a saturated space varies greatly with the temperature, but does not depend upon the barometric pressure, and is also quite independent of the presence of air in that same space, since the aqueous vapor and the dry air co-exist side by side. The elastic pressure of the dry air and the elastic pressure of the aqueous vapor added together produce what is ordinarily called barometric or atmospheric pressure. The weight of the moisture and the weight of the dry air added together determine the density of a cubic foot of atmosphere at any time. When a cubic foot of space contains as much aqueous vapor as it can possibly hold at any given temperature, it is said to be saturated with moisture. The following table shows that there may be as much in an extreme case as twenty grains of invisible aqueous vapor in a cubic foot if the space is saturated at the temperature of 100° F., and this vapor will exert an elastic pressure of about one pound to the square inch, such as would be counterbalanced by a column of mercury of about 1.9 inches of the barometer. If, now, dry air is added to this cubic foot of space until a pressure of thirty inches is exerted in all directions, then the weight of the



dry air at a temperature of 100° F. will be 465 grains per cubic foot, and the combined weight of the vapor and the air, or the so-called saturated air, will be 485 grains. The following table gives these relations for saturation at a pressure of thirty inches and for temperatures between zero and a hundred, computed according to the data adopted in the Psychrometric Tables of Prof. C. F. Marvin (United States Weather Bureau, 1900):

PRESSURE AND WEIGHT OF VAPOR AND AIR IN A CUBIC FOOT OF ATMOSPHERE AT A PRESSURE OF 30 INCHES WHEN SATURATED AT THE RESPECTIVE TEMPERATURES

TEMPERATURE	Vapor pressure	Dry air pressure	Vapor weight	Dry air weight	Total weight saturated air
DEGREES FAHR.	Inches	Inches	Grs. per cu. ft.	Grs. per cu. ft.	Grs. per cu. ft.
0	0.038	29.962	0.48	605.32	605.80
10	0.063	29.937	0.78	591.93	592.71
20	0.103	29.897	1.24	578.79	580.03
30	0.164	29.836	1.94	565.79	567.73
40	0.247	29.753	2.85	552.89	555.74
50	0.360	29.640	4.08	539.93	544.01
60	0.517	29.483	5.74	526.75	532.49
70	0.732	29.268	7.98	513.00	520.98
80	1.022	28.978	10.93	498.48	509.41
90	1.408	28.592	14.79	482.65	497.64
100	1.916	28.084	19.77	465.77	485.54

This table shows that the capacity of the unit volume of space or air for aqueous vapor increases very rapidly with rising temperature. When the space is not saturated, the atmosphere is said to have a relative humidity expressed as a given percentage of complete saturation. Thus if the air has a temperature of 100 degrees and contains only 10 grains of vapor per cubic foot, it contains only 50 per cent. of the maximum amount possible at that temperature.

The humidity of the atmosphere is usually determined by either the dew-point apparatus or the psychrometric apparatus. In the former the air is cooled down without altering the quantity of moisture that it contains, and the temperature at which that moisture saturates the air is determined. This dew-point temperature is always lower than the temperature of the free air. In the psychrometric method the temperature of a thin layer of water that is evaporating under standard conditions in the open atmosphere is determined. From this temperature of evaporation the psychrometric formula gives us the vapor-tension, the temperature of the dew-point, and the quantity of moisture in the air. In general the temperature of the dew-point is about as far below the temperature of evaporation as the latter is below the temperature of the air.

The rate of evaporation from a moist surface diminishes with increasing humidity of the air, so that the total evaporation under a given wind in any given unit of time indicates the average dryness of the air during that time.

Nearly all animal and vegetable substances, by reason of their cellular structure, absorb moisture from moist air, but give it up to very dry air. They are, therefore, perpetually expanding and contracting, curling and uncurling, and their changes may be utilized in the construction of hygrometers. When moist air cools by radiation at night to temperatures below the dew-point, the vapor is precipitated, forming cloud, mist, fog, or dew. On the other hand, when air rises, thereby coming under less pressure, it expands, does work, and is cooled dynamically by reason of the work done. Ordinary air cools at the rate of one degree Fahrenheit for 183 feet of ascent. In this way air that is forced over a mountain may be cooled below the dew-point and form cloud or rain. The moisture in ordinary dry air is easily absorbed by many substances, such as sugar, flour, salt, and in very moist weather objects may become so damp that fungus germs floating in the air and settling on them take root and cover them with mold, or set up fermentation within them.

The humidity of the atmosphere, although invisible, has a special and strong influence in absorbing radiant energy, whether from the sun or from the earth. It therefore converts the dry air into a powerful obstructor to the passage of radiant heat, and by this means the humid atmosphere is made to act as a blanket, keeping the earth and the lower air much warmer than it would otherwise be. See HYGROMETER.

HUMIL'IA'TI (Lat. nom. pl., humbled). A monastic Order, which originated in the eleventh or twelfth century, and was confirmed by Innocent III. in 1201. In the sixteenth century it had 94 houses, with about 170 monks, in Italy, but as it was corrupt, Carlo Borromeo (q.v.) tried to reform it. This attempt led to a murderous assault on him, so Pius V. in 1571 suppressed the Order. Several of their houses were turned over to the Barnabites.—A female Order of Benedictines, known as humiliate nuns, or nuns of Blassoni, from their founder, Clara Blassoni of Milan, served as nurses, etc. The Order still exists in Italy, with four houses.

HUMMEL, hum'mel, JOHANN NEPOMUK (1778-1837). A distinguished Austrian pianist and composer, born at Pressburg and educated primarily by his father, who was a music-teacher. When but eight years of age he accompanied his father to Vienna on the appointment of the latter as kapellmeister of Schikaneder's Theatre. Here he came under the notice of Mozart, who became so interested in the boy that he admitted him to his own family and instructed him for two years. His début in 1787 was also under the auspices of Mozart. Next followed a number of very successful tours through Germany, Denmark, England, and Holland. Probably no other musician in the entire history of music had so distinguished a number of teachers and patrons as Hummel. Beginning with Mozart, his next teacher was Clementi, with whom he studied in London during 1791, followed by a course of study in composition under Albrechtsberger in Vienna (1793), while at the same time he was studying with Salieri in dramatic writing, and receiving much indirect, but nevertheless profit

success and the appreciation of the public, so much so that at one time he was considered to rival Beethoven. His principal appointments were as follows: From 1804 to 1811, deputy kapellmeister under Haydn in the service of Prince Eszterházy; 1811-16, a successful teacher of composition in Vienna; kapellmeister to the Court of Stuttgart 1816-19, when he resigned to take a similar position at Weimar. None of these appointments interfered with his concert activities, for during his many leaves of absence he appeared in Saint Petersburg (1822), in Paris (1825), Belgium and Holland (1826), Vienna (1827), Warsaw (1828), and made a return visit to France in 1829. He appeared in London, and was for a season the musical director of German opera at the King's Theatre. From this time on his health gradually failed, and after much suffering he died at Weimar. He was a Chevalier of the Legion of Honor, and during his lifetime received many tokens of princely favor. As a pianist he ranked with the most famous of his generation, and as a composer was of scarcely less excellence. His compositions number over a hundred, and include operas, cantatas, ballets, and considerable chamber music. For the Church, he wrote three masses arranged for four voices with orchestral and organ accompaniment, which are still held in high esteem. His Graduale and Offertorium are in use to-day throughout Austria and Hungary. At least six of his concertos and a few of his sonatas remain standard works, and are in constant demand. He is of importance in the history of music, if only because of his efforts to introduce the present method of fingering in pianoforte study.

HUMMEL, KARL (1821—). A German landscape painter and engraver, son of the composer, Johann Nepomuk Hummel. He was born at Weimar, studied engraving under Schwerdgeburth and painting under Preller, with whom he traveled through Europe. From an earlier and idealized manner, after the fashion of Preller or of Claude Lorraine, Hummel gradually approached a more natural treatment, and turned in this second period from Italian scenery to landscapes nearer home. Among his pictures, of which many belong to the Grand Duke of Weimar, are: "The Gardens of Armida," which is his most important work (1858); "View of Brienz Lake" (1858), and "View in Lauterbrunn Valley" (1859), both in the Leipzig Museum; "Civitâ Castellana" (1879); "Monte Coracte;" "Keller Lake in Holstein" (1884); and a "Wooded Landscape Near Michaelstein" (1888). His engravings of landscapes are also well known. Hummel became professor in the Weimar Academy of Art in 1859.

HUMMELER (from *hummel*, variant of *humble, hamble*, to mutilate, from AS. *hamelian*, OHG. *hamalōn*, to maim, Ger. *hammeln, hämmeln*, to geld, from OHG. *hamal, ham*, mutilated; possibly connected with Skt. *śam*, to injure). A hand implement or machine used especially in Scotland, for removing the awn from the grain of barley after it has been thrashed. A common kind of hummeler is a set of blunt knives fixed in a frame, with a handle, by means of which the machine is operated. Another form consists of blunt knives set on a roller. Hummelers of various construction are sometimes at-

HUMMING-BIRD (so called from the sound of its whirring wings). One of the diminutive birds of the picarian family Trochilidæ, closely related to the swifts. More than 400 species are known, exclusively American, and mainly confined to the tropics, though a few species are summer visitors to colder latitudes, as far even as 61° N. A few, also, of the tropical species inhabit elevated mountainous tracts, even to the confines of perpetual snow. In the United States eighteen species of humming-birds are known, but only one of these is found east of the Mississippi and north of Florida. All of the others belong to the Southwestern States and the Pacific Coast (see below).

CHARACTERISTICS. The brilliancy of humming-birds, the rapidity with which they dart through the air, their hovering above the flowers from which they obtain their food, with a humming sound of wings which move so quickly as to be indistinctly visible, or 'like a mist,' have attracted universal admiration. The diminutive size of almost all of them—some are the smallest of birds, and when stripped of their feathers not larger than a bumblebee—has still further contributed to render them objects of interest. Like the bumblebees, too, they perform a service in the cross-fertilization of flowers. Consult Belt, *Naturalist in Nicaragua* (London, 1888).

The largest known species is *Patagona gigas* of the Andes, which reaches a length of 8½ inches, but this is really gigantic, few species exceeding 6 inches. The smallest known species is *Calypte Helenæ*, which is only 2¼ inches long; it is a native of Cuba.

The plumage of the different species exhibits an almost endless variety of form as well as of color, in crests, neck-tufts, leg-tufts, and many an extraordinary development of tail. The plumage of the males is usually far more varied and glittering than that of the females, and this tribe furnishes an extensive and forcible example in support of the doctrine of sexual selection (q.v.). The metallic brilliance of the plumage, which in the gorgets and elsewhere often exhibits a gem-like coruscation and iridescence, is due to the interference of light by the minute scales upon the surface of each feather, and not to pigments. The young resemble their mothers until they reach maturity.

FOOD, ETC. Humming-birds have slender bills, which are also generally long, and in some extremely so, the form of the bill exhibiting adaptation to the kind of flowers from which the bird obtains its food—straight in some, curved in others. The bill of the 'swordbill' (*Docimastes ensiferus*) is 5 inches long, much longer than the head, body, and tail of the bird together, while in *Rhamphomicron microrhynchum* the bill is only ¼ of an inch long. In the sickle-billed humming-birds (Eutoxeres) (see HERMIT) the bill is notably curved so as to form almost one-third of a circle, while in Avocettula it is sharply and abruptly recurved at the tip. Humming-birds do not, as was long supposed, feed on honey alone, but to a considerable extent, and some of them perhaps chiefly, on insects, not excepting spiders, while they often snatch away the insects which have become entangled in spiders' webs. The lower mandible fits into the

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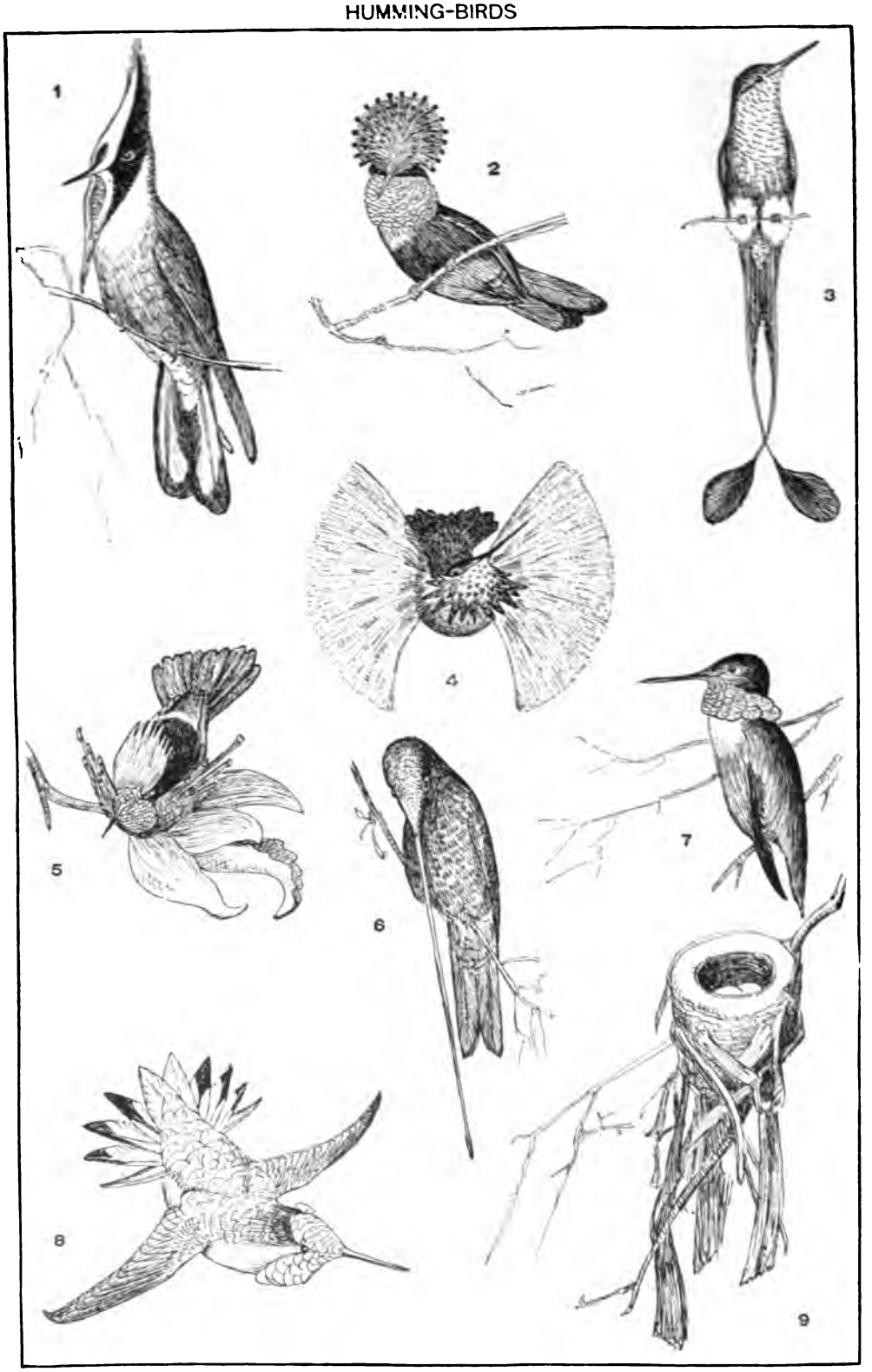
1 RUBY THROATED HUMMING-BIRD
TROCHILUS COLUBRIS
2 CALLIOPE HUMMING-BIRD – STELLULA CALLIOPE
NATURAL SIZE

3 GOLDEN HUMMER – HELIOTHRIX AURITUS
4 LONG-TAILED HUMMING-BIRD
AITHURUS POLYTMUS



1. HELMET-CREST (Oxypogon Guerini).
2. SPANGLED COQUETTE (Lophornis reginae).
3. RACKET-TAIL (Steganura Underwoodi).
4. CALLIOPE HUMMER (Stellula calliope).
5. TUFTED COQUETTE (Lophornis ornatus).
6. SWORD-BILL (Docimastes Ensiferens).
7. RUFUS HUMMER (Selasphorus rufus).
8. FLORESIS HUMMER (Selasphorus floresii).
9. NEST OF RED-THROATED SAPPHIRE (Hylocharis sapphirina).

upper, and the bill is thus adapted as a tube for sucking, in which, as well as in seizing small insects within the recesses of flowers, the tongue is also a very efficient organ. The tongue is very long, capable of being darted out to a considerable length; the bone of the tongue is much elongated, and its branches pass round the back of the skull to the forehead, where they meet in a point before the line of the eyes. The tongue itself consists of two filaments, joined together for the greater part of their length, and separated at the tip. The wings of humming-birds are very long and powerful, the first quill-feather the longest, and the rest shorter in succession.

NESTS, ETC. These diminutive birds construct exquisite nests of shreds of bark, soft grass, or cottony substances. They are placed in a great variety of situations, from a mere saddling upon a branch to an attachment to the tip of a pendent and swaying leaf or tendril; and often the exterior is made almost invisible by having a coating of lichens or something else allying it closely to its background. The eggs are invariably two in number, and they are always plain white. The tiny owners are very bold in defense of their nests and young, and are said to strike fearlessly with their needle-like bills at the eyes of birds of prey, which they far surpass in agility and rapidity of flight. They are very easily, however, imbued with confidence in a person with whom they are familiar, and have been known to return again in spring, after a winter migration to a warmer climate, to the window from which they had been allowed to escape. Attempts to keep them in confinement have generally failed, and few have ever been carried alive across the Atlantic. Most of the hummers have no song, their only notes being querulous squeaks of wrath or fear. A few of the tropical forms, nevertheless, are said to be slightly musical. The skins of humming-birds were employed for ornamental purposes by the more civilized American races before the discovery of America by Europeans, and were used by the Mexicans for making the pictures which excited the admiration of their Spanish conquerors.

EXAMPLES. Within the present space limits it will not be possible to give any adequate description of the various species of humming-birds, and this article must be confined to mention of the forms illustrated herewith, and to a brief account of the better-known species of the United States. The helmet-crests (Oxypogon) are Andean, and owe their name to their high-pointed head ornaments. The coquettes (Lophornis) are small, much ornamented hummers of the Amazon region, and are easily recognized by their fan-like crests, and by the spangled frills on each side of the neck. They are numerous and well scattered in South America, where one of the most beautiful is the 'tufted' coquette of the island of Trinidad and the adjacent mainland. The racket-tailed hummer (Steganura), whose home is a limited region near the head of the Amazon, is among the smallest and most extraordinary of these birds; and is described as crossing, recrossing, and 'snapping' in a marvelous way its long tail-feathers in the air, as it darts about, especially when a rival male is near. The long-tailed species of the genus Aithurus are West Indian; the one figured is a denizen of Jamaica.

RUBYTHROAT, ETC. Of the several humming-birds of the United States, the ruby-throated (*Trochilus colubris*), is most widespread and familiar. It extends far to the north in summer, and may be found breeding from Florida to Hudson Bay. In winter it retires to subtropical regions, and is found from southern Florida to Central America. It is less than 4 inches long, and the principal color is bright shining green. The throat of the male is a beautiful metallic ruby-red. This exquisite bird arrives in the Northern United States early in May, with the opening of the cherry-blossoms, and goes south late in August or early in September. In the Rocky Mountain region of the United States the rubythroat is replaced by the broad-tailed hummer (*Selasphorus platycercus*), a somewhat larger bronze-green bird with rose-purple throat. On the Pacific Coast the common hummer is the Nootka Sound or rufous humming-bird (*Selasphorus rufus*), about the size of the rubythroat, but deep rufous above, with the throat brilliant scarlet. It is notable for its occurrence as far north as Nootka Sound, Alaska, but it winters in Mexico. The commonest species in California, where it is resident through the year, is Anna's humming-bird (*Calypte Anna*), a trifle smaller than the rubythroat, and of more exquisite coloration. The male is bronze-green above, with the whole head and throat brilliant purplish or rose-red.

BIBLIOGRAPHY. The literature devoted to humming-birds is very extensive, including several hundred titles, but the most important works are: Gould, *Monograph of the Trochilidæ* (London, 1861), and Elliot, *Synopsis and Classification of the Trochilidæ* (Washington, 1879), while to the American reader, Ridgway, "The Humming Birds" (*Annual Report of the Smithsonian Institution* for 1890, Washington, 1892), is by far the best popular work. See HELMET-CREST; HERMIT; HILL-STAR; SUN-BIRD.

HUMORESKE, hụ'mō-rĕs'ke (Ger., Dan., from *humor*, Lat. *humor*, humor, disposition, from *humere*, to be moist). Originally a short, humorous tale or sketch, but applied by Schumann to short compositions for the pianoforte in a rather free form, and distinguished by originality in harmonic and rhythmic combinations.

HUMORS. See HIPPOCRATES; MEDICINE.

HUMPBACK. A rorqual (family Balænopteridæ) or whalebone whale of the genus Megaptera, in which the dorsal fin forms a lump upon the back. It is found in all seas, often reaches a length of 50 feet, and sometimes much more; is thick and ungainly, and yields fifty or more barrels of oil. The baleen is short and of poor quality. This whale (*Megaptera longimana*) is recognizable at a long distance by its lolling, irregular manner of swimming, and at the mating season pairs indulge in antics highly amusing because of their size and uncouthness. They strike each other with their long flippers, and these love-pat caresses may be heard miles away. It is believed that in these performances originated the stories current about the attack of the whale by the thresher shark, which, as a matter of fact, could not injure such an opponent. See RORQUAL; WHALE.

HUMPBACKED SALMON. One of the smallest and poorest of the Pacific salmon (*Oncorhynchus gorbuscha*). It weighs only

three to six pounds, and is distinguishable by the small size of the scales and by the oblong coarse markings on the tail. It is occasionally seen in California and in the Columbia River, but is common from Puget Sound northward, where it is the 'dog-salmon' or 'gorbuscha' of Alaska; also called 'haddo' and 'hay-ko' by the Indians, who smoke-dry it, and use it as winter food. See SALMON; and Plate of SALMON.

The term humpbacked is applied to other fishes, having an elevated dorsal outline, especially an Alaskan whitefish (*Coregonus Nelsoni*).

HUMPED CATTLE, or ZEBU. The common domestic cattle of India and the East, known in books as 'zebu' or 'zubr,' but not so called anywhere in the Orient. It seems to be a distinct species (*Bos Indicus*), of which no wild examples remain. Certain bands of these cattle running wild have, however, ranged the forests of Eastern India for hundreds of years, and are large, long-horned, and shy. In addition to the enormous hump on the fore shoulders, these cattle show some convexity of the forehead, concavity of the upper border of the short horns, large drooping ears, and a very large dewlap. In size and color they vary considerably. The most common colors are ashy gray or creamy buff, but red, brown, black, and even white ones are seen. A certain number of white bulls are held sacred by the Hindus, whence the name 'Brahminy,' often given to the entire race; and these wander about, devastating crops and feeding upon the vegetables exposed for sale in the bazaars without serious interference. The humped cattle are diffused over India, China, the Asiatic islands, Madagascar, and the east coast of Africa. There are many breeds, differing much in size; the largest are greater than any oxen of Europe, while the smallest are not much bigger than a large mastiff. The hump of the largest breeds is said to be sometimes 50 pounds in weight. English residents in India esteem the hump as delicious for the table. There are hornless breeds, and a breed with two fatty humps, one behind the other, is common in the vicinity of Surat. The voice resembles the grunting of the yak, almost as nearly as the lowing of the ox. The zebu is used in India both as a beast of draught and of burden, is yoked in the plow, is occasionally used for riding, and can travel from twenty to thirty miles a day, and is very gentle and docile. In recent years they have been introuuced into Jamaica in considerable numbers, and are used on the large banana estates.

GALLA OX, OR SUNGA. A breed of humped cattle domesticated in East Africa, and most common in Abyssinia, remarkable for its massive horns, which sometimes form the figure of an upright lyre above its head. A sunga's horn may be 46 inches long, and 15 inches around the base. This variety was known in ancient Egypt, and has been regarded as the parent stock of the Indian breeds of humped cattle; while Blyth finds in it an affinity to the banteng. Consult *Proceedings of the Zoölogical Society of London* (London, 1898).

HUMPERDINCK, hụm'pĕr-dĭnk, ENGELBERT (1854—). A German composer, critic, and teacher, born in Siegburg, near Bonn. He was studying to become an architect at Cologne, when he came under the influence of Hiller (q.v.), and was persuaded to devote himself to music. Few of his native contemporaries have been more fortunate or successful in securing recognition for their work and talents. At the age of twenty-six he was an intimate friend of the Wagner family at Bayreuth, and for the two or three years immediately preceding the great master's death was his especial protégé; besides which he was the instructor of Siegfreid Wagner, and was selected because of his intimate knowledge of the composer's ideas, to write the pianoforte arrangements of Wagner's music dramas, and to assist in the preparation of *Parsifal* for the public stage. He is better known throughout Europe generally, and America in particular, for his opera *Hänsel und Gretel* (1893)), which gained for him a world-wide reputation. In 1902 an English dramatic version of *Die Königskinder* (1896) was given in England and America under the title of *The Children of the King*, in which was retained the incidental music of the original German version. Humperdinck was educated largely at the Cologne Conservatory. He won the Mendelssohn prize in 1878, and the Meyerbeer prize in 1880. His principal teaching appointments were at the Barcelona (Spain) Conservatory (1885-86); Cologne (1887-88); Frankfort, in which city he won the Mozart scholarship and also acted as concertmaster at the opera (1890-96). Other important compositions in addition to those already mentioned are: *Dornröschen* (1895); *Die sieben Geislein*, a children's fairy story (1896); *Symphony in C* (1896); and incidental music to *Der Richter von Zalamea* (1896). During his stay in Frankfort he served as musical critic on the staff of the *Frankfurter Zeitung*, from which he retired in 1896, when he took up his residence at Boppard. His manner is somewhat Wagnerian, but his music is nevertheless strikingly original and pure. He is particularly happy in his musical treatment of folk-lore and fairy tales. In 1900 he was called to Berlin as member of the Academy of Fine Arts and teacher of composition.

HUM'PHREY, HEMAN (1779-1861). An American Congregational clergyman and educator. He was born in Connecticut; graduated at Yale in 1805, and was pastor of the Congregational church in Fairfield, Conn., from 1807 to 1817, and of that in Pittsfield, Mass., from 1817 to 1823. He was president of Amherst College from 1823 to 1845, during the infancy of that institution. He was an early advocate of temperance, and a report of his on the subject made in 1813 is said to have been the first temperance tract. Among his publications there are, besides biographies, *The Sabbath* (1830); *Tour in France, Great Britain, and Belgium* (1838); and *Domestic Education* (1840). Consult: Z. M. Humphrey and Neill, *Memorial Sketches of Heman and Sophia Humphrey;* and Tyler, *History of Amherst College* (Springfield, 1873).

HUMPHREY, THE GOOD DUKE (1391-1447). Duke of Gloucester and youngest son of Henry IV. He was Regent of England under Henry V. and Protector previous to the coronation of Henry VI. He married Jacqueline, heiress of Holland and Hainault, and in 1424 overran Hainault, which was recovered by the Duke of Brabant. Later he married Eleanor Cobham, who was imprisoned for life for treason, and at the time of his death Humphrey himself was under similar charge.

HUMPHREY CLINKER, THE EXPEDITION OF. A novel in the form of letters, by Tobias

Smollett. It narrates the fortunes of the title character, a postillion, after he enters the service of the Brambles. He proves to be his master's natural son, and marries his mistress's maid, Winifred. The work was published in 1771, and founded partly on Anstey's *New Bath Guide*, and partly on the author's own life. Tabitha and Winifred are obviously the literary ancestors of Sheridan's Mrs. Malaprop; while Scott admits copying the pedantic Lismahago in his Sir Dugald Dalgetty.

HUM'PHREYS, ALEXANDER CROMBIE (1851—). An American gas-engineer and educator, born in Edinburgh, Scotland. Having come to the United States in 1859, from 1866 to 1872 he was a member of the staff of a New York insurance company; in 1872 was appointed secretary of a Greenville (N. J.) gas-light company, and shortly afterwards its superintendent. In 1877-81 he studied at the Stevens Institute of Technology (Hoboken, N. J.); from 1881 to 1885 was chief engineer of a lighting company of New York, and in 1885 was appointed superintendent of construction of a gas improvement company, of which he became general superintendent, and ultimately commercial manager, with headquarters at Philadelphia, Pa. He entered a London gas company in 1892, and in 1894 established a branch of the company in New York. During his connection with these various enterprises he greatly furthered the manufacture of water-gas. In 1902 he was elected president of Stevens Institute to succeed Henry Morton, deceased.

HUM'PHREYS, ANDREW ATKINSON (1810-83). An American soldier. He was born in Philadelphia; graduated at West Point in 1831, and was assigned to the artillery. He resigned in September, 1836, and for the next two years was a civil engineer employed on Government work under Major Hartman Bache. In July, 1838, he reëntered the army as first lieutenant, and was assigned to the corps of topographical engineers. From 1842 to 1849 he was assistant in charge of the Coast Survey office. Later he was engaged in the surveys of the delta of the Mississippi, and in those for various railroads. Soon after the outbreak of the Civil War he became a member of the staff of General McClellan, with the rank of major, and in the Peninsula campaign was chief topographical engineer of the Army of the Potomac. In April, 1862, he was promoted to be brigadier-general of volunteers, and he was afterwards in command of a division in the Fifth Corps of the Army of the Potomac, participating in the battles of Fredericksburg and Chancellorsville. In the battle of Gettysburg he commanded the Second Division of the Third Corps, and as such had an active share in the second day's fighting, earning promotion to a major-generalship in the volunteer service. From July 8, 1863, to November, 1864, he was chief of staff to General Meade, and subsequently commanded the Second Corps of the Army of the Potomac in Grant's final campaign against Lee. He was brevetted major-general in the Regular Army for services at Sailor's Creek, commanded the District of Pennsylvania for a time, and after being mustered out of the volunteer service was placed in command of the engineer corps with the regular rank of brigadier-general. He was retired from active service in 1879. He published: *The Virginia Campaigns of 1864 and 1865* (1882); *From Gettysburg to the Rapidan* (1882); and, with H. L. Abbott, a *Report on the Physics and Hydraulics of the Mississippi River* (1861).

HUMPHREYS, DAVID (1752-1818). An American soldier, diplomat, and poet, born in Derby, Conn., and educated at Yale College. At the outbreak of the Revolutionary War he entered the army as captain, became major of a brigade under General Parsons in 1777, was made aide to General Putnam in 1778, and in 1780 became Washington's aide and military secretary. After the battle of Yorktown he was put in charge of the colors and standards captured from the British troops, and for his services received from General Knox, in 1786, a sword voted by Congress five years before. In 1784 he acted as secretary of the commission, consisting of Adams, Jefferson, Franklin, and others, that went to Paris to arrange commercial treaties between foreign powers and the United States. He served in the Connecticut Legislature in 1786, participated in the suppression of Shays's Rebellion in 1787, and from 1788 to 1790 lived with Washington's family at Mount Vernon, where he wrote *An Essay Upon the Life of Gen. Israel Putnam*. From 1791 to 1797 he served as United States Minister in Lisbon, being the first diplomatic representative of the United States ever sent to Portugal; and was then made Minister Plenipotentiary to Spain. In 1802 he returned, bringing with him the first merino sheep introduced into the United States. During the War of 1812 he commanded the Connecticut militia. He was a fellow of the Royal Society of London, and a prominent member of the literary coterie known as the 'Hartford Wits,' with whom he wrote the *Anarchiad*. His other writings include: *The Widow of Malabar*, a translation of the French tragedy; *An Address to the Armies of the United States* (1782); *The Happiness of America; The Future Glory of the United States;* and many political papers and orations.

HUMPHREYS, HENRY VOEL (1810-79). An English author, illustrator, and naturalist, born in Birmingham. Much of his early life was spent in Italy. He provided the illustrations for Westwood's *British Butterflies* (1841), and for Loudon's *British Wild Flowers* (1856). He was the author of some numismatic handbooks, such as: *The Coins of England* (1846); *Ancient Coins and Medals* (1850); two volumes of illustrations for *Froissart's Chronicles* (1844); *Illuminated Books of the Middle Ages* (1844-49, with Owen Jones); and other works and illustrations.

HUMPHREYS, JOSHUA (1751-1838). An American shipbuilder of Revolutionary time. Welsh by descent, but a native of Haverford, Pa., he learned his trade in Philadelphia, and when it became necessary for the English colonies to have ships of their own with which to fight the mother country, Humphreys was their first builder. From that fact he was called 'the father of the American Navy.' He built such ships as the *Constitution*, *Chesapeake*, *Congress*, *Constellation*, *President*, and *United States*.

HUMPHREYS, MILTON WYLIE (1844—). An American educator, born in West Virginia. He was educated at Washington and Lee University, and at Leipzig and Berlin, and from 1869 t 1875 was adjunct professor of the ancient la

guages at Leipzig. Having held the chair of Greek at Vanderbilt University from 1875 to 1883, he was professor of ancient languages at the University of Texas from 1883 to 1887, and in the latter year became professor of Greek at the University of Virginia. In 1882 he was president of the American Philological Association, and for a number of years he was American editor of the *Revue des Revues*. His publications include excellent editions of *The Clouds* of Aristophanes (1885), and the *Antigone* of Sophocles (1891).

HUMUS (Lat., ground). A generic term for the decomposed organic matter contained in soil. During decomposition of vegetable matter the carbon, nitrogen, oxygen, and hydrogen pass off in the form of water, carbon dioxide, ammonia, etc., or are carried down into the earth in solution, while the remainder of the constituents form compounds less easily removed, to which the name humus is properly applied. These compounds have been investigated chemically, but little is known as to their nature and relations; special names have been given to a few of them, as crenic acid, apocrenic acid, ulmic acid, and ulmin. They are of importance in relation to the fertility of the soil, increasing its power of absorbing and retaining water, lessening its tenacity, and causing more rapid absorption of heat from the sun's rays. They may also indirectly afford nutrition to plant life. See SOIL; COMPOST.

HUMUS PLANTS. Plants which grow naturally in humus soil. Ordinarily in nature, where large amounts of humus are found, there is a rich development of forest trees. Associated very intimately with the humus, however, are a number of plants which depend not only upon the rich organic food found in the humus and in the shade furnished by the trees, but also upon the presence of fungi which permeate the humus. The significance of these fungi is discussed under the head MYCORHIZA. Until recently, the plants dependent upon humus have been called saprophytes, but inasmuch as more close investigation has shown that the dependence is very rarely directly upon the humus, but rather upon the fungi spoken of above, such plants are now referred to as symbiotic saprophytes. Among these are found not only plants destitute of chlorophyll, like the Indian pipe, but also a large number of green plants, even forest trees, such as beech and pine. See FOREST; SAPROPHYTE.

HU-NAN, hōō'nän' (Chin., south of the lake, i.e. the Tung-ting Lake). An inland province of China, bounded on the east by the mountains of Kiang-si, on the south and southwest by the Nan-ling Mountains, which separate it from the provinces of Kwang-tung and Kwang-si, on the west by Kwei-chow and Sze-chuen, and on the north by Hu-peh (Map: China, D 6). Area, about 75,000 square miles. It is made up of the basins of four rivers, which discharge into the Tung-ting Lake and through it into the Yang-tse. The chief of these rivers are the Siang, which rises in the Nan-ling and flows north, receiving many tributary waters in its course; the Tsze; and the Yuen, which has its origin in the southeast of Kwei-chow, the latter furnishing the shortest and most satisfactory route to Kwei-chow, Yun-nan, and Burma, being navigable by native boats as far as Ch'ên-yuan-fu on the Kwei-chow frontier. The general slope of the province is toward the lake. Hills attaining in some places the height of mountains are found in the south, southeast, and along the Kwei-chow border on the west. The soil is fertile, and in many parts two crops a year are produced. The chief agricultural products are tea, rice, hemp, and tobacco. Hu-nan is one of the principal tea-producing regions of China, and immense quantities are shipped every year to foreign countries from Hankow. The coarser varieties are prepared in brick form and sent overland via Hankow to Siberia and Russia. Both bituminous and anthracite coal is found and mined. The anthracite is of good quality and is exported. Iron, copper, and tin are also found. Capital, Ch'ang-sha-fu. The population of Hu-nan is estimated at about 22,000,000. The inhabitants are noted for their lawlessness and their hostility to foreigners.

HUNCAMUNCA, hŭn'kȧ-mŭp'kȧ. The ingenuous daughter of King Arthur and Queen Dollallolla in Fielding's burlesque *Tom Thumb the Great*.

HUNCHBACK, THE. The most successful comedy of J. Sheridan Knowles, produced in 1832. At Covent Garden, under Kemble's direction, Fanny Kemble played Julia, and the part of Master Walter was taken by the author himself.

HUNDRED (AS. *hundred*, Ger. *hundert*, from AS., Goth. *hund*, OHG. *hunt*, Ger. *hund*, OIr. *cēt*, Lith. *szimtas*, Lett. *simts*, OChurch Slav. *sŭto*, Lat. *centum*, Gk. *ἑκατόν*, *hekaton*, Skt. *śata*, hundred + AS. *-red;* connected with OHG. *radia*, Ger. *Rede*, account, speech, Goth. *raþjō*, Lat. *ratio*, reckoning, *reri*, to think). An ancient territorial unit in England, less than a shire or county, and usually greater than a parish or town. The origin of the name is involved in obscurity, but it is supposed to be derived from a convenient grouping of one hundred families for purposes of defense, or for local administration. Hundreds varied greatly in size in different parts of England, from two square miles in the southern counties, to three hundred square miles in Lancashire, but they maintained considerable uniformity within the limits of a given county. But they were not mere subdivisions of the county, being both historically and for various administrative purposes independent of the greater territorial division within which they were included. See WAPENTAKE; WARD.

Each hundred had a court of ancient and forgotten origin, which was known as the *Hundred Court*. This was held at frequent intervals and appears to have been of equal authority with the county courts, though its jurisdiction seems to have been more restricted, being apparently confined to civil causes, such as actions of debt and trespass. Like the other customary courts of the feudal period, such as the county courts, courts baron, and the like, the hundred courts were composed of the freeholders of the hundred, who were liable to do service as 'suitors,' i.e. triers of suits, as one of the obligations of their freehold tenure. Most of these courts have been abolished and their jurisdiction transferred to the county courts, but a few, which were courts of record, have been permitted to survive.

But the hundred was more than a political

and administrative unit; it was also a communal unit. It was liable in damages for a false judgment given by the hundred court. As early as the reign of Edgar it was provided that the hundred should be responsible for the administration of justice and liable to punishment by fine or otherwise if thieves and other criminals were not brought to justice. The statute of Winchester in 1285 (13 Edw. I., c. 2) made the hundred liable to respond in damages for robberies committed within its limits if the offender was allowed to escape punishment. At a still earlier period it was subject to the famous murder fine, imposed by the laws of Canute upon any hundred in which any one not an Englishman was found slain. (See ENGLISHERY.) As lately as 1886 the hundred continued to be legally liable for damages resulting from rioting. Consult: Pollock and Maitland, *History of English Law* (2d ed., London and Boston, 1899); Stubbs, *Constitutional History of England* (Oxford, 1880).

HUNDRED DAYS, THE (Fr. *les cent jours*). The term of Napoleon's second reign as French Emperor. The period extended from March 20, 1815, the date of his entry into Paris, to June 28th, when Louis XVIII. once more assumed power. At Elba Napoleon had been kept informed of the dissension prevailing among the Allies at the Congress of Vienna, and of the extreme unpopularity of the restored Bourbons in France. Seizing the opportunity, he left Elba, February 26th, landed with 900 men near Cannes, and called upon the country to rise in his favor, March 1st. The apathy of the Bourbons at Paris allowed Napoleon time to recruit his strength. When Louis at last bestirred himself it was too late. The Napoleonic fever had spread, the soldiers of the Empire rallied around their old leader, and the troops sent out against him joined his standard. The final blow to the monarchy came when Ney, after great hesitation, went over to Napoleon, who entered Paris in triumph March 20th, Louis having fled northward to Ghent. Napoleon immediately organized a government, issued writs for the election of an extraordinary assembly to draft a new constitution, abolished the existing Legislature, and began to raise troops. Meanwhile the Allies at Vienna, on hearing of his landing, pledged themselves to hunt down the 'bandit' and to put it out of his power, once for all, to disturb the peace of Europe. Eight hundred thousand men were sent out against him. At Paris there was a foreboding that this sudden restoration could not last; but though men had lost much of the fear and respect Napoleon had been wont to inspire, the work of organization nevertheless went on actively. On June 1st, in the Champs de Mars, Napoleon solemnly swore to this new Constitution, which was very liberal in character, and then set out with his army, for he had succeeded in raising 287,000 men, for the north. (See LIGNY; QUATRE-BRAS; WATERLOO.) Four days after Waterloo, June 22d, he abdicated in favor of his son, attempted to escape to America, failed, and gave himself up to the English. See FRANCE.

HUNDRED YEARS' WAR, THE. The name of the long series of contests waged by the English kings, between 1337 and 1453, to gain the French crown and French territory. It was by no means an uninterrupted war, but rather a succession of battles, truces, and peaces. The first great period of the war extends from 1337 to 1380. Philip VI. (1328-50), of the House of Valois, had succeeded Charles IV., the last of the direct descendants of Hugh Capet, since, in accordance with the Salic law (q.v.), the crown of France could be transmitted through the male line only, though Edward III. of England was a nearer relation to the late King, his mother, Isabella, being a sister of Charles. Edward's claim, however, was weak in this, that if females could transmit claims to the crown, then there were others who had even better claims than the English King. On June 6, 1330, and May 30, 1331, Edward by letters patent recognized Philip's claims, and had the latter been a more capable man, war might not have resulted. The French King interfered in the affairs of the Flemish cities, with which England had intimate commercial relations. Moreover, Edward was influenced by the exiled Robert of Artois, who had been unable to obtain his inheritance from Philip VI. Edward declared war in 1337, and gradually made alliances with the Emperor Louis IV. and John of Brittany, who was opposed by Charles of Blois, cousin of Philip VI., in his attempts to secure his inheritance. It is this war in Brittany which the great chronicler Froissart (q.v.) has especially described. On the other hand, Philip established that close alliance of France and Scotland which was to endure for centuries. There were many small skirmishes during the first years of the war, but neither side gained decisive victories, and on January 9, 1343, a truce was concluded for three years, each side retaining its possessions. Hostilities, however, were resumed in 1345. At this juncture the alliance of the Flemish cities was lost to England by the death of Jakob van Artevelde (q.v.), the leader of the Flemings, who perished in a popular tumult. On August 26, 1346, the English, under the leadership of Edward himself, won their first great victory at Crécy (q.v.), which showed that the French knights could not stand against the well-disciplined yeoman archers of England. The victors took possession of Calais.

Meanwhile France was already experiencing the evils of war; the distress of the peasants was great; financial troubles set in, made worse by the tampering with the coin and the ever-increasing taxes. The second great defeat of the French took place at Poitiers (q.v.) in 1356, where the famous Black Prince led the English, and where King John, the successor of Philip VI., was taken prisoner. The States-General now for a time had control of the Administration. Their leaders were Etienne Marcel, provost of the Merchants (q.v.), Robert le Coq, Bishop of Laon, and Charles the Bad of Navarre; but the revolt of the peasants (see JACQUERIE) in 1358 caused the more conservative classes to rally to the aid of the Dauphin Charles, who had been appointed regent by the States-General during King John's captivity. A brief breathing-spell was brought about in 1360 by the Peace of Bretigny (q.v.). John died in 1364, and his son Charles V. (q.v.), who was to be known as the 'Wise,' succeeded him. Himself an unwarlike man, he had the help of a great soldier in Du Guesclin (q.v.). His object was to regain the lands his father had lost, and by interfering with

the possessions of the English in France, and attacking them in Spain, he forced a new war in 1369. Du Guesclin did not attempt to meet the English in the open, but harassed them, and cut off their supplies, and the English experienced a succession of misfortunes. Moreover, in 1376 the Black Prince died, and there was no one capable of taking his place; a year later Edward III. also died, and was succeeded by Richard II., a minor. When, in 1380, Charles VI. (q.v.) succeeded his father, few possessions remained to the English in France. In 1396 a truce for twenty-eight years was signed, which ended the first period of the war.

In France meanwhile Charles VI. had become insane, civil war broke out between the factions of the Armagnacs (q.v.) and the Burgundians, and Paris itself was distressed by the rising of the Cabochiens (q.v.) in 1413. In England Richard II. was overthrown by Henry IV. in 1399, and the latter was succeeded in 1413 by his son Henry V. But the House of Lancaster did not feel secure on the throne, and nothing would turn the attention of the people away from internal affairs as completely as a foreign war. So, in 1415 the war began again with the invasion of France by Henry V. France disunited offered an easy prey to the English, and soon the country was almost entirely in their possession, especially as they were aided by Philip, Duke of Burgundy (q.v.), who was eager to revenge the murder of his father, John the Fearless (q.v.). To the first year of this period belongs the battle of Agincourt (q.v.), the last of the three great English victories. On May 20, 1420, the Treaty of Troyes was signed, by which Henry V. was recognized as Regent of France and the heir of Charles VI., while the Dauphin was disowned by his own mother. The English held practically the whole of France.

In 1422 both Henry V. and Charles VI. died, and the former was succeeded by his son, Henry VI., a child of ten months, who was crowned Henry of France at Paris, his uncle Bedford being Regent. Charles VII., the successor of Charles VI., gave no signs of ability, and it seemed as if Henry VI. would really hold France permanently. But when affairs looked darkest France was saved by Joan of Arc (q.v.), who came forward and raised the siege of Orléans in 1429, thus turning the tide of war. From that time on the English slowly but surely lost ground, and when, in 1453, their last great captain, Talbot, fell at Castillon, the war ceased. Of all the extensive English conquests in France, nothing remained except the city of Calais and a small adjoining district. This France did not regain until 1558. Consult: Lavisse and Rambaud, *Histoire générale*, vol. iii. (Paris, 1894); Kitchin, *History of France*, vol. i. (Oxford, 1873); Hardy, *La Guerre de cent ans* (Paris, 1877); Dognon, *Les Armagnacs et les Bourguignons* (Toulouse, 1890); Wallon, *Jeanne d'Arc* (Paris, 1875); Longman, *Edward III.* (London, 1869). See FRANCE; ENGLAND; and BURGUNDY.

HU'NEKER, JAMES GIBBONS (1860—). An American musical writer and critic, born in Philadelphia, Pa. He was a pupil of Alfredo Barili, and of Ritter and Doutreleau for theory, in Paris. On the completion of his studies in the latter city he returned to New York, where he took up his permanent residence (1885). He was musical editor, and in 1902 became dramatic editor, of the New York *Sun*. His numerous contributions to the leading magazines and reviews contain vigorous and consistent presentations of his musical ideals. His works include: *Mezzotints in Modern Music* (1899); *Chopin, as Man and Musician* (1900), probably the most sympathetic life of Chopin for either musician or layman; and *Melomaniacs* (1902), a volume of stories on musical subjects, characteristically clever and imaginative.

HUNFALVY, hụn'fôl-vẽ, JÁNOS (1820-88). An Hungarian geographer. He was born in the County of Zips, Hungary; became professor of statistics in the Academy of Kesmark; took part in the political agitation preceding the revolution of 1848; and was professor of history in the polytechnic school at Buda (1866-70), and of geography in the University of Pest after 1870. He was elected a member of the Hungarian Academy in 1865, and died in Budapest. Hunfalvy wrote a *Universal History* (1850-51), and a *Universal Geography;* of the latter, only two volumes appeared during the author's lifetime; the third was published in Budapest in 1890. An excellent descriptive work on Hungary, entitled *A magyar birodalom természeti viszonyainak leirása*, appeared in 1863-66. He issued in German his *Ungarn und Siebenbürgen in Originalansichten* (1856), and in both German and Magyar his work on the *Travels of Ladislas Magyar* (1859).

HUNFALVY, PÁL (1810-91). An Hungarian philologist and ethnographer, brother of the preceding. He was born in the County of Zips, studied law at Pest, and from 1842 to 1848 was professor of law at Kesmark. Then he was elected to the Hungarian Diet, in which he sat until it was dissolved, when he went to Pest, and in 1856 founded the philological review *Magyar Nyelvészet*. Having been elected to the Hungarian Academy in 1859, he was for many years its librarian. He wrote: *Chrestomathia Fennica* (1861); *Utazás a Balt-tenger vidékein*, travels in the Baltic country (1871); treatises on the dialects of the Voguls (1872) and the Ostiaks (1875); a Magyar ethnography (1876; German by Schwicker, 1877); in Prochaska's series on the peoples of Austria-Hungary, a volume entitled *Die Ungarn oder Magyaren* (1881); and *Die Rumänen und ihre Ansprüche* (1883).

HUNGARIAN CONFESSION, THE. A confession of faith prepared by the Synod of Czenger, and adopted by the Reformed Church of Hungary, 1558. Its chief points were its emphatic rejection of the anti-Trinitarian views which had spread widely through Hungary of the Roman Catholic and Lutheran doctrines of the Eucharist, and of Anabaptism. Upon the point of reprobation it is silent. The Confession was superseded in 1567 by the Hungarian Synod's acceptance of the Second Helvetian Confession (1566). Consult Schaff, *Creeds of Christendom* (London, 1884). See CREEDS AND CONFESSIONS.

HUNGARIAN GRASS. See FOXTAIL GRASS.

HUNGARIAN LANGUAGE. Called by those who speak it, Magyar; one of the Ural-Altaic group of languages, and both politically and literarily the most important representative of the group. With the exception of the closely allied Finnish (including the various Finnic dialects spoken in Russia, as well as the Lapp) and

Turkish, and the problematic Basque in the Pyrenees, it is to-day the only European language that does not belong to the Indo-Germanic group. The Ural-Altaic languages are divided into: (1) The Finno-Ugric and (2) Samoyedic, forming the Ural branch; and (3) Turkic, (4) Mongolic, and (5) Tungusic, forming the Altaic branch. The linguistic position of Hungarian was for many years the subject of a heated controversy, one school led by Vámbéry claiming its close affiliation with Turkish, while the other, under Hunfalvy, placed it where it is now recognized to belong, in the Finno-Ugric division.

Hungarian, like other Ural-Altaic tongues, is agglutinative in structure. It is built upon a basis of monosyllabic roots, through the addition of successive suffixes, which entail no inner change or structural modification in the original stem, but are merely set up in a row, one after another, like a row of bricks. The suffixes themselves, however, are modified in obedience to a law of so-called vowel harmony, which forms the most distinctive feature of this group of languages. The vowel sounds in Hungarian are divided into three classes: Open vowels, a, á, o, ó, u, ú; close vowels, e, ö, ő, ü, u; middle or neutral vowels, é, í, i. These neutrals may be used indifferently in words containing vowels of either of the other classes; but suffixes containing open or close vowels may stand only after a root containing a vowel of the same class; e.g. *házban*, 'in the house'; *kertben*, 'in the garden'; *váratandanak*, 'they will be expected'; *kéretendenek*, 'they will be entreated.' Hungarian has no inflectional endings, in the strictest sense of the term. It has no grammatical gender, or even suffixes indicative of sex; ő means 'he' or 'she,' *neki*, 'to him' or 'to her,' and so on. In expressing case relations, the bare stem is used regularly for the nominative, and to some extent for the possessive; the other cases are represented by means of the various postpositive particles which in Hungarian take the place of prepositions: e.g. *ház*, 'house'; *házban*, 'in the house'; *házból*, 'out of the house'; *házelött*, 'in front of the house'; *házhoz*, 'toward the house'; *házal*, 'with the house'; *házat*, 'house' (accusative); *házalatt*, 'under the house'; *hazfelet*, 'above the house'; etc. A noteworthy peculiarity is the system of possessive suffixes employed with substantives, closely analogous to the personal endings of the verbs: e.g. *házam*, 'my house'; *házad*, 'thy house'; *háza*, 'his (her) house'; *házunk*, 'our house'; *házotok*, 'your house'; *házok*, 'their house.' In the absence of the auxiliary verb 'to have,' these possessive endings are used with the verb 'to be,' to denote ownership; *nekünk van házunk*, 'to us is house ours,' i.e. 'we have a house.' The verbal system in Hungarian is highly developed, giving the language a remarkable flexibility and a wide range of expression, though it offers to foreigners the chief difficulty in acquiring the language. There are two distinct forms of the verb, a definite and an indefinite form, differing throughout in their terminations. Their respective uses are exceedingly idiomatic, but in general the distinction between them depends upon whether or not the object of the verb is a definite person or thing: *látok*, 'I see'; *a kutyát látom*, 'I see the dog.' Hungarian is especially rich in derivative verbs. Not only are there suffixes which, added to the simple verbal stem, form causative, frequentative, inceptive, intensive, diminutive, reciprocate, potential, and desiderative stems, but with the characteristic facility of agglutinative languages, two or more of these suffixes may be used in combination, resulting in such linguistic anomalies as reflexive-frequentative-potential, intransitive-diminutive-potential, and transitive-frequentative-causative-potential verbs. The following examples will give some idea of the formation of derivative verbs: *látni*, 'to see'; *látogatni*, 'to visit'; *beszélnek*, 'they talk'; *beszélgetnek*, 'they chatter'; *beszélkednek*, 'they talk with each other'; *ver*, 'he beats'; *verinthet*, 'he can beat gently.' Among the peculiarities of the language are: the two-person suffix, *lak*, used in place of the regular ending of the first person, when the subject of the verb is 'I,' and the object 'thee' or 'you'; the use of the singular number with ordinal numerals, e.g. *tíz ház*, 'ten house' (not 'houses'); and the inverted order of name and surname, e.g. Arany János = John Arany; Petőfi Sándor = Alexander Petőfi. The requirements of emphasis often allow the words in a short Hungarian sentence to be put in an order the reverse of that in English: e.g. *Pénzemet elvett szolgálom*, 'money-my away-took servant-my' ('my servant took (away) my money'). The extent to which agglutination may be carried in the Hungarian language will be illustrated by the fact that it is possible to perform the following operation of word-building: *Magyar*, 'Hungarian'; *Magyarázni*, 'to render into Hungarian,' hence 'to make clear,' 'to translate'; *megmagyarázni*, 'to translate,' with the added notion of the accomplishment of the action, the syllable *meg* having the force of the German *be* and *er*; *megmagyarázhat*, 'he may translate'; *megmagyarázhatatlan*, 'that cannot be translated,' 'untranslatable'; *megmagyarázhatatlanabb*, 'more untranslatable'; *legmegmagyarázhatatlanabb*, 'most untranslatable'; plural subs. *legmegmagyarázhatatlanabbak*, 'the most untranslatable'; *a legmegmagyarázhatatlanabbakal*, 'with the most untranslatable.' A large number of names of common things in the Hungarian language are borrowed from the Slavic and German. Consult Hunfalvy, *Die Ungarn oder Magyaren* (Vienna, 1881); id., *Ethnographie von Ungarn* (German trans. with additions by Schwicker, Budapest, 1877); id., *Vámbéry's Ursprung der Magyaren* (Vienna, 1883, refuting Vámbéry's theory of a Turkish relation); Riedl, *Magyarische Grammatik* (Vienna, 1858); Topler, *Grammar*, in German (Budapest, 1882); Singer, *Grammar*, in English (London, 1882); Ballagi, *German-Magyar and Magyar-German Dictionary* (3d ed., Budapest, 1874); Bizonfy, *English-Hungarian Dictionary* (ib., 1878); the *Dictionary of the Hungarian Academy of Sciences* (ib., 1862-74). See HUNGARY.

HUNGARIAN LITERATURE. Until modern times, literature in the vernacular did not flourish to any very great extent in Hungary. Latin was the general medium of cultured expression during the Middle Ages, and even recently it has sometimes sought to supplant the popular tongue in official and literary use. There are, however, documents in Hungarian or Magyar that belong to the mediæval period, most of them being translations of legends and of books of the Bible. The earliest continuous monument of Magyar is a funeral ceremonial dating from

about the beginning of the thirteenth century. From the middle of the fifteenth century until the second half of the sixteenth century there was some activity in the way of translating into Hungarian the lives and legends of the saints and the individual books of the Bible.

With the religious revolution ordinarily termed the Reformation there was inaugurated a more important era of literary production. Poetry was cultivated by Valkai, Tinódi, Rimai, Balassa; but no very great degree of originality marked the ensuing period, for from then until the closing years of the eighteenth century Magyar literature was chiefly one of imitation. Considerable attention, however, was shown to some of the more striking forms of literary art. Thus, during the sixteenth and seventeenth centuries lyric verse was cultivated; the drama was started by Karádi (1569); and much prominence was given in the seventeenth century to epic verse, by the poems of Zrinyi, Gyöngyösi, Liszti, and others. Before the commencement of the eighteenth century there also appeared many works of a polemical, legal, and philological nature.

During the eighteenth century an endeavor was made by the central authorities to subordinate Hungarian life and patriotic feelings to Germanic ideals. The attempt failed, but it resulted temporarily in an undue production of books in Latin and German, to the detriment of composition in Magyar.

Near the close of the century, and with the advent of the French Revolution, there was a reaction, and societies for the cultivation of the Magyar tongue were formed, and various periodicals (the first newspaper in Hungarian was started by Ráth at Pressburg in the eighth decade of the eighteenth century) founded in the same interest. The new movement, which coincided with the great national awakening in Hungary, bore rich fruit; and within the first quarter of the nineteenth century all foreign elements gave way before it. The credit of this is largely due to Francis Kazinczy, the great linguistic reformer, and the poets Csokonai, Dayka, Verseghy, Alexander Kisfaludy, and Virág. The golden age of Hungarian literature was the thirty years preceding the revolution of 1848-49. Charles Kisfaludy, brother of Alexander, created the Hungarian drama by his tragedies and comedies, and his contemporary Katona won great fame as a writer of tragedy. Kölcsey, by his poems, ballads, prose writings, and orations, exerted a potent influence upon the patriotism of the nation. Fay's fables and Czuczor's and Vörösmarty's popular epics also did much to evoke and foster a true national feeling. In the lyrics of Alexander Petöfi, one of the greatest and most original of modern poets, whose "Up Magyars!" became the war-hymn of the Revolution, and in the epic verses and ballads of Arany, Hungarian literature reached its culmination in the middle of the nineteenth century. Their contemporary, Bajza, was not only an eminent lyrical poet, but an historical writer and æsthetical critic. Jósika (a disciple of Scott's) and Eötvös, eminent in the field of fiction, exercised a large influence. In the domain of political literature and journalism Széchenyi, Kossuth, Eötvös, and Csengeri hold high rank. In the field of history Horváth, Jászay, and Szalay deserve mention. In 1848 the powerful national awakening culminating in revolution supplied a new inspiration. National consciousness prompted Tompa's *Folk-tales* and *Folk-Sagas* (1846), and Erdélyi's *Hungarian Folk-Songs and Tales* (1846-48), with literary and æsthetic essays. Erdélyi's *Poems* (1844), lyric in the main, exercised a powerful influence over the famous trio, Petöfi, Arany, and Tompa. Arany (1817-82), the greatest ballad writer, surpassed him in formal perfection, and his greatest work also was a national epic, *Toldi*, in twelve cantos, celebrating the exploits of Toldi, the Hungarian Samson. Tompa (1819-68), unexcelled for sombre melancholy, struck the popular fancy with his *Poems* (1847). In drama, Szigligeti (1814-78), with a wonderful mastery of dramatic development and situation, mostly based on intrigue, created a new genre with *The Deserter* (1843), which still holds the boards. His masterpiece, *Mamma* (1857), and other successful plays called forth a host of successors, with the results that the Viennese farces and vaudevilles were banished from the Hungarian stage.

However, the Revolution of 1848-49 doomed many gifted writers to the dungeon, the scaffold, or exile. Lyric poety was under the ban; the activity aroused sought new channels. Arany translated Shakespeare, Tasso, Goethe; Szász followed suit with masterly versions of Molière, Hugo, Dante, Shakespeare, Tennyson, Goethe, Schiller, and Heine. At this time the novel, with its opportunities for covert allusions, and the drama gained ascendency. Jokai (1825—), novelist, poet, publicist, historian, and political champion, won his reputation, and Szász (1829—) proved his genius equally prominent in lyric poetry, fiction, and journalism. In 1860 the Austrian restraint was modified, and this gave a new impetus to literature. Tolnay's (1837—) *Ballads* (1861) were justly classed with Arany's; his *Lyric Poems* (1865) are strikingly original and tinged with melancholy, while the same brooding over life's problems characterizes his novels. Madach (1826-64) grappled with philosophical questions in *Man's Tragedy*, his best work. Rákosi (1842—) produced in *Esope* (1866) a comedy remarkable for poetic language and deft character-drawing, while his keen drama, *Magdalen*, and the æsthetic study of tragedy are among the best contributions to Hungarian drama.

The constitution of 1867 marked a new epoch: the fight for nationalism being over, the Hungarians could look more soberly upon themselves, the wider horizons of cosmopolitanism having opened new vistas. In short stories, novels, and especially in his comedies, *The Good Patriots* (1872) and *New Men* (1873), Toldy (1844-79) gave splendid satires of contemporary life. Csaky (1842—), the most fertile playwright, elicited applause with his *Proletarians*. Hungarian literature has its realistic writers, its psychological fiction, the short stories of Gyulai (1826—), who fosters the highest literary ideals in his *Poems* (1882), his critical studies and university lectures. Abrány (1849—), in the character-play, *The Infallible Man* and the novels, *Who Is Stronger?* and *The Philosophy of the Husband*, devoted himself to a study of the problems of marriage. Mikszáth (1849—), probably the most popular novelist of the day, champions the peasants in North Hungarian village stories, matchless in their style, language, and sympathetic tone. Finally Bródy, a wonderful complex

of unusual powers and nonchalance in workmanship, represents symbolism hand in hand with the most uncompromising realism.

Consult: Toldy, *A magyar nemzeti irodalom története* (*A Description of the National Literature of Hungary*) (Budapest, 1851); the first volume, which deals with the mediæval period, was translated into German (ib., 1865); Dux, *Aus Ungarn* (Leipzig, 1880); Schavicker, *Geschichte der ungarischen Litteratur* (Leipzig, 1889); Neményi, *Das moderne Ungarn* (Berlin, 1883). Professor Beöthy, of the University of Budapest, is now preparing a history of Hungarian literature which is to be published in Gosse's English series of *Literatures of the World*.

HUNGARIAN MILLET. See FOXTAIL GRASS.

HUNGARIAN MUSIC. See MAGYAR MUSIC.

HUNGARIAN POLITICAL PARTIES. See POLITICAL PARTIES, paragraph on *Hungary*.

HUNGARIAN VERSION. See BIBLE.

HUN'GARY, or, officially, THE LANDS OF THE HUNGARIAN CROWN. A kingdom of Central Europe, constituting one of the units in the dual monarchy of Austria-Hungary. It occupies a compact area of 125,039 square miles, comprising Hungary proper, with Transylvania and the crownlands of Croatia and Slavonia and Fiume, which are united to Hungary, but have more or less independent administrations. The lands of the Hungarian Crown are often designated as Transleithania, or the country beyond the Leitha, the Austrian half of the monarchy being called Cisleithania, or the country on this side of the Leitha, the Leitha being a small river which forms a part of the boundary between the two divisions. The Hungarian name of the country is Magyarország (pronounced möd'yör-ör'säg), the 'land of the Magyars' (Hungarians); the German name is Ungarn. The Kingdom of Hungary, exclusive of Croatia and Slavonia, has the form of an oval with its longest axis lying east and west along the parallel of 46° N. It is encompassed for two-thirds of its perimeter by the broad curve of the Carpathian Mountains, which, beginning at the Danube a short distance below the Austro-Hungarian capital, Vienna, extend northeast, then east, then southeast and south, and finally west, forming a great wall on the side of Moravia, Galicia, Bukowina, and Rumania. On the west Hungary proper borders on Lower Austria and Styria, and on the south, for a distance of about 100 miles, on Servia, from which it is separated by the Danube. Southwest of Hungary proper, and separated from it by the Drave and the Danube, is the dependent Kingdom of Croatia and Slavonia, a great part of whose southern boundary is formed by the Save, separating it from Bosnia and Servia. Croatia has a coast-line on the Adriatic, and on an arm of this sea is Hungary's busy port of Fiume.

TOPOGRAPHY. The two great orographic features of Hungary are the Carpathians and the vast plains which they inclose in their broad sweep of about 800 miles. Croatia and Slavonia are traversed by the eastern offshoots of the Alps. The Carpathians spread out laterally in minor ranges, and a large portion of Transylvania, in the extreme east of the Kingdom, is covered by them. The loftiest portions of the Carpathians are the High Tâtra range in the north and the Transylvanian Alps in the southeast, which rise in peaks over 8000 feet above the sea. The culminating point of the High Tâtra is the Gerlsdorferspitze, 8737 feet. The Carpathians, rising above their densely wooded lower slopes, present an imposing aspect, with their naked granite peaks, on whose summits but little snow rests through the winter. The great stretch of monotonously level land in the central and southern parts of Hungary proper is divided into the Little Hungarian and the Great Hungarian plains. The Little Hungarian Plain (Kis-Alföld) in the northwest comprises an area of about 5000 square miles, with a mean elevation of 450 feet. A portion of its surface is swampy, but for the most part it is exceedingly fertile. The Great Hungarian Plain (Alföld), which is the basis of Hungary's agricultural wealth, and the principal seat of the Magyar nationality, lies in the centre of the country between the Danube and the northeastern highlands. It covers an area of nearly 40,000 square miles, and lies at an average elevation of 325 feet above the sea. Its surface has a very gradual slope from north to south. Low hills of loess and sand, with deep, swampy hollows, lend the only appearance of relief. The surface is to a great extent treeless. The soil, especially in the broad alluvial lands, is exceedingly fertile. In spite of its monotony, the Alföld, with its interminable expanse, its boundless fields and wide-spreading villages, its great herds of cattle and droves of horses, and its picturesque types of peasants, herdsmen, and fishermen, is a region replete with interest for the traveler, and with poetical charm for its inhabitants.

HYDROGRAPHY. The Danube receives the drainage of the entire country, except a small area in the north, which is drained into the Vistula. The course of the Danube from Pressburg to Orsova meaures nearly 600 miles, and the river is navigable throughout. The principal tributary from the north is the Theiss (Tisza), which traverses the Great Hungarian Plain, and the principal affluent of which is the Maros; from the west and south the Danube receives the Drave and the Save. There are two large lakes in Hungary, the Balaton (Platten See), with an area of over 400 square miles (including submerged marshes), and the Neusiedler See or Fertö, 110 square miles, both lying in the western part, south of the Danube. In the Carpathians there are many beautiful little lakes of great depth, to which the Hungarians apply the name tengerszem, or 'eye of the sea.'

CLIMATE. Hungary may be divided into two main climatic belts, the highland belt forming the northern, eastern, and southeastern portions, and the lowlands occupying the great central and southwestern parts. The winter, however, is severe throughout the country, and in the highland region the temperature sometimes falls as low as —18° F., while in the lowlands it seldom falls below 5°. The summers are oppressively hot in the central lowlands, the Alföld, where the mercury rises to 95° or even 105°. The rainfall differs considerably between the highlands and the lowlands, the annual precipitation in the former being 47 inches, and in the latter only half as much. The Alföld suffers frequently from prolonged droughts, but may at other times receive even excessive rains.

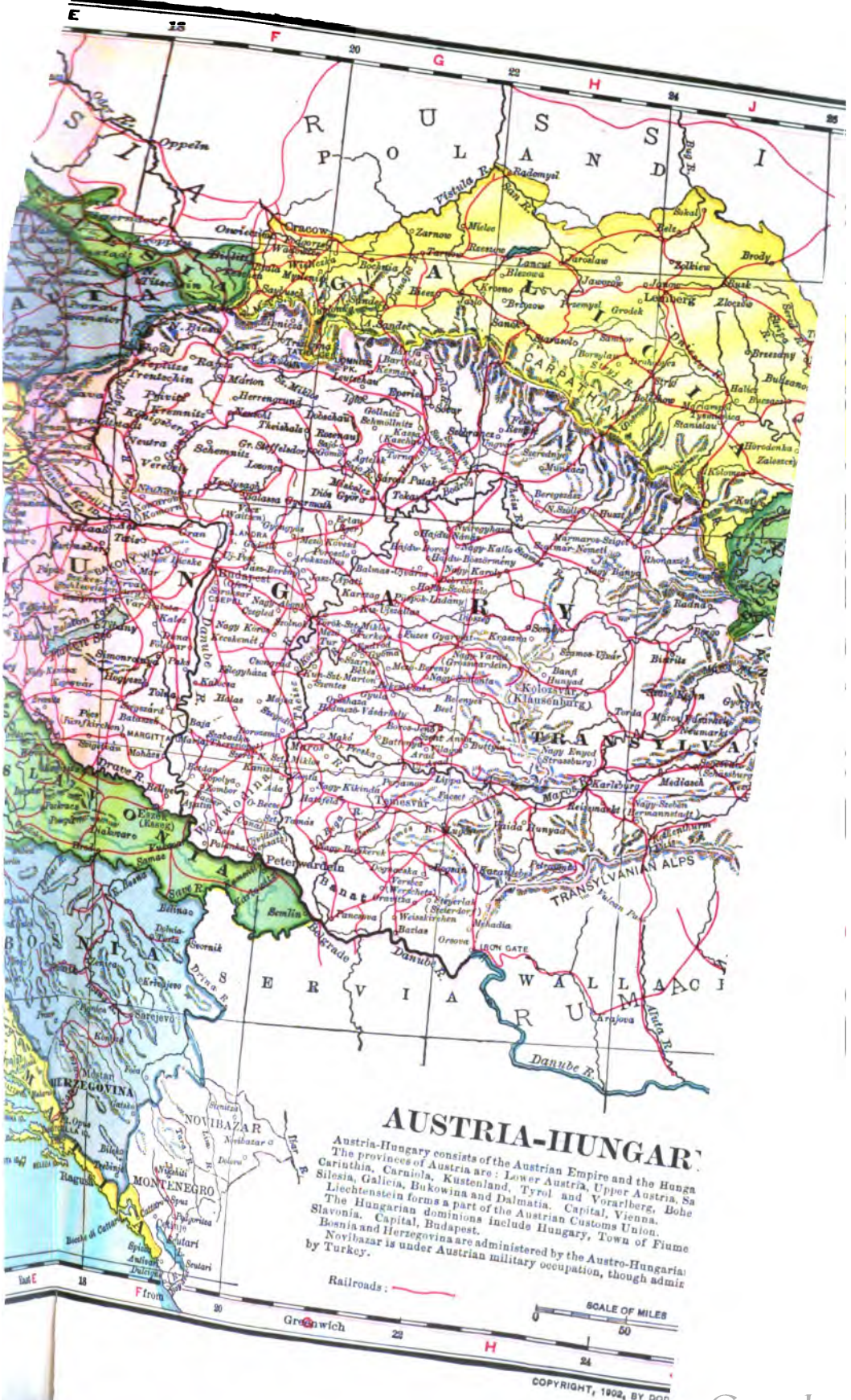
GEOLOGY AND MINERAL RESOURCES. Hungary

stands in marked contrast to Austria, in that by far the greater part of its surface consists of geologically recent formations. The Great Plain, watered by the Danube and the Theiss, presents an almost unbroken surface of Quaternary and recent alluvial deposits, while the great northern and eastern mountain systems show a preponderance of Tertiary rocks on their surface. The Croatian and Slavonian highlands are of Jurassic and Triassic formation, and here also are the chief outcroppings of the coal-measures. Archæan diabases and granites occur in western Transylvania, and along the entire southern slope of the Carpathian Mountains runs an extensive belt of volcanic rocks. The nuclear mass of the Carpathians is largely constructed of granite. Hungary possesses a very considerable mineral wealth. There are great deposits of coal, iron, and salt; lead, copper, silver, and gold are found in various localities, the last mentioned chiefly along the rivers of Transylvania. Antimony, cobalt, nickel, mercury, and zinc also occur, and among the non-metallic minerals there are precious stones, kaolin, marble, and porphyry. The Hungarian opal is particularly worthy of mention. It is only within recent times that the wealth of coal and iron has begun to be exploited on a large scale. The deposits of salt in the county of Mármaros, in the Eastern Carpathians, which are worked by the State, are practically inexhaustible. (See table, under AUSTRIA-HUNGARY.) There are hundreds of mineral springs scattered throughout Hungary. Among the most celebrated are those at Tátra-Füred (Schmeks), in the Northern Carpathians, Mehádia (Baths of Hercules), near Orsova, and the Iron Gate of the Danube, and Füred, on Lake Balaton, and Harkány, near Fünfkirchen (Pécs).

AGRICULTURE, LIVE STOCK, FORESTS, ETC. Hungary is preëminently an agricultural country, about three-fourths of the total population being included in the agricultural class. The country made marked progress, both in the extent of the industry and in respect to agricultural methods, during the last two decades of the nineteenth century. Indeed, the development recently made in this and in other phases of its economic life has won for the country the appellation of the 'European Japan.' In respect, therefore, to its agricultural system, it belongs to Western Europe, and contrasts sharply with the adjoining regions to the east and south. A large majority of the cultivators of the soil are independent landowners. In 1895 48.5 per cent. of the total area (excluding properties consisting only of woods or pastures) was included in holdings which ranged in size from 5 to 100 acres. There are, however, a great many large estates belonging to the State and to members of the nobility, upon which the prevailing system of agriculture is very similar to that in vogue upon the large English estates. The improvement in agriculture is largely indebted to the activity of agricultural societies. The natural conditions are generally favorable to the industry, the great fertility of the soil being especially a marked feature of the Hungarian plain. In some respects this plain is comparable to the Western prairies of the United States, but, like that region, it is subject to an uncertain rainfall, and it contains considerable stretches of sandy, arid land as well as marshy tracts, which have never been brought under cultivation. While the products of the country are characterized by their great variety, Hungary is best known for its production of wheat, live stock (including horses), and wine, the first two entering the European markets in competition with American products. The area devoted to wheat increased from a little less than 6,500,000 acres (on an average) during the period 1881 to 1885 to 8,142,000 acres in 1900, and has become greater than the combined acreage of rye, barley, and oats, which are about on a level with each other in importance. The increase in the area devoted to wheat was principally in the sandy and previously uncultivated tracts of Central and Southern Hungary. Increased attention is also being given to corn, 5,469,000 acres having been devoted to its cultivation in 1900. A large variety of root crops are grown, of which the potato leads in importance, followed by beets, much less than half of the latter crop being sugar-beets. The yield of the principal agricultural staples will be found in the table under AUSTRIA-HUNGARY. Vine culture is extensively carried on in the hilly districts, the Hungarian wines being the most superior known to the market. The most famous Hungarian wines are those that bear the name of Tokay. During the latter part of the nineteenth century the phylloxera devastated the Hungarian vineyards, and their area greatly decreased. From an average of 367,360 hectares (907,747 acres) in the period 1881 to 1885 it decreased to 202,865 hectares (501,279 acres) in 1895, but had increased again in 1900 to 221,838 hectares (548,162 acres). Hungary has an extraordinary wealth of temperate-zone fruits. The grapes are unsurpassed in flavor, and the plums and watermelons are of an excellent quality. Apples, pears, cherries, etc., are very extensively raised, and some semi-tropical fruits are cultivated in the south. Nuts are found in great variety. There is a considerable production of tobacco, but this is under the monopoly of the Crown.

The Hungarian horse, though not large, is in great demand in the European market, because of its endurance and swiftness. The superiority of the breed is due to the care of the Government, which selects and owns most of the stallions kept in the country. The fondness of the Hungarian for horses is well expressed in the saying, "The Magyar was created on a horse." The number of horses in 1895 was 1,972,930. In the same year there were 5,829,483 head of cattle, 7,526,783 sheep, 6,446,134 hogs, and 286,392 goats. As compared with the figures of the 1884 census, there was a decided increase in all varieties of live stock, excepting sheep, the latter having suffered a large decrease. In some sections buffaloes are used in considerable numbers in tillage. The Hungarian oxen are characterized by the extraordinary spread of their horns. The principal forest area is in the Carpathian Mountains, and consists of forests of beech, oak, and pine. The numerous rivers of the country are rich in fish, and thus contribute an important item to the food-supply of the people.

MANUFACTURES. Since no duties can be collected upon the imports from Austria, the Hungarian manufacturing industries must compete with the long-established and highly developed Austrian industries; but in spite of this, much progress has been recently made. The Govern-



ment has sought to encourage industries by favorable legislation, such as exemption from taxation. Most of the industries are being thoroughly modernized—concentrated under large plants, with highly improved machinery. The leading industries are those which draw their supplies from the abundant agricultural products of the country—flour-milling, brewing and distilling, sugar and tobacco manufactures, etc. Iron products, clothing, and many less important items are also included among the manufactures. Many of the large establishments are centred in Budapest.

TRANSPORTATION AND COMMERCE. In respect to railway mileage, Hungary will compare favorably with other European countries. Including Croatia and Slavonia, there were in 1899 10,500 miles of railway lines, about four-fifths of which were owned by the State, while the greater part of the remainder was operated by the State. Hungary has the distinction of having first applied the 'zone-tariff' system to its railroads. The Danube and its tributaries afford extensive facilities for water transportation. The navigation of some of the rivers, notably the Theiss, has been greatly improved through the shortening of the course by means of numerous cuts. The limited coast-line tends to restrict the country's participation in the sea-going trade. The principal port, however, Fiume, is rapidly growing in importance, and a subvention is granted to Hungarian vessels registering in this port, the number of which is rapidly increasing. Over three-fourths of the imports are from Austria, which takes a not much smaller proportion of the exports. This arises from the fact that the two countries are mutually complementary in respect to their products, and that trade between them is free, whereas there is a tariff barrier to the trade with other countries. Grain, cattle, and other farm products pass from Hungary to Austria in return for manufactured products, principally textiles. Germany occupies a second place in the trade with Hungary.

GOVERNMENT. The Emperor of Austria is King of Hungary. The foreign and military and naval affairs of the Austro-Hungarian Monarchy are conducted jointly by Austria (Cisleithania) and Hungary (Transleithania) through the medium of common ministries (including a ministry for the common finances) and the so-called Delegations representing the separate halves of the Monarchy. The crownland of Croatia-Slavonia enjoys autonomy in local affairs, having its own Diet and its own Ban or Governor. It is, however, also represented in the Hungarian Diet. Since 1867 Transylvania has been an integral part of Hungary. In the national Hungarian Parliament the Magyar interests are predominant, and the Magyar language is official throughout Hungary proper, being obligatory in schools, etc. Croatia and Slavonia are allowed the official use of their native language. A full exposition of the government and the educational system, and a statement of finances, will be found in the article AUSTRIA-HUNGARY.

POPULATION. The population of the Lands of the Hungarian Crown in 1900 was 19,254,559, or 153 per square mile. This was somewhat more than two-fifths of the population of the Austro-Hungarian Monarchy, exclusive of Bosnia and Herzegovina. There are a large number of racial elements represented in Hungary, and the bitterness of racial feeling is the occasion of much political and social friction. The Magyar-speaking population numbers about 9,000,000, but this figure includes a large number of persons not of Magyar blood. The Rumans (Wallachs), mostly in Transylvania, number about 3,000,000, and the Southern Slavs (Croats and Serbs) are nearly as numerous. The Northern Slavs number about 2,500,000, about four-fifths of them being Slovaks, and the remainder mainly Ruthenians. Hungary has a German-speaking population of over 2,000,000. The Germans constitute an important element in many of the cities, and in Transylvania there is a German-speaking district known as the 'Saxon Land.' There are over 850,000 inhabitants of Jewish blood, most of whom are included in the Magyar-speaking population. Next to Rumania, Hungary contains a larger number of gypsies than any European country. They form a picturesque element in the population, and their music is quite a feature in the charms of rural life in Hungary. There are a number of Armenians and Bulgarians in the Kingdom. The population of Transylvania consists mostly of Rumans, and the Magyar element is but feebly represented in Croatia and Slavonia. The Magyars are, as a rule, the land-owners of the country. Hungary is unique among progressive European countries in the extent to which the different races still retain their own peculiar and long-established costumes. The costume of an Hungarian peasant is made of a linen shirt with long sleeves, reaching to the knee; a bodice ornamented with metal buttons or cords; wide linen trousers or tight-fitting ones, made of black or blue cloth, and stuck into leather boots ornamented with cords; a black round hat with feathers, or a black fur cap for head-dress, and a cloak made of close, coarse cloth and trimmed with fur, cords, etc., or a wide sleeveless sheepskin coat, worn also to some extent in summer. The costume of the Hungarian peasant woman is also very picturesque, and is made usually of lighter materials. The population is very largely centred in villages, some of which contain several thousand inhabitants, but there are a few large towns. Budapest in 1901 had a population of 732,322, or more than twice its population in 1881. Szegedin, with a population in 1901 of 102,991, is the only other town containing over 100,000 inhabitants. Cities having between this and 50,000 inhabitants in the order of size, are: Szabadka (Maria-Theresiopel), Debreczin, Pressburg (Pozsony), Hódmezö-Vásárhely, Agram (Zágráb), the capital of Croatia and Slavonia, Kecskemét, Arad, Temesvár, and Grosswardein (Nagy-Várád). Other well-known towns are: Klausenburg, Kronstadt, and Hermannstadt, the three principal places of Transylvania; Fiume, Kaschau, Oedenburg, Stuhlweissenburg, Raab, Eszék, and Gran (Esztergom), the seat of the Catholic Primate of Hungary. The population of the Kingdom of Hungary, in 1900, according to religions, was as follows: Roman Catholics, 9,920,000; Orthodox Greeks, 2,816,000; Calvinists, 2,441,000; Lutherans, 1,289,000; United Greeks and Catholic Armenians, 1,854,000; Israelites, 851,000; Unitarians, 68,500.

HISTORY. The Hungarians, or, as they call themselves, the Magyars, have been settled in their present abode just 1000 years. They constitute a branch of the Finno-Ugrian race (Uralo-

(See HUNGARIAN LANGUAGE.) They figure in the old writers as Ugri, Wengri, Ungri, Ungari, Hungari. Hungary, south and west of the Danube, was included in the Roman Province of Pannonia. The southeastern portion formed part of the Roman Province of Dacia. At the time of the great migration of nations which overwhelmed the Roman Empire of the West and in the succeeding period, the middle basin of the Danube was overrun by Germanic peoples (Ostrogoths, Gepidæ, and Longobards), by non-Aryan peoples (Huns and Avars), and by the Slavs. The Avars, who had established a realm in Pannonia, were conquered by Charles the Great, King of the Franks, at the close of the eighth century. A century later the Magyars (Hungarians) left their abodes on the plains to the east of the Carpathians (whither they are supposed to have come from the original home of the Finno-Ugrian race in Western Siberia), and moving westward under the lead of Arpád, who is sung as a great national leader by the Hungarians, they descended about 896 into the region which was to take its name from them. The invaders were a barbarous horde, who for more than half a century were the terror of the nations to the west and the south. They broke up the Moravian realm, made incursions into Germany and Italy, everywhere pillaging, burning, and slaughtering, and awakening superstitious terrors in the minds of the inhabitants, and carrying their devastations almost to the Straits of Dover. At last the German kings succeeded in putting an end to their onslaughts. They were defeated in 933 by Henry the Fowler on the Unstrut, and Otho the Great vanquished them on the Lech in 955. Forced to accommodate themselves to a settled existence, and in possession of a fruitful domain, the Hungarians showed themselves amenable to the civilizing influences emanating from without, and among other things they developed a capacity for the adoption of political institutions based upon Western models. Shortly before the close of the tenth century their ruler, Gejza, embraced Christianity, which began to take root in the nation. His son Stephen, the first King of Hungary, known as the Saint, was crowned in the year 1000 (some years after he began his rule), with a crown sent him by Pope Sylvester III., who at the same time bestowed on him the title of 'Apostolic Majesty.' With Saint Stephen, whose reign of over forty years terminated in 1038, a new era began for Hungary; Christianity took the place of heathen superstitions; the royal authority was firmly established; new laws were made, and the people advanced rapidly in civilization. After Stephen's death there was a reaction, and his immediate successors had to contend aaginst a pagan revival and a general tendency to disintegration. Ladislas I., the Saint (1077-95), renowned for his wise legislation and for great personal valor, proved a worthy successor of Stephen; and under his rule Hungary again became a strong kingdom, with its boundaries increased by the acquisition of part of Croatia. Coloman (Kálmán) (1095-1114), known as the 'Learned,' was far in advance of his age, as many of his laws show. He gained possession of Dalmatia. Under King Gejza (1141-61), German colonists settled in Northern Hungary and in Transylvania, in consequence of which mining and several branches of industry known in connection with the Crusades. The Golden Bull, the Hungarian Magna Charta, was extorted from him by his nobles in 1222. Béla I. (1235-70) showed great qualities in subduing the pride of the nobles and in healing the wounds of his people after the terrible invasion of the Mongols in 1241. Andrew III. was the last male scion in the Arpád line—dying without issue in 1301. The crown of Hungary now became elective.

The succeeding period of Hungarian history, terminating with the battle of Mohács in 1526, witnessed the culmination and decline of the independent monarchy. Louis I., called the Great (1342-82), was the second King of the House of Anjou, which obtained the throne in 1307, being by his great-grandmother connected with the Arpád dynasty. Louis extended the power of the Hungarian kings over Moldavia and Wallachia, Bosnia, Servia, and parts of Bulgaria. In 1370 he was elected King of Poland. At home he reëstablished the authority of law, which under his predecessors had been openly violated by the powerful nobles. He promoted science, industry, and commerce. Sigismund (1386-1437), the son-in-law of Louis, succeeded him as King, but he is better known as Holy Roman Emperor. In the person of Sigismund's son-in-law, Albert V. of Austria (1438-39), the Hapsburgs first came into possession of the Hungarian throne. After his death the country was for a few years under the rule of King Ladislas of Poland, who was overwhelmed and slain by the Turks at Varna in 1444. He was succeeded by Ladislas the Posthumous, the son of Albert of Hapsburg, under whom the government was administered by John Hunyadi, an heroic figure in the wars between Christendom and the Turks. Hunyadi's son, Matthias I., ascended the throne in 1458. Matthias I.—better known as Matthias Corvinus—has been called not only the greatest King of Hungary, but also the greatest sovereign of his age. By his military successes, sagacity, and love of learning he raised his nation to a high pitch of splendor. From the death of Matthias (1490) to the fatal day of Mohács, Hungary exhibited the fiercest strife of factions —a protracted agony, preceding the loss of national independence. Among the many calamities during the reign of Ladislas of Bohemia (1490-1516), the peasant war occupies a prominent place. Dózsa (q.v.) and his insurgent bands, after having committed great havoc, were exterminated by the famous John Zápolya, Waywode of Transylvania. Louis II. (1516-26), who was also King of Bohemia, was but ten years old at the death of his father, Ladislas. The Turks, who had been making incursions into the Kingdom since the early part of the fifteenth century, took advantage of the anarchy under the young Louis to attempt the conquest of Hungary. In 1521 they captured Belgrade, and on August 29, 1526, an army of 100,000 men under Solyman the Magnificent crushed the forces of the Hungarians at Mohács, where the King and more than 20,000 of his men perished. The national party in Hungary chose John Zápolya, Waywode of Transylvania, to be Louis's successor, while a part of the nobles offered the royal crown to Ferdinand of Austria (brother of the Emperor Charles V).), between whom and Louis a double marriage connection had existed. After

a struggle between the rivals and fresh invasions by Solyman the Magnificent (who had given his support to John Zápolya), Hungary, after 1541, remained rent into three parts. The central part of the Kingdom, with the capital, Buda, came into the immediate possession of the Turks.

The Austrian power for a long time was confined to the western part of the country. The religious policy of the Hapsburg Emperors and the activity of the Jesuits excited the fierce opposition of the Protestants, which culminated in 1604 in a great rising, headed by Stephen Bocskay (q.v.), who in the Peace of Vienna, in 1606, forced the Emperor Rudolph II. to grant religious freedom to his Protestant subjects in Hungary. At the beginning of the Thirty Years' War (1618-48), and toward its close, the princes of Transylvania were in arms for the Protestant cause against the Hapsburgs. Ferdinand III. (1637-57) was compelled to concede a large measure of self-government and religious freedom to the Hungarians; but his successor, Leopold I., initiated a policy of repression which led to a formidable uprising under Tökölyi (1678), who summoned the Turks to his aid. In 1683 Vienna, the capital of the Hapsburgs, after a heroic defense, was on the point of falling into the hands of the Moslems, when the victory achieved before the city by John Sobieski and the German princes turned the tide of war, and the power of Turkey collapsed. Buda was recovered by the Christians in 1686. After sanguinary vengeance had been wreaked on the leaders of the rebellion, Leopold I. forced the Hungarians in 1687 to declare the crown of Hungary forever hereditary in the House of Hapsburg. The dominion of the Turks rapidly disappeared from Hungary; the Treaty of Karlowitz (1699) left only the Banat in their hands; and that, too, was acquired by the Treaty of Passarovitz (1718) as a result of the victories of Prince Eugene. The Treaty of Karlowitz also secured Transylvania to the Hapsburgs. In 1703 Francis Rákóczy excited the Hungarians to rise in defense of their liberties against the Austrian House, and a struggle ensued which was not terminated until 1711, when Charles VI., immediately after his accession, found it necessary to come to terms with his Hungarian subjects. Charles VI. succeeded in gaining the approval of the Hungarians for his Pragmatic Sanction by the grant of extensive privileges; and after the Emperor's death, when the onslaught of Frederick the Great, the Saxons, the Bavarians, and the French threatened the dismemberment of the Austrian realm (1741), the nation rallied to the support of the young Queen, Maria Theresa, who had appealed to the National Diet, assembled at Pressburg. During her reign Hungary enjoyed an era of progress and prosperity. The reforms of Joseph II., her son and successor (1780-90), were received with violent opposition, because of their attack on the local liberties of the people through the institution of a strongly centralized administration. Bitter dissatisfaction was also aroused by the Emperor's attempts to make German the official language of the country. In 1790 Joseph II. saw himself driven to repeal his measures of reform, except those dealing with the abolition of serfdom and the establishment of freedom of worship. Under Leopold II. (1790-92) the old Constitution was restored; but his successor, Francis I. (1792-1835), ruled in an arbitrary fashion, and seldom troubled himself to assemble the Diet. In his reign a great political upheaval began to manifest itself in Hungary. The period after 1815 witnessed the rapid development of an intense national (Magyar) consciousness, which evinced itself in the demand for a strictly constitutional government and the enactment of widespread reforms. The strife of parties was carried from the legislative hall to the press, and the Liberals grew in strength as their support among the mass of the people increased. This great national and reform movement, which was headed by such men as Széchenyi, Batthyányi, Eötvös, Deák, and Kossuth, and which was accompanied by remarkable activity in the field of literature, constitutes a brilliant and stirring episode in the annals of Europe in the second quarter of the nineteenth century. Notable gains were the law of 1843, which made men not of noble blood eligible for office, and the enactment of measures for making the Magyar tongue the official language of Hungary. The revolutionary movement of 1848, which, emanating from France, convulsed a great part of Europe, brought upon Hungary a sudden and terrible catastrophe. In March of that year, immediately after the downfall of Metternich, who had so long guided the reactionary policy of Austria, the Hungarians were accorded an independent Ministry. Under its guidance the progress of liberal reform continued. But the hostile attitude of the Austrian Court toward the new order, and the encouragement which it gave to the Croats and Wallachs, who rose in revolt against the Magyar rule, resulted in an open war between the House of Hapsburg and Hungary, which, under the lead of Kossuth, declared its independence in April, 1849. After an heroic struggle (the details of which will be found in the article AUSTRIA-HUNGARY), Hungary succumbed to the combined forces of Austria and Russia, and was deprived of its constitutional liberties and treated as a conquered country. Before many years, however, the Emperor Francis Joseph was forced to recognize the necessity of some kind of reconciliation with his Hungarian subjects, and the blow sustained by Austria at the hands of Prussia in 1866 brought about the rerection of Hungary as a constitutional kingdom. The demands of the Hungarian people, as set forth by their great spokesman, Francis Deák, were acceded to in the Ausgleich of 1867, by which the present dualistic frame of the Austro-Hungarian Monarchy was established. The settlement was sealed by the coronation of Francis Joseph as King of Hungary on June 8, 1867, the ceremony taking place at Buda with extraordinary pomp. The revivified Magyar people now set itself with ardor to the task of the strengthening of its nationality, the introduction of political and ecclesiastical reforms, the extension of public education, and the development of the economic resources of the country. The nation enthusiastically followed the lead of the great Francis Deák, who, at his death, in 1876, had an able successor in Tisza. The patriotic zeal of the Magyars has at times transgressed the bounds of moderation, and the measures taken to extend the use of the Magyar tongue have excited fierce opposition, especially in Croatia. The economic progress of Hungary in the last three decades has been almost unprecedented, and the energy and enterprise displayed in the building of railways, the

anniversary of the coming of the Magyars was celebrated by a national exposition held at the capital.

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HUNGARY WATER. A celebrated perfume or toilet water, the original receipt of which was given to a queen of Hungary by a hermit, in consequence of which it was called the 'Queen of Hungary Water,' subsequently abbreviated to 'Hungary Water.'

HUNGER. See DIGESTION.

HUNGERFORD, Mrs. MARGARET WOLFE (c.1855-97). An Irish novelist, known by her pseudonym The Duchess, though the majority of her books were published anonymously. She was born at Ross, County Cork, where her father, Fitzjohn Stannus Hamilton, was rector and vicar-choral of the cathedral. She was twice married—to Edward Argles and to Thomas H. Hungerford. The Duchess began to write in 1877, *Phyllis* appearing in that year, and her most successful novel, *Molly Bawn*, in 1878, and from that time to her death she published nearly thirty volumes of short stories and novels, which attained a remarkable popularity. They are sentimental and melodramatic; the plot, conventional; but the reproduction of the general air and small chatter of society, very truly done.

HUNG-SIU-TS'EUEN, hung'sê-ōō'chwĕn, or **HUNG-HSIU-CHUAN** (1812-64). A Hakka schoolmaster who originated and was the leader of the Tai-ping Rebellion (1850-64). He was born in a small village, about 30 miles from the city of Canton, in 1812; attended school from 7 to 16; became village schoolmaster, continued his own studies and passed all the examinations preliminary to that for the first degree, but failed again and again in the competition for the degree. He was subject to frequent illnesses, and in one attack, in 1837, is said to have lain in a trance for nearly forty days, during which he had a religious vision which profoundly impressed him. A few years later a friend found in Hung's bookcase some Christian books and tracts which Hung had obtained in Canton in 1833. The two began to study them, and Hung found in them the key to his visions, and was thereby inspired to destroy idols. They became converted, baptized each other, and began to preach. Hung set out for Kwang-si to convert the aborigines there, but lack of acquaintance with their language made the work difficult. He met others, however, who gladly accepted his teaching and themselves became zealous propagandists. About this time he joined a society of 'God-worshipers,' which had been formed in 1836, and soon became supreme in it. with him for two months, but was refused baptism, because the request was accompanied with an application for a monthly stipend. He returned to Kwang-si, and his disciples, mostly persons disaffected to the reigning dynasty, began to destroy temples and to demolish idols. In July, 1850, Hung and his followers, who were now numerous, broke out into open rebellion. At first Hung had styled himself the 'Brother of Christ'; he now became the 'Heavenly King' (T'ien Wang), and adopted the style of 'Heavenly Kingdom of Great Peace' (*Tai-ping Kwoh*) as that of the empire he was about to establish. He made Nanking his headquarters until 1864, writing Christian books, issuing edicts to his followers, attending to the printing and circulation of the Bible and other works, and directing the movements of his numerous generals and their immense armies.

On June 30, 1864, seeing the Imperial armies closing in on him and realizing that he could not hold out much longer, he poisoned himself. His body was later found and burned. (See TAI-PING REBELLION.) Consult: Meadows, *The Chinese and Their Rebellions* (London, 1856); Williams, *The Middle Kingdom* (New York, 1883); and Mayer's *Chinese Reader's Manual*.

HUNG-WU, hung'wōō'. The name given to the period of years (1368-98) during which Chu Yüanchang, the founder of the Chinese dynasty of Ming (1368-1644), reigned, and commonly transferred by Europeans to the Emperor himself. He was a native of the Province of Ngan-hwei, and was born in 1328, the second son of a poor laborer. At 17 Chu entered a monastery as a novice, but in the troubles of the times this was burned down by rebels under the command of a maternal uncle of his, whose forces he joined. He was given a small command, scored victory after victory; and in 1355, on the death of his uncle, he was offered the post of assistant generalissimo. Declining this offer, he recovered from the Mongols, then the ruling dynasty, the whole left bank of the Yang-tse, and proclaimed himself Prince of Wu. Within two years he had become master of Kiang-si and part of Che-kiang; sent his generals north in 1367, in 1368 mounted the throne as Hung-wu, called his dynasty the Ming, or 'Illustrious,' and made his capital at the city which has since been known as Nanking, 'the southern capital.' In the same year he recovered the provinces of Fuh-kien, the two Kwang, and Shan-si, and brought Shen-si under his sway in 1369. In the following year the last Mongol Emperor died, the dynasty founded by Kublai Khan came to an inglorious end, and China was once more free from the yoke of aliens. In 1371 Sze-chuen and Liao-tung fell before him, and Yun-nan in 1381.

Hung-wu proved an able administrator, and became a liberal patron of education and of literature. He organized the present system of literary examinations, established a new penal code, abolished mutilation as a punishment, regulated taxes and placed the coinage on a proper basis, made Buddhism and Taoism State religions, and prohibited eunuchs from holding office. He also reestablished the customs of the T'ang dynasty (618-907) and labored for the welfare of his people. He had 24 sons, all of whom became

princes, and set nine of them as governors over as many provinces. He died in 1398, and is known in history as *Tai-tsu*, his Temple name. He is popularly known, however, as the 'Beggar King,' in allusion to his early poverty. See Rémusat, *Nouveaux mélanges asiatiques* (2 vols., Paris, 1829).

HUNKERS (perhaps from Dutch *honk*, station, home). In American political history, the name applied for some years after 1843 to that part of the Democratic Party in the State of New York which stood for conservatism, and was arrayed against the radical faction of the same party, known as the Barnburners (q.v.). Factional differences had arisen in the party prior to 1843, but open and avowed antagonism may be said to date from that year. The Hunkers adhered to the regular Democratic Party in the Presidential contest of 1848, while their opponents united with the Free Soilers, and with them nominated Van Buren. After 1852 the two factions acted more or less in harmony in both State and National politics. Among the leaders of the Hunkers were Horatio Seymour, William L. Marcy, Samuel Beardsley, Edwin Croswell, and Daniel S. Dickinson. The name 'Hunkers' was also applied at times to the Conservative element of the Democratic Party in other States.

HUN'NERIC, or HUNERIC. King of the Vandals in Africa (?-484). He was the son of Genseric, whom he succeeded in 477. In 435 he had been sent to Rome as a hostage for his father's fidelity. One of his wives was a daughter of Theodoric, King of the Visigoths. Suspecting her of a plot against him, Hunneric cut off her nose and ears and sent her home. Another and later wife was Eudocia, the daughter of the Roman Emperor Valentinian III.

HUNNÉUS, ụn-nā'ụs, GEORGE (1831—). A Chilean statesman, born in Santiago. He was educated there and became professor of jurisprudence and political economy in the university the year after his graduation (1858). A fine speaker and a leader of the Liberal opposition, he was sent into exile by President Montt, but improved his time by studying the government and people of the United States. Recalled to his native land in 1861, he was once more sent to the House of Representatives and became its Speaker, as well as the Secretary of Public Instruction and Justice. Besides lecturing in the Santiago University, where he was rector, he continued to occupy high positions in the Chilean Government, such as president of the Senate and Secretary of Foreign Affairs. He published *Historia política de Chile* (1862); *La administración Montt* (1863); *Historia de la guerra con España* (1866); and *Historia de la guerra del Pacífico* (1883).

HUNOLD, hōō'nôlt, CHRISTIAN FRIEDRICH (1680-1721). A German author, known by his pseudonym Menantes. He was born at Wandersleben, and was educated at Jena. But means to carry on his studies failed him, and in 1700 he went to Hamburg, then the literary centre of Germany. Here the success of his novel, *Die verliebte und galante Welt* (1700), put an end to his precarious teaching and writing. This was quickly followed by *Der europäischen Höfe Liebes- und Heldengeschichte* (1704) and by *Satirischer Roman* (1705), which told so plainly the scandal of Hamburg—which Hunold knew only too well—that he was forced to leave the city (1706). He went to Thuringia; published *Die allerneueste Art zur reinen und galanten Poesie zu gelangen* (1706), besides text-books in rhetoric and style; and after many wanderings settled in Halle, where he became an instructor in literature, poetry, and jurisprudence, and where his works lost the earlier freedom and obscenity. Consult: Wedel, *Geheime Nachrichten und Briefe von Herrn Menantes Leben und Schriften* (Cologne, 1731); and Vogel, *Christian Friedrich Hunold* (Leipzig, 1897).

HUNS (Lat. *Hunni, Chunni*, Gk. Οὖννοι, *Ounnoi*, Χοῦννοι, *Chounnoi*, probably from Chin. *Hiong-nu*, name of a powerful Tatar tribe). The name of a nation of antiquity, which made repeated incursions upon the Roman dominions, and under Attila (q.v.), the most renowned of its leaders, brought the empires of both the East and the West to the verge of destruction.

The Huns are generally considered to be a people (or rather a collection of tribes) of Turko-Tatar affinities, the descendants perhaps of the Hiong-Nu, who figure in Chinese annals as making incursions and founding States in Central Asia as early as the second century B.C. Some authorities think that the bulk of Attila's hordes were of Turki stock, and Theophanes in the eighth century writes of 'the Huns whom we commonly call Turks.' The distinction between 'white' and 'black' Huns, made by the mediæval writers, has led Bloch (1901) to put forward the view that we have here a dark race in process of transformation into a white one, but the uncertainty of the connotation of these epithets makes such a startling view even less probable. Like the modern Magyars, Osmanli Turks, etc., the ancient Huns no doubt assimilated themselves to the populations of their environment, and in Europe lost more and more of the distinctly Asiatic character. The 'white' Huns were probably not a little mixed with Asiatic Aryan blood (Iranian, etc.), before they entered upon their career in Europe. About B.C. 200 the Huns overran the Chinese Empire, defeated the Chinese armies in numerous engagements, and drove the Emperor Kao-ti himself to a capitulation and treaty. During the reign of Wu-ti (B.C. 141-87), the power of the Huns was much broken. Eventually they separated into two distinct camps, one of which, amounting to about 50,000 families, went southward, while the other endeavored to maintain itself in its original seat, but finally the most warlike went west and northwest in search of new homes. Of those that went northwest a large number established themselves for a while on the banks of the Volga. They then advanced into the territories of the Alani, a people dwelling between the Volga and the Don. At what period this took place is uncertain, but probably it was early in the fourth century. The Alani resisted the incursions of the Huns until at length a battle was fought on the banks of the Don, in which the Alani King was slain, and his army utterly routed; the vast majority of the survivors joined the invaders.

The Huns now invaded the country of the Goths, whose aged King, Hermannrich, roused himself to meet the invaders, but in vain. His successor, Withimir, encountered the Huns in a pitched battle, in which he was himself slain, and his countrymen utterly routed. The Goths

now threw themselves upon the protection of the Emperor Valens, who in A.D. 376 gave permission to a great number of them to cross the Danube and settle in the countries on the south side as auxiliaries to the Roman arms against further invasion. The Huns now occupied all the territories that had been abandoned by the Goths; and when the latter not long afterwards revolted against Valens, the Huns also crossed the Danube and joined their arms to those of the Goths in hostilities against the Empire of the East. In the wars that followed the Huns were not so conspicuous as the Goths, their former enemies, and but little is known of them during the remainder of the fourth century. It is supposed, however, that early in the following century they were joined by fresh hordes. In the reign of Theodosius the Younger they had increased so considerably in power that their sovereign Rugilas, or Roas, was paid an annual tribute to secure the Empire of the East from further injury.

Rugilas, dying in the year 434, was succeeded in the sovereignty of the Huns by his nephews Attila and Bleda. The latter was put to death by his brother about 444. Attila carried his arms as far west as Gaul, where the Romans and Visigoths successfully encountered him on the Catalaunian Plain. In the following year he ravaged Italy, and Rome itself was saved, it is said, only through the awe which its Bishop, Leo I., inspired in the barbarian conqueror. With Attila's death, about 454, the power of the Huns was broken. A few feeble sovereigns succeeded him, but there was strife now everywhere among the nations that had submitted to Attila, and the Huns especially never regained their power. Many of them took service in the armies of the Romans, and others joined fresh hordes of invaders from the north and east, aiding them in their repeated attacks upon the Empire.

HUNT, HELEN. See JACKSON, HELEN (FISKE HUNT).

HUNT, HENRY (1773-1835). An English politician, born at Widdington Farm, Wiltshire, and educated by tutors and in private schools. Though destined for the ministry, he turned to farming, which he followed intermittently until within a few years of his death. He was imprisoned in 1800 for challenging to a duel the commanding officer of the Marlborough Troop, in 1810 for an assault upon a gamekeeper, and again in 1819 for two years for his part in the Peterloo massacre. In politics he was a Radical, and allied himself with Sir Francis Burdett, Horne Tooke, William Cobbett, and others of the same party, though he later published a pamphlet in which Burdett was charged with wavering loyalty to the reform, and was alienated from Cobbett through his own over-zealousness and political mistakes. He was often a candidate for Parliament and contested many elections. In 1831, through the retirement of the successful candidate, he obtained a seat from Preston, and advocated strenuously women's rights, universal suffrage, and the repeal of the corn laws. He managed to exercise considerable influence upon local politics, and his public speeches, though positive and demagogic, were always impressive; but his disagreeable personality found him few followers in Parliament, and in 1833 he retired to private life.

HUNT, HENRY JACKSON (1819-89). An American soldier, born in Detroit, Mich. His father, Samuel W. Hunt, was an army officer, and after his death the son was appointed to West Point, where he graduated in 1839. He was immediately assigned to the artillery arm of the service. His first active service was on the Canadian frontier in the year of his graduation during the Canadian Rebellion of 1837-38, after which he continued in garrison duty until the Mexican War. He served with the Second Artillery in Scott's advance from Vera Cruz to the City of Mexico, distinguishing himself particularly at Contreras and Churubusco, and being twice wounded at the battle of Molino del Rey (September 8, 1847). He was brevetted captain and major for his services. He afterwards served on the frontier for some years, and in 1856 was appointed a member of the board to revise the system of light-artillery tactics. He was promoted captain in 1852, and at the outbreak of the Civil War was stationed at Fort Pickens, Fla., from April to June, 1861. Promoted major in May of that year, he commanded the artillery on the extreme left at the battle of Bull Run. He was in command of artillery in the defenses of Washington in the summer of 1861, and in the September following was promoted colonel, attached to General McClellan's staff, and assigned to organize and command the artillery reserve of the Army of the Potomac. He served throughout the Peninsular campaign, his disposition of the artillery at the battle of Malvern Hill (July 1, 1862) being especially praiseworthy, and in September became chief of artillery of the Army of the Potomac, a position which he held until the end of the war. He participated in the battle of South Mountain on September 14, 1862, and on the following day was appointed brigadier-general of United States volunteers. He served thereafter at Antietam, at Fredericksburg, where his artillery fire rendered possible the crossing of the Rappahannock, at Chancellorsville, and at Gettysburg, where the withering fire from his batteries rendered impossible the success of Pickett's brilliant charge and turned the tide of battle in favor of the Federal arms. After serving in the Wilderness campaign with distinction he continued on Grant's staff until the close of hostilities, receiving the brevet ranks of major-general of volunteers and brigadier-general in the United States Army. In the winter of 1865-66 he was in command of the military district of Arkansas. In 1866 he was made colonel in the reorganized army, placed in command of the Fifth Artillery, and appointed president of the permanent Artillery Board. He commanded the Department of the South from 1880 to 1883, when he retired and became governor of the National Soldiers' Home at Washington. He published *Instruction for Field Artillery* (1860), and three articles on the battle of Gettysburg in the *Century* (New York, 1886), later republished in *Battles and Leaders of the Civil War* (New York, 1887).

HUNT, ISAAC (1751-1809). An English lawyer and loyalist in the American Revolutionary era, father of Leigh Hunt, the poet. He was born in Barbadoes, West Indies, was sent to school in Philadelphia and studied law there, but the college declined to grant him an M.A. degree on account of his anonymous literary productions, which were highly displeasing to the popular sentiment of the time. When the Revolution was

actually in progress he was mobbed and imprisoned for his activity in the royal cause, but fled to England, where he entered the Church. After preaching in London for a time he turned private tutor and wrote *The Political Family, or a Discourse pointing out the Reciprocal Advantages which flow from an Uninterrupted Union between Great Britain and her American Colonies* (1775), and *Right of Englishmen, an Antidote to the Poison of Thomas Paine* (1791).

HUNT, JAMES HENRY LEIGH (1784-1859). An English poet and essayist, born at Southgate, Middlesex, October 19, 1784. He was a son of Isaac Hunt (q.v.). His mother was of Quaker descent. The boy was educated at Christ's Hospital, London. While at school he wrote verse in imitation of Collins, Gray, and others. A selection of these juvenile poems his father helped him to publish in 1801. In 1805 Leigh attracted some notice by his theatrical and literary criticism in the *News*, a short-lived paper started by his elder brother John. Two years later he made out of these contributions a book entitled *Critical Essays*. He also served as clerk in the office of his brother Stephen, who was an attorney, and for a short time he occupied a minor post in the War Office. In 1808 he joined with his brother John in founding a newspaper called the *Examiner*, of which he was editor for thirteen years. Hunt was a Liberal in politics before Liberalism had become fashionable; and for one of his articles, reflecting on the obesity of the Prince Regent—'a fat Adonis of fifty,' Hunt had called him—he was sentenced to pay a fine of £500, and to undergo two years' imprisonment. Hunt was happy enough in his confinement; he hid the prison bars with flowers, and received visits from Byron, Shelley, and Keats. Released in 1815, he published the next year *The Story of Rimini*, a verse narrative based on Dante's episode of Paolo and Francesca.

In 1818 appeared a volume of original poems and translations entitled *Foliage*. The next year he started another journal, the *Indicator* (continued for seventy-six weeks), in which first appeared some of his best essays. In 1821, having severed his London literary connections, he went to Italy to assume the editorship of a journal projected by Byron and Shelley. There were annoying delays; Shelley died; Byron and Hunt quarreled; and of this journal, called the *Liberal*, only four numbers appeared (1822-23). Returning to London, Hunt gave his version of the enterprise in *Lord Byron and Some of his Contemporaries* (1828). In the same year he began the *Companion* (28 nos.), a sequel to the *Indicator*. In 1834 he started the *London Journal*, which he edited for about two years. His principal works, besides those already mentioned, are: *Captain Sword and Captain Pen*, a poem (1835); *Legend of Florence*, a fine play (1840); *The Seer*, a selection from his essays in various magazines (1840); some remarkable prefaces to an edition of the Restoration dramatists (1840); *Palfrey, a Love Story of Old Times* (1842); *One Hundred Romances of Real Life* (1843), made up from contributions to the *London Journal* in 1834-35; *Imagination or Fancy*, containing the well-known essay on *What Is Poetry?* (1844); a volume of his collected poems (1844); *Wit and Humour*, selections from the English poets, with comments (1846); *Stories of the Italian Poets, with Lives* (1846); *Men, Women, and Books*, a delightful collection of miscellanies (1847); *A Jar of Honey from Mount Hybla* (1848), made up mostly of contributions to *Ainsworth's Magazine* in 1844; *The Autobiography* (1850); *Table Talk* (1851); and *The Old Court Suburb* (1855). In spite of his industry, Hunt was always poor. In 1844 Sir Percy Shelley settled upon him a pension of £120, which was augmented in 1847 by a Government pension of £200. He died at Putney, August 28, 1859.

Hunt undoubtedly wrote too much, but the best of his poems and essays render his reputation secure. *The Story of Rimini* is one of the finest narrative poems since Dryden; his *Palfrey* is delightful from its good spirits and bright, sunny glimpses of landscape and character; and *Abou-ben-Adhem* is a charming fable. As an essayist he is always cheerful and fanciful, and as a critic he is subtle and appreciative. His style is graceful. Consult: *Autobiography*, ed. by his son, T. Hunt (London, 1860); *Poetical Works* (ib., 1860), and *Correspondence* (ib., 1862); *Recollections of Charles and Mary Cowden Clarke* (London, 1878); Ireland, *List of Writings of Hazlitt and Hunt* (ib., 1868); Monkhouse, *Life of Hunt*, in "Great Writers Series" (ib., 1893); Johnson, *Leigh Hunt* (ib., 1896); selections from works by Ollier (ib., 1869, new ed. 1890), Symons (ib., 1887), Kent (ib., 1889), Johnson (ib., 1900-02), and *Classical Tales* (ib., 1894); *Dramatic Essays*, selected by Archer and Lowe (ib., 1894); *Tales*, with memoir, Knight (ib., 1890); reprint of *The Months*, edition of 1821, with introduction by Andrews (ib., 1897).

HUNT, RICHARD MORRIS (1828-95). An American architect, born at Brattleboro, Vt., the brother of William Morris Hunt. At fifteen he began the study of architecture in Geneva, Switzerland, and later studied at the Ecole des Beaux-Arts in Paris. After travel in Europe, Asia, and Egypt, he was employed as inspector of works on the buildings connecting the Tuileries with the Louvre, under his old master Lefuel, who had succeeded Visconti as architect in charge. In 1855 he returned to his own country, and was architect of the Capitol extension at Washington, the Lenox Library, the *Tribune* Building, New York, the United States Naval Observatory at Washington, the Divinity College Building at Yale, the Administration Building for the World's Fair, Chicago, and the Yorktown Monument. Among private houses by him are: W. K. Vanderbilt's, New York; the country house of George Vanderbilt, Biltmore, N. C.; and several beautiful summer houses at Newport, R. I., including the 'Marble House' and the 'Breakers.' Mr. Hunt exercised a powerful influence on the architecture of America, and many prominent architects were his pupils. He was one of the founders, and in 1888 became president of, the Institute of Architects. He was a knight of the Legion of Honor and a foreign associate of the Institute of France. In 1898 the associated architectural and art societies of New York City erected a beautiful memorial to him, including a bust of Mr. Hunt, in the wall of Central Park opposite the Lenox Library. It was designed by Daniel C. French and Bruce Price.

HUNT, THOMAS STERRY (1826-92). An American scientist, born at Norwich, Conn. He studied chemistry and acted as laboratory as-

sistant at Yale College. In 1847 he was made chemist and mineralogist to the Geological Survey of Canada, and, while holding this position, was also for several years professor of chemistry at Laval and McGill universities. In 1872 he resigned his position on the Geological Survey to become professor of geology at the Massachusetts Institute of Technology, and six years later he retired from official service. His extensive and fruitful researches in general and economic geology, in pure and applied chemistry, and in mineralogy, have won for him a place of eminence in the scientific world, and universities and learned societies the world over conferred upon him their honors. He was made a Fellow of the Royal Society of London, a Chevalier of the Legion of Honor in France, an honorary Doctor of Laws of the University of Cambridge, president of the American Chemical Society (1880), and president of the Royal Society of Canada (1884). Besides a very large number of papers on special scientific topics, his publications include the following works: *Chemical and Geological Essays* (1874); *Azoic Rocks* (1878); *The Domain of Physiology* (2d ed. 1882); *Mineral Physiology and Physiography* (1886); *A New Basis for Chemistry* (1887).

HUNT, Ward (1810-86). An American jurist, born in Utica, N. Y. He was educated at Union College, prepared himself for his legal career in Litchfield, Conn., and after following his profession for many years in his native town, of which he was Mayor in 1844, he was raised to the Court of Appeals in New York (1865), and seven years later to the bench of the United States Supreme Court. This position he occupied for ten years, and then retired with a pension.

HUNT, William Henry (1790-1864). An English painter in water-colors. He was born in London, March 28, 1790, the son of a tinplate worker. A cripple from childhood, he was apprenticed at an early age to John Varley (q.v.), and made such rapid progress in painting that he could exhibit at the Academy at the age of seventeen. He was much encouraged in his studies by the friendship and patronage of Dr. Thomas Munro, of Adelphi Terrace. He at first painted in oil, but later devoted himself exclusively to water-color. He became an important member of the Water Color Society in 1827, exhibiting a large number of drawings—usually twenty-five—each year. He began by painting landscapes and still life, but later did rustic scenes and sketches of the sea, visiting Hastings every year for thirty years. Toward the close of his career he made many drawings of flowers and fruits. He excelled in depicting common objects, seen in the sunlight, at a short distance, and he preferred pure to mixed colors. His genre subjects are nearly always rustic, and are distinguished by a delightful vein of humor. Among the best known are: "Too Hot," the "Cardplayers," the "Fly-fisher," the "Attack," and the "Defeat." The South Kensington Museum contains a large number of his aquarelles, but the best collections are those of James Orrock and Louis Huth. Hunt died in London, February 10, 1864. Consult: Redgrave, *A Century of British Painters* (London, 1890); Ruskin, *Notes on Samuel Prout and William Hunt* (London, 1879).

HUNT, William Henry (1824-84). An American lawyer and politician, born in Charleston, S. C. After studying for two years at Yale College in the class of 1843, he removed to Louisiana, studied law, and was admitted to the bar in 1844. For many years he was a professor in a law school in New Orleans. Throughout the Civil War he favored the Union cause, and ever afterwards remained a stanch Republican. In 1876 he was appointed Attorney-General of Louisiana to fill a vacancy, and was regularly nominated for that position in the same year; but the vote was contested, and largely through the agency of President Hayes the Democratic candidates were placed in office. Hunt was made a judge of the United States Court of Claims in 1878, was prominently mentioned two years later as a successor to Justice Strong on the Supreme Court bench, and in 1881 was appointed by Garfield Secretary of the Navy, after he had declined the judgeship of the United States Circuit Court of the Fifth District. He retired when Arthur reorganized Garfield's Cabinet, and in 1882 was made Minister to Russia.

HUNT, William Holman (1827—). An English historical painter. He was born in London in April, 1829. He was intended for commercial life, but his taste for painting prevailing, he studied for a short time under John Varley (q.v.), and in 1854 he entered the schools of the Royal Academy. At the age of nineteen he exhibited his first picture at the Academy exhibition. Together with Rossetti and Millais, Hunt founded the Pre-Raphaelite Brotherhood (q.v.). His first painting that was an exponent of its principles was "The Flight of Madeleine and Porphyrio," a subject taken from Keats's *Eve of Saint Agnes*. He has been the most consistent follower of the Pre-Raphaelite movement, and even in his later works has remained unaffected by a modern artistic development. He soon turned to religious subjects, to which he is peculiarly adapted, and became one of the greatest modern exponents of Christianity. His works are full of strong religious feeling, and are characterized by an absolute fidelity to nature, to the extent of a hard realism. Every detail, even the leaves and blades of grass, is painted with the utmost minuteness. His works are the triumph of industry. He went to Palestine to study the figures and landscapes of his religious subjects, spending four years there in preparation for his picture "Christ Discovered in the Temple." This industry has been richly rewarded by the public, which bought the latter picture for £5000, and "The Shadow of Death" for £10,000.

The best known of Hunt's works is his "Light of the World," now in Keble College, Oxford. It represents Christ wandering through the night, with a lantern in His hand, and an embroidered robe thrown over His shoulders; it is executed with great detail and realism. Among his earlier works are a "Converted Christian Family Sheltering Christian Missionaries from the Druids" (1849), in the Taylor Museum, Oxford; "Rienzi Vowing to Avenge His Brother's Death" (1841); the "Hireling Shepherd" (1852); and the "Awakened Conscience" (1854). The "Scapegoat" (1856) is a strange religious production, representing a goat perishing among the miasmas of the Dead Sea. In the Gallery of Birmingham is the "Christ Discovered in the Temple"

(1873); at Manchester, the "Shadow of Death" (1873), also called "Christ, the Carpenter," and "Valentine and Silvia;" at Liverpool, the "Triumph of the Innocents" (1885). Among his latest works are: "Isabella and the Pot of Basil;" "May Morning in Magdalen Tower;" "Holy Fire in the Church of the Sepulchre at Jerusalem."

HUNT, William Morris (1824-79). An American landscape, figure, and portrait painter. He was born at Brattleboro, Vt., March 31, 1824. He entered Harvard College in 1840, but, compelled to leave on account of his health, he traveled in Europe. He at first studied sculpture at the Academy of Düsseldorf in 1846, and afterwards took up painting with Couture in Paris. Attracted to Barbizon, he became a friend and follower of Millet, who exercised the strongest influence on his art. In 1855 Hunt returned to the United States, and soon afterwards established himself in Boston. There he became a very successful teacher of painting, and exercised a marked influence upon American art. He taught his pupils the new art methods of Paris, and influenced large classes. not only by the superiority of his aims, but by his own work. His criticisms and sayings in his studio were compiled and edited by his pupil, Helen M. Knowlton, and published under the title *Talks on Art* (3 vols., Boston, 1875-82). Under sudden derangement he committed suicide on the Isle of Shoals, September 8, 1879. His work is fine in color, and masterly in execution. At first he showed a preference for figure subjects—peasants, children, flower-girls, and Parisian types. In portrait painting his aim was to represent the character of the person, even at the expense of finish in the accessories. His later subjects were principally landscapes, in which he showed largeness of style and vigor of execution.

Among his most important figure subjects are: "Head of a Jewess;" "Sheep Shearing at Barbizon;" "The Farmers' Return;" "The Fortune-teller;" "The Prodigal Son." The Boston Museum contains a number of his works: "Girl with the Kitten," "Girl Reading," "Peasant Girl at Barbizon," "Marguerite," "Hurdy-Gurdy Boy," and a portrait of the artist. His portraits include those of Chief Justice Gray, Mrs. F. G. Ward, Mrs. Charles Francis Adams, Mrs. G. W. Long, William H. Gardiner, and William M. Evarts. Among his landscapes are: "Gloucester Harbor," "Newton Lower Falls," "Coast Scene at Magnolia, Mass.," and "Dead in the Snow." His most ambitious works, the "Flight of Night," and other decorations in the Capitol at Albany, were executed in 1878, not long before his death.

HÜNTEN, hun'ten, Emil (1827-1902). A German battle painter, born in Paris. He was a pupil of Flandrin and Vernet; later studied in Antwerp under Wappers and Dyckmans, and after settling at Düsseldorf received further instruction from Camphausen. His first picture of importance was the "Charge of the Cuirassiers of the Time of Frederick II." He was with the army in Schleswig (1864), accompanied the Army of the Main in 1866, and provided illustrations for a history of that campaign. Many of his other works illustrate episodes of the Franco-Prussian and the Seven Years' wars.

HUNTER, David (1802-86). An American soldier, born in Washington, D. C. He graduated at West Point in 1822, and from 1833 to 1836 served as captain of dragoons in the far West. He held the rank of major throughout the Mexican War, entered the Civil War as colonel of the Sixth Cavalry, and headed the Second Division of the Army of the Potomac at the first battle of Bull Run, where he was severely wounded. He was afterwards promoted to be a major-general of volunteers (1861); commanded the Western Department, and the Department of Kansas; was then appointed head of the Southern Department, and was the first to enlist colored troops. He gave a premature order in 1862 for the manumission of slaves in Georgia, Florida, and South Carolina, which President Lincoln countermanded, but the Confederate Congress outlawed the author. In 1864 Hunter was head of the Department of West Virginia, and led 18,000 men to an unsuccessful attack upon Lynchburg, leaving the valley of Virginia exposed by his retreat. General Grant defended his reputation when it was attacked. Hunter presided at the court which tried the conspirators in the assassination of Lincoln. At the close of the war he was brevetted Brigadier and Major-General in the Regular Army.

HUNTER, Edward (1839—). An American soldier, born at Gardiner, Me. He graduated at West Point in 1865, was commissioned in the Army as second lieutenant of the Twelfth Infantry, U. S. A. In 1867-69 he was aide-de-camp to General Getty at Santa Fé, N. M., and participated in the battle of December 25, 1868, against the Arapahoe and Cheyenne Indians. Transferred to the First Cavalry, U. S. A., in 1870, until 1886 he served in California, Nevada, Washington, and Montana, and in 1879 was promoted to be captain. In 1888 he became major and judge-advocate, and as such served in the Division of the Pacific and the Department of California from 1889 to 1895. He was made lieutenant-colonel in 1895, and served as deputy judge-advocate in the Department of Dakota until 1898, and in that year went with General Brooke to Porto Rico as judge-advocate and mustering officer. In 1899 he was appointed judge-advocate of the Department of the Pacific.

HUNTER, John (1728-93). A celebrated English physiologist and surgeon, born at Long Calderwood, Glasgow, Scotland, the youngest of ten children. After a deficient primary education he was apprenticed to a cabinet-maker; but in 1748 he began to make up deficiencies in his education, and applied himself to anatomy under his brother's tuition. He studied under Cheselden at Chelsea Hospital, and under Pott between 1749 and 1753, and at Oxford from 1753 to 1754; became a hospital pupil in surgery in 1754, and was made house surgeon at Saint George's Hospital in 1756. He joined the Army as staff surgeon, serving in France and Portugal from 1761 to 1763; practiced surgery in London from 1763; was made a Fellow of the Royal Society in 1767; became surgeon to Saint George's Hospital in 1768; surgeon extraordinary to the King in 1776; and deputy surgeon-general to the Army in 1786. He received the Copley medal from the Royal Society in 1787. He was a man of great industry, the boldest and best operative surgeon of his day, as well as the greatest anatomist known, and a marvelous zoölogist.

He invented the process of tying an artery on the cardiac side for cure of aneurism. His museum contained at the time of his death 10,563 specimens and preparations illustrative of human and comparative anatomy, physiology, pathology, and natural history. He died in comparative poverty, and his collection was purchased, two years after his death, by the Government for £15,000, and was presented to the Royal College of Surgeons. In addition to numerous papers contributed to the *Transactions* of the Royal and other learned societies, he published the following independent works: *A Treatise on the Natural History of the Human Teeth* (Part I. 1771; Part II. 1778); *A Treatise on the Venereal Disease* (1786); *Observations on Certain Parts of the Animal Economy* (1786); and *A Treatise on the Blood, Inflammation, and Gunshot Wounds* (1794). Consult Palmer, *The Works of John Hunter, F.R.S., with Notes* (4 vols., London, 1838). To this is prefixed *The Life of John Hunter, F.R.S.*, by Otley.

HUNTER, John Dunn (c.1798-1827). An American adventurer from a Southern settlement who claimed that he had been captured and reared by Western Indians. His account of explorations with them, and of their manners and customs, was ultimately discredited, but it is certain that when he came to New Orleans in 1817 he knew no English, and that he studied it there and in Kentucky. He was lionized while visiting England, but on his return to America did nothing but make trouble among the Mexicans and Indians, and was finally killed by one of the latter. The work by which he is known was published in London and Philadelphia, and translated into German and Swedish. The English edition is called *Memoirs of a Captivity Among the Indians of North America from Childhood to the Age of Nineteen* (1823).

HUNTER, Joseph (1783-1861). An English literary antiquary, born at Sheffield. He studied for the Presbyterian ministry; in 1809 was appointed to a congregation in Bath, and in 1833 removed to London, where he became subcommissioner of the public records, and assistant keeper (1838). His researches began in early life and extended over his entire career. He edited various volumes of records, made discoveries in regard to the first settlements in America, and illustrated the text of Shakespeare's plays by investigations in many directions. His voluminous notes are now in the British Museum. Among his publications are: *Hallamshire* (1819); *Disquisitions on Shakespeare's Tempest* (1839); *New Illustrations of the Life, Studies, and Writings of Shakespeare* (1845); *Milton* (1850); *Robin Hood* (1852); *Early History of the Founders of New Plymouth* (1849); and the *Church and Congregation of Protestant Separatists at Scrooby* (1854).

HUNTER, Mrs. Leo. A poet and lion-hunter, whose literary reception and recitation of her own "Ode to an Expiring Frog" form one of the amusing incidents in Dickens's *Pickwick Papers.*

HUNTER, Peter (1746-1805). A Canadian governor, born in Scotland. He chose the army as his profession, and in 1799 was made lieutenant-general. In the same year he was appointed Lieutenant-Governor of Upper Canada, and remained in office for six years. He was a fairly successful administrator, though he had little sympathy with the wishes of the Legislative Assembly, and his acts were mainly dictated by an irresponsible executive council.

HUNTER, Robert (?-1734). A British Colonial Governor of New York and Jamaica. He belonged to an Ayrshire family. He served on the Continent, fought at Blenheim, and rose to be a colonel of dragoons before he was made Lieutenant-Governor of Virginia in 1707. The vessel in which he had sailed to the Colony was taken by the French, and he was held a prisoner, but soon was exchanged for the Bishop of Quebec. In 1710 he came to America again, this time with a ship-load of persecuted German Protestants who had sought an asylum in England, and Colonel Hunter, being now Governor of New York, was able to establish them comfortably along the Hudson, though the settlement was an unending care to himself. Difficulties between royal governors and colonial assemblies were rife even in his day, and he doubtless rejoiced to return to England in 1719; but he was sent out again ten years afterwards to be Governor of Jamaica and major-general of the local troops, positions which he filled most creditably until his death.

HUNTER, Robert Mercer Taliaferro (1809-87). An American politician, born in Essex County, Virginia. He graduated at the University of Virginia in 1829, and after studying law at the Winchester (Va.) Law School began practicing in his native county. His political career began in 1833 with his election to the State Legislature, and in 1837 he took his seat in the National House of Representatives, to which he had been elected as a Democrat. From the beginning he attracted attention by his earnest opposition to Clay's protective policy and the United States bank scheme. Reëlected to the next Congress, the Twenty-sixth, he was, although only thirty years old, chosen Speaker of the House. He was reëlected to the Twenty-seventh Congress, and was defeated for the Twenty-eighth (1843-45); but was reëlected to the Twenty-ninth, and served until his elevation to the United States Senate in 1847. He served as Senator until the outbreak of the Civil War, withdrew after the secession of Virginia, and was expelled in July, 1861. He was a radical States-Rights Democrat, and a champion of Texas annexation, the Fugitive-Slave Law, and all other legislation favorable to the slave power. As chairman of the Senate Committee on Finance for many years, he was a prominent figure in financial legislation, was the author of the low tariff of 1857, and the originator of the bonded warehouse system. In 1860 he was a prominent candidate for the Democratic nomination for President before the Charleston Convention, receiving, next to Douglas, the highest number of votes. He was a member of the first Provisional Confederate Congress, was Secretary of State in the Confederate Cabinet for a few months in 1862, and was then chosen from Virginia a Senator in the Confederate Senate, where he served throughout the war, leading the opposition to the Davis Administration in that body. In 1865 he was one of the Confederate commissioners with Alexander Stephens and J. A. Campbell to confer with President Lincoln and Secretary Seward at Hampton Roads. (See Hampton Roads Conference.) After the war he was Treasurer of the State of Virginia from

1874 to 1880, but took no part in national politics.

HUNTER, WILLIAM (1718-83). A celebrated Scotch surgeon, the elder brother of John Hunter. He was born at Long Calderwood, Lanarkshire. He took up the study of theology at the University of Glasgow, but decided to devote himself to the study and practice of medicine. In 1746 he was invited by a society of naval surgeons to deliver a course of lectures on operative surgery. After 1748 he confined himself almost exclusively to obstetrics, and became connected with the Middlesex and the British Lying-in hospitals. In 1764 he became physician extraordinary to Queen Charlotte; and in 1768 was appointed professor of anatomy in the Royal Academy. His principal work is an *Anatomical Description of the Human Gravid Uterus and Its Contents* (1783).

HUNTER, Sir WILLIAM WILSON (1840-1900). A British Indian administrator, scholar, and statistician, born in Glasgow. Educated at Glasgow, Paris, and Bonn, he entered the Indian civil service in 1862. Seven years after he was transferred from Orissa and put on special duty to plan an Imperial gazetteer of British India; in 1871 he was appointed director-general of statistics. Ten years later, after the appearance of the first edition of the *Imperial Gazetteer*, which was edited by Hunter, and is one of the greatest works of reference on India, he was made a member of the Governor-General's council, and in 1882 acted as president of the educational commission. He retired from the service in 1887, settled at Oxford, and became a regular correspondent of the London *Times* on affairs in India. He wrote in a vigorous and picturesque style, and for the most part with great scientific accuracy: *Annals of Rural Bengal* (5th ed. 1872); *Comparative Dictionary of the Non-Aryan Languages of India and High Asia* (1868), which has more valuable material than original induction, as Hunter himself saw afterwards; a *Statistical Account of Bengal* (1875-77); *Statistical Account of Assam* (1879); *A Brief History of the Indian Peoples* (1880; and, in more expanded form, 1895, under the title *The Indian Empire*); *Lord Mayo* and *Lord Dalhousie* (1890), in *Rulers of India*; *Bombay, 1885-1890* (1892); an idyll, *The Old Missionary* (1895); a biography of his friend Brian Houghton Hodgson (1896); *The Thackerays in India* (1897); and the incomplete but valuable *History of British India* (1899-1900). Consult Skrine, *Life of Sir William Wilson Hunter* (London, 1901).

HUNTING (AS. *huntung*, from *huntian*, to hunt; connected with Goth. *hinþan*, to seize, and probably with Eng. *hand*). The pursuit of game, especially as a recreation or sport. The true sportsman is a strong supporter of every law designed for the protection of game (see GAME LAWS), and rarely kills game for any other purpose than for eating, unless it is a dangerous creature or a nuisance. Thus an animal like the fox is hunted partly on account of its destructiveness and partly for the enjoyment to be obtained in its pursuit. *Drag-hunting*, in which the hounds follow the trail of an aniseed bag which has been previously dragged over a selected course, is a favorite substitute for fox-hunting. Hunting is a very ancient amusement, and the pursuit of game, either as a pastime or for the necessities of subsistence, has from the earliest times been one of the most prominent occupations of the human race. According to tradition, Alexander the Great paid a large sum for a treatise on this subject by Aristotle, while the chase has been described by Appianus, Nemesianus, and many other classic authors.

FIREARMS. The improvement in firearms has worked a great revolution in the hunting and shooting of such animals and birds as come under the game laws, or are regarded as permissible quarry by the huntsman. Nevertheless, it has made more necessary than ever the study of natural history and woodcraft by the would-be hunter. In order to be a first-class shot, or to attain dexterity in the use of the sporting gun, it is necessary that the weapon should 'fit' the shooter. Proper regard must be paid to the weight of the weapon, and the ease with which it can be manipulated; it must be adapted to his chest, length of arm, etc., so that it may be readily brought into service without any straining of the body, arms, or muscles of the neck. An experienced gunsmith should be consulted, who will easily decide the weapon best suited for his customer. The weight of the weapon depends largely on the size of the bore and the length of the barrels. For a more detailed description of the various types of shotgun for every variety of game, the reader is referred to SMALL ARMS.

DOGS. A description of the various varieties of dogs used in the hunting or pursuit of game will be found under FIELD DOGS. Other closely related articles are GAME-PRESERVE; HORSE; and HORSEMANSHIP.

There are many methods of hunting, and some animals necessitate a pursuit in special ways, but the killing of game by shooting is by far the most common method, and the one to which this article is largely devoted. In Europe, and in Great Britain particularly, the various forms of shooting may be grouped as follows: *Open Shooting.*—Partridge, grouse, plover, quail, landrail, snipe, etc.; hares and rabbits. *Covert Shooting.*—Pheasants, woodcocks, hares, and rabbits. *River and Pond Shooting.*—Wild duck, widgeon, teal, etc. *Salt-Water Wild-fowl Shooting.*—Such marine wild-fowl as the wild swan, wild goose, brent goose, etc. Formerly the game was hunted on open moors, stubbles, fens, and marshes, or in coverts, aided by spaniels and beaters; or else it was stalked on the hills (see DEER-STALKING), or along the shores of lakes and estuaries. This form or method still obtains in Continental Europe, the modern English method being the exception. In consequence of improved methods of agriculture, shooting over dogs in England and parts of Scotland and Ireland has become practically a thing of the past, and the 'drive' or *battue* has, of necessity, become the vogue. In America dogs may be regarded as a necessity. Many rules have developed for the guidance of sportsmen when shooting together in the field, some of the more important of which may be mentioned. Where two persons are shooting together it is the rule for one not to shoot at a bird which is flying toward his companion. It is very necessary to condemn the firing across a comrade's face; and good fellowship demands that a bird should never be fired at if it is flying so that it must cross before a companion until

he has failed with both barrels of his gun. Where the birds fly directly away from the sportsmen, shots are taken at them alternately unless several should rise at once, when it is permissible for each man to fire at the birds on his own side.

Snipe make their first appearance in springtime, and are usually found in meadows and salt marshes. The element of chance enters very largely into the sport of snipe-shooting, but the hunter accustomed to their habits will usually be successful. Windy weather, if the wind is not too high, is a favorable time. Among experienced gunners, jacksnipe is a great favorite, owing to the impossibility of formulating for it any fixed rule. No two snipe fly alike; one may flush at fifteen feet and another at fifteen yards; one may steady thirty yards away, another at forty, and another may not steady until clear out of range. *Woodcock.*—During the day these birds may be found seeking for food in marshy thickets. When disturbed they fly in a rising straight line as far as the top of the bushes, and then after making some little distance horizontally, they settle down by means of a number of quick zigzag movements. *Grouse.*—The two most important varieties are the ruffed grouse and the pinnated prairie-chicken. In common with the Canada grouse (spruce partridge), and the blue and sharp-tailed grouse of the West, they have stout bills, short feathered legs, and dark plumage. The bird is found in thick woods, and is greatly protected by its color, which is so much like that of the ground that it is frequently overlooked. It is very shy and wild, and frequently will run far ahead of the dogs, and eventually rise completely out of range. Sometimes they are hunted with dogs and shot after they have taken refuge in a tree, but the keen sportsman never shoots unless he can secure them on the wing. The ruffed grouse is the most cunning game-bird to be found in the Northern States. *Quail* is often called a partridge in the Southern States, and is popularly known as the Bob White. There are almost fifty varieties of the bird, all of which have practically the same conformation. They are found in the Eastern and Middle States, but are more abundant in the South and Southwest. They afford good sport and are more easily got at than grouse or woodcock. After the pointers or setters have flushed them they make a very swift flight, and unless the hunter can come up with them immediately they are raised, they are likely to get out of range. *Wild fowl* (in which general description is included swans and geese, and among the ducks canvasbacks, redheads, mallards, teals, pintail, and wood-duck) abound especially in the lakes of the Northern States, along the New Jersey coast, Delaware and Chesapeake bays, Currittuck Sound, the Mississippi Valley, Puget Sound, the Willamette and Columbia rivers, and all the lakes and bays of the Northwest. They are very fond of wild rice and wild celery, and are frequently lured to waters in which they have no natural food by hunters who plant wild rice. They are hunted in a variety of ways, among which may be enumerated the following: The hunter may station himself concealed near a point over which they fly, and shoot them as they pass; or he may put out decoys (see DECOY); or he may steal upon them while they are feeding or resting. In the Chesapeake Bay particularly, and occasionally elsewhere, sink-boats are used, in which the gunners lie and shoot the birds as they fly over. Another method is to sink a box in the sand or shallow water in which the hunter lies as in a sink-boat. Another very successful way is to employ the trained Chesapeake Bay dog, which will run up and down the shore, and by its actions excite the curiosity of the birds, which, if they approach to satisfy their curiosity, are within easy range of the gun. This method is known as 'toling.' *Wild turkey* is hunted with or without a decoy call or whistle. They are easily tracked by their trail on the ground, and may be shot at their roosts if surprised at break of day. One of the hardest birds to secure is the *upland plover* or *Bartram's sandpiper*, which cannot be approached except by means of some trick. For instance, in Rhode Island it is frequently hunted from a carriage in which the huntsman hides while he is driven in gradually lessening circles around where the bird is supposed to be. He must, however, be ready to spring out and fire the moment the bird rises. Occasionally trained ponies are used in much the same way as the carriage, the huntsman being concealed by the animal's fore legs and shoulder. Another method is to build a house of boughs and wait for the birds to alight in its vicinity. *The rail*, or ricebird, as it is known in the South, is usually hunted from boats at flood tide—a method which demands considerable skill and experience on the part of the man who manipulates the boat. Although they fly very slowly and are within the capacity of an indifferent shot, they must be killed at the first shot, or they will dive, and in a majority of instances be entirely lost. *Cranes* are hunted in the Mississippi Valley, their plumage being the principal attraction.

The hunting of game animals, as the lion, tiger, leopard, etc., will be found treated under the titles by which they are described. (For the fox, see FOX-HUNTING.) *Bears* are still found throughout the United States, but owing to the increasing proximity of man, and the increased employment of arms of precision, they have become exceedingly wary, and in many instances even timid. They may be found in the Catskill and Adirondack mountains in the East, the mountains of North Carolina and West Virginia, and in South Carolina, Mississippi, Georgia, Florida, Arkansas, and the mountains and forests of the West. They are hunted with rifles, and by the aid of dogs. *Hunting the hare* with beagles (q.v.) is a very popular sport in England, partly for the exercise it affords, and partly for its economy, in that horses are not required. The following list gives the charge and gauge of shotgun suitable for the various kinds of game-birds. Larger and wild animals are usually shot with a rifle, for which see SMALL ARMS. The first figure after the name of the bird has reference to the gauge, and the second figure to the size and kind of shot: Sora, rail, etc., from 12 to 20; 10 trap. Woodcock, 10 and 12; 10 shot. Snipe, 10 and 12; 9 shot. Quail, 10 and 12; 8 trap. Prairie-chicken, 10 and 12; 8 shot. Ruffed grouse, 10 and 12; 7 trap. Squirrel, 10 and 12; 6 shot. Teal, 10 and 12; 7 shot. Pintail, 10 and 12; 6 shot. Mallard, 10 and 12; 5 shot. Redhead, 10 and 12; 4 shot. Canvasback, 10 and 12; 3 shot. Turkey, 10 and 12; 2 shot. Goose, 10 and 12; BB.

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HUNTING CAT, or HUNTING LEOPARD. See CHEETA.

HUNTING DOG. This interesting animal (*Lycaon pictus*), which inhabits all the more open parts of Africa south of the Sahara and Abyssinia, is an aberrant species of dog distinguished from the typical Canis by having four toes on each foot, and other structural peculiarities. It is about as tall as a greyhound, its legs being relatively long and slender, and adapted to the swift and enduring speed upon which it must depend for a livelihood. The head is broad and flat, with a short muzzle armed with massive teeth, rather large upstanding furry ears, and a suggestion of the hyena in the physiognomy; hence it is sometimes called 'hyena-dog,' though the likeness (even to the spotted hyena) is wholly superficial. (See Plate of WOLVES AND DOGS.) The fur is short, thick, and smooth, and grows more shaggy about the cheeks and throat; and the tail is long and wolf-like. In general color this dog is yellowish gray, but it is marked most irregularly with a variety of colors, such as a combination of red, white, yellow, and black spots, so that the hyena-dog may be regarded as the most particolored of all mammalia. In the southern Sudan, where the animals are plentiful, Schweinfurth saw one specimen that was perfectly tame, required no other restraint than a cord, and yielded to its master with all the docility of an ordinary dog. This fact appears to corroborate the assertion of Livingstone that the natives of the Kalahari desert are accustomed to break in this animal and train it for the chase.

To the Africans generally, however, both white and black, the hyena-dog is one of the most truly wild and dangerous animals of the country, taking the place of the wolves of the northern part of the world. They gathered into packs, and astonished and terrified the early settlers and explorers by their numbers, audacity, and strange cries. They frequented mostly plains and scantily forested or brushy regions, where the small antelopes abound, which were their principal prey, and which they would pursue in concert, often only two working together, until the baffled victim (often of the larger species) was cornered or exhausted and might be pulled down. They were a terrible scourge to the sheep and goats of the early frontier farmers, and killed or mangled many more of the flock in one of their nocturnal forays than they could possibly eat. The war waged against them in consequence, and the diminution of the wild game, has caused a great decrease in their numbers; but numerous bands still range the wilds of East and Central Africa, and the deserts west and north of Cape Colony. Consult: for early history of the animal, the books of Livingston, Gordon-Cumming, Moffat, Harris, and their contemporaries; and for later facts, Schweinfurth, *Heart of Africa*, translated (London, 1873); Selous, *A Hunter's Wanderings* (London, 1890). See DOG.

HUNTINGDON. The capital of Huntingdonshire, England, on the Ouse, 17 miles south of Peterborough (Map: England, F 4). It is celebrated as the birthplace of Oliver Cromwell, the entry of whose birth is to be seen in the register of Saint John's Church. The grammar school, founded in 1260, where he was educated, has been restored. Of Saxon origin, the town was the seat of a royal castle built in 919. Huntingdon received its charter of incorporation in 1189. A fine bridge erected in the thirteenth century connects it with Godmanchester. Population, in 1891, 4350; in 1901, 4260.

HUNTINGDON. A borough and the county-seat of Huntingdon County, Pa., 98 miles west of Harrisburg; on the Juniata River, and on the Pennsylvania Railroad (Map: Pennsylvania, C 3). It is the seat of Juniata College (German Baptist Brethren), opened in 1876, and of the State Industrial Reformatory. The city is in an agricultural and fruit-growing section with valuable forests and deposits of iron, coal, fire-clay, and limestone, and has manufactures of flour, machinery, stationery, sewer-pipe, boilers, radiators, furniture, and knit goods. Huntingdon was settled about 1760 on the site of a famous Indian council ground, now marked by a 'Standing Stone Monument,' erected at the borough centennial. The government is administered under the original charter of incorporation, adopted in 1796, which provides for a chief burgess, chosen every three years, and a council elected at large. Population, in 1890, 5729; in 1900, 6053.

HUNTINGDON, HENRY HASTINGS, Earl of (1535-95). An English noble, leader of the Protestant party, son of Francis Hastings, the second Earl, whom he succeeded in 1561. He was an intimate of Edward VI., who knighted him in 1548; and, through his mother's descent from George, brother of Edward IV., claimed after Elizabeth the succession to the crown. Especially in 1562, during her severe illness, he was considered as her probable successor. He hotly opposed the scheme to marry Mary Stuart to Norfolk, and was intrusted by Elizabeth to see that the Scotch Queen did not escape at the time of the threatened uprising in 1569. In the same year he was one of the council which considered the evidence against Mary; helped try Norfolk in 1573; and was prominent and active in the preparations of 1588 for the Spanish invasion.

Huntingdon was a zealous Puritan in sympathies, possibly for political reasons. He was succeeded by his brother, George.

HUNTINGDON, SELINA HASTINGS, Countess of (1707-91). One of the most influential promoters of the early Methodist movement. She was the second of three daughters of Washington Shirley, second Earl Ferrars, and was born at Stanton-Harold, Leicestershire, August 24, 1707. She married, in 1728, Theophilus, ninth Earl of Huntingdon. She adopted the principles of the Methodists, much to the dismay of her friends, and gave her life with increasing zeal as the years went on to the interests of the new sect, introducing its ideas into aristocratic circles, to which its other adherents had no access. She was an intimate friend of both Wesleys, of Whitefield, and of many other clergymen prominent in her time. She became a widow in 1746. In the dispute between the Wesleys and Whitefield she sided with the latter, and assumed a leadership among his followers, who came to be known as 'The Countess of Huntingdon's Connection.' For the education of ministers she established and maintained a college of Trevecca, in Wales; removed, in 1792, to Cheshunt, Hertfordshire, and built, or became possessed of, numerous chapels in different parts of the country, the principal one being at Bath. She likewise expended large sums in the support of young men trained to itinerant preaching, as well as in private charity. She died in London, June 17, 1791. By her will she created a trust bequeathing her chapels to four persons for their care and management after her death. The number of these chapels was then sixty-four, of which about half still survive. Consult *The Life and Times of Selina, Countess of Huntingdon* (London, 1839-40).

HUNTINGDONSHIRE. A south-midland county of England, bounded on the east by Cambridgeshire, on the south by Bedfordshire, and on the west and north by the County of Northampton. Area, 366 square miles, almost the whole of which is in arable or pasture lands (Map: England, F 4). Population, in 1891, 57,760; in 1901, 57,770. It is watered chiefly by the Ouse and by the Nene, which skirts its northern boundary. The northern portion of Huntingdonshire is included in the great fen-country. The soil is various; clay, however, predominates generally. Grain, beans, rape, and clover are the chief crops. Capital, Huntingdon.

Huntingdonshire was traversed by two Roman roads, and Roman remains, as coins, pottery, etc., have been found. In early Anglo-Saxon times it belonged to East Anglia, afterwards to Mercia.

HUNTINGTON. A city and the county-seat of Huntington County, Ind., 24 miles southwest of Fort Wayne, on Little River, and on the Wabash and the Chicago and Erie railroads (Map: Indiana, D 2). It has a United Brethren college and a public high-school library with 11,000 volumes. There are railroad shops of the Chicago and Erie, numerous lime-kilns and wood-working establishments, and manufactures of boots and shoes, pianos, bicycles, etc. The city has also important commercial interests. Settled in 1834, Huntington was incorporated as a town in 1848, and in 1873 was chartered as a city. Under the charter of 1873, the government is vested in a mayor, elected biennially, and a city council. The water-works and electric-light plant are owned and operated by the municipality. Population, in 1890, 7328; in 1900, 9491.

HUNTINGTON. A town, including several villages in Suffolk County, N. Y., 30 miles east by north of New York City, on Long Island Sound and on the Long Island Railroad (Map: New York, G 5). It is in a fertile agricultural district and has manufactures of brick and pottery, but is primarily a residential suburb of New York and a popular summer resort. There are a public library of 3500 volumes and a monument marking the spot where Nathan Hale was captured. The government is administered by town meetings, which are held biennially. Population, in 1890, 8277; in 1900, 9483.

HUNTINGTON. A city and the county-seat of Cabell County, W. Va., 52 miles west of Charleston, on the Ohio River, and on the Chesapeake and Ohio, the Ohio River, and the Guayandotte Valley railroads (Map: West Virginia, B 3). It is picturesquely situated and well laid out, and has Marshall College (State normal school), the West Virginia Asylum for Incurables, and a Carnegie Library. The city controls an important commerce, and has several wholesale establishments, shops of the Chesapeake and Ohio Railroad, an extensive car-manufacturing concern, a steel plant, machine-shops, a brewery, and manufactures of glass, picture-frames, stoves, etc. Settled and incorporated in 1871, Huntington is now governed under a charter of 1895, revised in 1901, which provides for a mayor, elected every two years, and a unicameral council. Population, in 1890, 10,108; in 1900, 11,923.

HUNTINGTON, DANIEL (1816—). An American historical, genre, and portrait painter. He was born in New York, October 14, 1816, and was educated at Hamilton College. In 1835 he studied with Professor Morse, and later with Inman and Trumbull; in 1839 he visited Italy, studying with Ferrero in Rome. On his return to America he became a resident of New York. He was elected member of the National Academy in 1840, and held the office of president from 1862 to 1869, and from 1877 to 1891. He returned to Europe in 1854, and painted several important works at Florence and Rome.

His pictures are illustrations of taste rather than elaborate painting; his color is subdued but good, and his style is unaffected. He has been chiefly engaged in portrait painting, but he has also painted historical and genre works of note. Two of his largest canvases are "Lady Washington's Reception Day" and the "Atlantic Cable Projectors," in the Chamber of Commerce, New York, both containing exceptionally fine portraits. His other principal works are: "Florentine Girl" (1839); "Shepherd Boy" (1840); "Sacred Lesson" (1844); "Mercy's Dream" (1850), in the Corcoran Gallery, Washington (a replica in the Pennsylvania Academy, Philadelphia); "Henry VIII. and Catharine Parr" (1850); "Venice," owned by J. P. Morgan, New York; "Study in the Woods," owned by C. P. Huntington, New York; "The Sibyl," Historical Society, New York; "Republican Court" (1876), Stuart Collection, New York; "Philosophy and Christian Art" (1878). Among his portraits are those of Presidents Lincoln, Union League Club, New York; Van Buren, State Li-

brary, Albany; Gov. E. D. Morgan, William E. Dodge, Chancellor Ferris, New York University; Mr. and Mrs. Taylor, Corcoran Gallery, Washington; Bishop Whipple, Rev. Morgan Dix, Bishop Potter; Judge Blatchford (1879), United States District Court; Gen. John A. Dix (1880), Historical Society, New York; Hon. John Sherman (1881), Chamber of Commerce, New York; Rev. Dr. Adams (1883), Union Theological Seminary, New York; Hon. R. C. Winthrop, United States Congress; Julius Hallgarten, founder of prizes of the National Academy.

HUNTINGTON, FREDERICK DAN (1819—). An American clergyman, the first Protestant Episcopal Bishop of Central New York. He was born at Hadley, Mass.; graduated at Amherst in 1839, and at Harvard Divinity School in 1842, and was pastor of the South Congregational (Unitarian) Church, Boston. In 1855 he became preacher at Harvard and Plummer professor of Christian morals there. In 1860 he left the Unitarian Church to become an Episcopalian. Resigning his professorship, he organized a parish in Boston, and was its rector until 1869, when he was consecrated Bishop of the newly created Diocese of Central New York. Among his numerous works are: *Lectures on Human Society* (1860); *Memorials of a Quiet Life* (1874); *Christ in the Christian Year* (2 vols., 1877-81); and *The Golden Rule Applied to Business and Social Life* (1892).

HUNTINGTON, JABEZ WILLIAMS (1788-1847). An American jurist and legislator. He was born in Norwich, Conn., graduated at Yale in 1806, studied and practiced law in Litchfield, Conn., was a representative in Congress from 1829 to 1834, was then a judge of the highest courts in Connecticut, and was finally United States Senator from 1840 until his death.

HUNTINGTON, JEDIDIAH (1743-1818). An American general in the Army of the Revolution, born in Norwich, Conn., the son of Jabez Huntington (1719-1786). He graduated at Harvard in 1763, joined the American Army at Cambridge, became a brigadier-general in 1777, and took part in many important engagements until the close of the war, when he was brevetted major-general. He was one of the organizers of the Society of the Cincinnati. He became collector of the port of New London in 1789, and held the office twenty-six years.

HUNTINGTON, SAMUEL (1732-96). An American lawyer and signer of the Declaration of Independence. He was born at Wyndham, Conn.. on a farm, educated himself for the law; practiced at Norwich, represented that constituency in the General Assembly, and became associate justice of the Superior Court (1774), of which, ten years later, he became Chief Justice. From 1776 to 1784 he was a member of the Continental Congress, of which he was president, as the successor of John Jay, in 1779-80. From 1786 to his death, Huntington was Governor of Connecticut. His nephew and adopted son, SAMUEL HUNTINGTON (1765-1817), graduated at Yale in 1785, was admitted to the bar in 1793, and in 1801 removed to Cleveland, Ohio. He passed the rest of his life in that State, and held the offices of Judge of the Superior Court, Chief Justice of the Supreme Court, State Senator, and Governor of the State from 1808 to 1810.

HUNTINGTON, WILLIAM HENRY (1820-85). An American journalist, born at Norwich, Conn. He spent most of his life in Paris, where for twenty years he was a correspondent of the New York *Tribune*. He remained in Paris during the siege of 1870-71, engaged in the relief of the suffering. His remarkable collection of portraits of Washington and Franklin was given to the Metropolitan Museum of Art.

HUNTINGTON, WILLIAM REED (1838—). An American clergyman, of the Protestant Episcopal Church. He was born in Lowell, Mass., graduated at Harvard in 1859, and became an instructor in chemistry there. Entering the Episcopal ministry, he was rector of All Saints Church, Worcester, Mass., in 1862-83, and of Grace Church, New York, after 1883. Dr. Huntington always took a prominent and influential part in public affairs. In his own communion he was active in the movement for liturgical revisions, and was long chairman of the Prayer-Book Revision Committee, and joint editor with Dr. Samuel Hart of the *Standard Prayer-Book* of 1892. In addition to sermons, his publications include: *The Church Idea, an Essay Toward Unity* (1870); *Conditional Immortality* (1878); *The Book Annexed, Its Critics and Its Prospects* (1886); *Short History of the Book of Common Prayer* (1893); and *A National Church* (1898).

HUNTLY, GEORGE GORDON, fifth Earl of (?-1576). A Scottish statesman. He was educated for the Church, but gave up the idea of entering it upon the death of his elder brother, and became Sheriff of Inverness and the keeper of its castle (1556). Entering into the political plots of his time, he was more than once imprisoned and condemned to death. Mary, Queen of Scots, released him and restored his estates and title, with a view to gaining his adherence; but he refused to turn Catholic to please her, though he sided with his brother-in-law, Bothwell, in the troubles that followed. Huntly tried to rescue Rizzio, and was a main mover in the murder of Darnley as well as in the Queen's subsequent marriage to Bothwell, to which he was a witness. He conspired to rescue his royal mistress from Lochleven (1568), and raised troops in her service; but his lifelong enemy, the Earl of Moray, vanquished him at last, and Huntly's resolve to give up her cause as hopeless was Mary's chief reason for surrendering to Elizabeth.

HUNTSVILLE. A city and the county seat of Madison County, Ala., 100 miles north of Birmingham, on the Memphis and Charleston and the Nashville, Chattanooga and Saint Louis railroads (Map: Alabama, C 1). It is in the fertile valley of the Tennessee River, and has important farming, cotton-growing, and stock-raising interests. There are cotton-mills, a foundry and machine-shops, saw-mills, sash and blind factories, etc. Among the educational institutions are the Huntsville Female College, Huntsville Female Seminary, a State normal and industrial school, and the Central Alabama Academy. The government, as provided by a charter of 1898, is vested in a mayor, elected biennially, and a council which controls appointments to all administrative departments. The city owns and operates its water-works. Settled in 1775, Huntsville was first incorporated in 1809. At one

time it was the capital of the State. Population, in 1890, 7995; in 1900, 8068.

HUNTSVILLE. A city and the county-seat of Randolph County, Mo., seven miles west of Moberly, on the Wabash Railroad (Map: Missouri, D 2). It has coal-mines and some manufactures, and a trade in coal, farm produce, live stock, etc. Population, in 1890, 1836; in 1900, 1805.

HUNTSVILLE. A city and the county-seat of Walker County, Tex., 75 miles north of Houston, on the International and Great Northern Railroad (Map: Texas, G 4). It is an important cotton market, and manufactures cotton goods, cottonseed oil, wagons, furniture, steam-engines and boilers, cigars, etc. The city has the Sam Houston Normal School (State), the State Penitentiary, and, of historic interest, the old home and grave of Gen. Sam Houston, and the grave of H. Yokum, the first historian of Texas. Huntsville was first settled about 1836. The government is administered by a mayor, elected every two years, and a unicameral council. Population, in 1890, 1509; in 1900, 2484.

HUNYADY, hụn'yŏ-dĭ, JÁNOS (John Hunniades) (c.1387-1456). The national hero of Hungary. His origin is shrouded in obscurity. He saw his first military service under King Sigismund. Under Sigismund's successor, Albert II. (1438-39), he became known as a brilliant soldier, and was ban of a district on the borders of Transylvania, exposed to the Turkish attacks. It was the period when the Turkish power was at its height, and it seemed within the range of possibility that the Mohammedans would obtain possession of the greater part of the Danube Valley and seriously menace Western civilization. To Hunyady, more than to any other one man, Europe owes it that the danger was averted. Albert died in 1439, and as there was no male heir, the nobles elected King Ladislas, of Poland, to the Hungarian throne. Meanwhile the wife of Albert gave birth to a son, Ladislas Posthumus, and a civil war resulted, of which the Turks took advantage. Hunyady, however, defeated them in several battles, and in 1443 an advantageous peace was made. Nevertheless, King Ladislas, incited by the Papal Legate, Julian Cesarini, began war again, and on November 10, 1444, the Hungarian army under Ladislas and Hunyady was overwhelmed at Varna. Ladislas was among the slain, whereupon Ladislas Posthumus was recognized by all parties as King, and Hunyady was made Regent during the minority. War was actively carried on both against the Turks and Frederick III. In 1448 Hunyady was completely defeated by the Turks at Kossovo, after which he was held prisoner for a short time by the Servians. His most splendid achievement was the defense of Belgrade in 1456 against the army of Mohammed II., the conqueror of Constantinople, in which he was aided by the celebrated John Capistrano (q.v.). On June 15, 1456, the Turkish attack began, and on July 14th Hunyady forced his way into the city, while Szilágyi, the commander of the town, made a sortie, and finally, on July 21st, the Turks were decisively repulsed and raised the siege, having lost 80,000 men. A few days after this glorious victory dysentery broke out in the army, and Hunyady, the great Christian hero, after a short illness, fell a victim to the disease. He left two sons, Ladislas and Matthias Corvinus. The former was treacherously imprisoned and beheaded at Buda, by Ladislas Posthumus. Matthias, generally known as Matthias Corvinus, became King of Hungary in 1458. Consult Chassin, "Jean de Hunyad," in *La Hongrie* (Paris, 1856).

HUNZAS, hōōn'zäz. One of the Aryan tribes of Dardistan, inhabiting the district about Hunza.

HUON DE BORDEAUX, ụ'ŏn' de bôr'dō'. A French *chanson de geste*, probably belonging to the thirteenth century, and then somewhat altered when rewritten for Charles Seigneur de Rochefort, early in 1454. The oldest printed edition is in folio and without date; the second, in quarto, bears the date 1516. The English translation was made by Lord Berners, in Henry VIII.'s time. The subject has proved a tempting one for poets, the famous *Oberon* of Wieland, and Weber's opera of the same name, being among the poems founded upon it, while Shakespeare drew from it in the *Midsummer Night's Dream*. A prose adaptation has been issued by Gaston Paris (1899).

HU'ON PINE. See DACRYDIUM.

HUPA, hōō'pä. A tribe of Athabascan stock, originally occupying a number of small villages on the lower Trinity River, Lower California, now gathered on the Hupa Valley Reservation in the same region. Like some of the stock, they were formerly of warlike and aggressive character, and are said to have brought a number of surrounding tribes under regular tribute, besides compelling them to a certain extent to use their language. In their pristine condition, they subsisted chiefly upon salmon, dried and smoked, and acorns made into flour and porridge. They were noted for the variety and beauty of their basketry. They now number 420, not including some remote tribes.

HU-PEH, hụ'pĕ (Chin., Lake North). One of the eighteen provinces of China proper, situated in the very centre of the country, and surrounded by the populous and important provinces of Hu-nan on the south, Sze-chuen on the west, Shen-si and Ho-nan on the north, and Ngan-hwei on the east. The Yang-tse from west to east runs through its southern part, while the Han, in its tortuous course from the northwest, irrigates its fields and provides a splendid waterway for its commerce. The province is mountainous in the north, being penetrated with spurs and outlines from the Ta-pashan and Fu-niu mountains. Toward the southwest it is low-lying, and is covered with many marshes, shallow lakes, and lagoons, the remains of that portion of the Tung-ting Lake which formerly spread much farther north than it does now. These sheets of water have been connected by navigable ditches, and serve as a safe short cut for the smaller class of native junks from Sha-shi (on the Yang-tse opposite the entrance to the Tung-ting) to Hankow, or to towns farther up the Han.

The area of the province is estimated at 70,450 square miles, and its population at 33,790,556. For administrative purposes it is divided into 10 fu, or departments, 1 sub-department, 60 hien (or hsien) or prefectures, and 10 subprefec-

tures. The capital is Wu-chang, on the Yang-tse, opposite Hankow, where the Futai or Governor of the province, and the Tsung-tuh or Governor-General of the united provinces of Hunan and Hu-peh reside. Three of the towns are treaty ports—Hankow, Sha-shi, and I-chang (qq.v.)—all on the left bank of the Yang-tse, There are several extensive coal-fields in the province, and both coal and iron are now being actively mined by modern methods.

HUPFELD, hōōp'fĕlt, HERMANN (1796-1866). A German theologian and Orientalist. He was born in Marburg, studied at the university there, was professor from 1825 to 1843, and in the latter year succeeded Gesenius at Halle. His most important work is the *Uebersetzung und Auslegung der Psalmen* (1855-61), characterized by sound scholarship. His further publications include: *Exercitationes Æthiopicæ* (1825); *Die Quellen der Genesis* (1853); and *Die heutige theosophische und mythologische Theologie und Schrifterklärung* (1861). Consult Riehm, *Dr. Hermann Hupfeld* (Halle, 1867).

HURA, hū'rȧ (Neo-Lat., from the native name). A genus of plants of the natural order Euphorbiaceæ. *Hura crepitans*, a native of the West Indies and tropical America, is a tree which abounds in a very acrid milky juice, and has stalked, heart-shaped, acuminate, leathery leaves. The fruit is a woody capsule, of the size of a large apple, very much flattened, formed of 12 to 15 carpels, each containing a large seed. These carpels surround a common axis, and separate with great elastic force. The tree is called sandbox-tree, because, before the use of blotting-paper became general, the capsule was generally used in the West Indies as a sandbox for powdering letters with fine sand; but it was found necessary to bind it with a hoop of iron, as, even after being used for years, it would sometimes burst with a loud report. The seeds are a violent drastic purgative.

HU'RAM. See HIRAM.

HURD, RICHARD (1720-1808). An English prelate. He was born at Congreve, in Staffordshire, January 13, 1720; studied at Cambridge University, and became fellow of Emmanuel College in 1742. In 1749 appeared anonymously his first notable production, *Commentary on Horace's Ars Poetica*, in which he advocated the now discredited theory that the poem was a systematic criticism of the drama of the Romans. In 1750, on Warburton's recommendation, he was appointed one of the Whitehall preachers. He became Bishop of Lichfield and Coventry (1775), and in 1783 declined the Archbishopric of Canterbury. He died at Hartlebury Castle, May 28, 1808. His principal works are: *Moral and Political Dialogues*, in which historic characters are introduced as interlocutors on such themes as sincerity, retirement, the golden age of Elizabeth, and the constitution of the English Government (1759); *Letters on Chivalry and Romance* (1762); and *An Introduction to the Study of the Prophecies Concerning the Christian Church, and Particularly Concerning the Church of Papal Rome* (1772). His complete works with life appeared in eight volumes (London, 1811). Consult, also, his life by F. Kilvert (ib., 1860).

HURDWAR, hĕrd-wär'. See HARDWAR.

HURDY-GURDY (of onomatopoetic origin). A very old musical instrument of the stringed kind, which, under the name of leyer, or Bauernleier, spread from its native country, Germany, over a great part of Europe. The hurdy-gurdy consists of a flat, oval-shaped sounding-board, over which the strings are stretched, with a back or bottom of the same size and shape. These are bound together by tolerably deep sides, or ribs. On one side are from ten to twelve finger-keys, for shortening the sounding lengths of the strings when required. There are four strings of gut which are put into a state of vibration by being rubbed by the edge of a small wooden wheel charged with rosin, and turned by a handle. Two of the strings are tuned in unison as a key-note, or one of them a fifth above; they are placed out of reach of the keys, and form a sort of drone-bass. The other two strings are acted on by the keys, and produce a diatonic scale of from ten to twelve notes. The hurdy-gurdy is only suited to simple music, and was used for such as had many repetitions. From the tenth to the twelfth century it was one of the most popular instruments, but was then superseded until the eighteenth, when it again, and especially in France, became very popular. It is now nearly obsolete. The name is also applied to a large street or barrel organ (q.v.). For illustration, see MUSICAL INSTRUMENTS.

HURLBUT, JESSE LYMAN (1843—). An American clergyman of the Methodist Episcopal Church. He was born in New York City; graduated at Wesleyan University in 1864, and held several pastorates in New Jersey. After 1879 he was connected with the Sunday-school and tract work of his denomination, spending much of his time as an editor of Sunday-school literature. He was secretary of the Epworth League in 1889-92, and for some time was associated with Dr. J. H. Vincent in the direction of the Chautauqua Literary and Scientific Circle. Among his works are: *Manual of Biblical Geography* (1882), and *Outlines in Old Testament History* (1890).

HURLBUT, STEPHEN AUGUSTUS (1815-82). An American soldier and diplomat, born in Charleston, S. C. He studied law, was admitted to the bar in 1837, and practiced in Charleston until 1845, when he removed to Belvedere, Ill. He was a Whig member of the Illinois State Constitutional Convention in 1847, served as a Whig Presidential elector in 1848, was in the State Legislature from 1859 to 1861, and in May, 1861, became a brigadier-general of volunteers. He commanded a division at Fort Donelson, after its capture, and at Shiloh; was promoted to be major-general of volunteers in 1862; commanded the Sixteenth Army Corps during Sherman's Mississippi campaign of 1863, and succeeded General Banks as head of the Department of the Gulf. He was returned to the Illinois Legislature in 1867, and was a Republican Presidential elector in 1868. From 1869 to 1872 he served as United States Minister to Colombia, was a member of Congress from 1873 to 1877, and in May, 1881, he was appointed United States Minister to Peru, where he died the following year.

HURLEY. The county-seat of Iron County, Wis., 40 miles east by south of Ashland, on the Montreal River, opposite Ironwood, Mich., and on the Wisconsin Central and the Chicago and

Northwestern railroads (Map: Wisconsin, C 2). It is in the productive Gogebic iron-mining district, several large mines being in the vicinity, and is engaged to some extent also in lumbering, farming, and stock-raising. Population, about 2000.

HURLING. A field sport, akin to the more modern game of hockey (q.v.). It is played today on a field 140 × 84 yards, with goals at each end, the posts of which are 21 feet apart and a cross-bar 8 feet high, and two point-posts 21 feet on each side of the goal-posts. The field is lined across, parallel with the goals, at 21 and 50 yards, and half-way down. The hurley-stick approximates to the ice-hockey stick in shape, but is held with the left hand below the right. The ball, or 'stiller,' is of cork, wound round with woolen threads and covered with leather. It is 5 inches in diameter and weighs 7 ounces. Play is begun by the 14 players on each side facing each other in the centre of the field. The referee then throws the ball between the two lines of players, who thereupon scatter to their respective positions in the field. The object of the players is to drive the ball through the space between their opponents' goal-posts. If the ball passes over the side line, previously appointed sidesmen throw it back into play. The use of the hands is barred, though in a scrimmage a moderate use of the feet is tolerated. There are some very pretty strokes made with the hurley, notably that where the ball is raised in the air with the point and hit forward as it falls.

HURLOTHRUMBO. An operatic burlesque, written by one Samuel Johnson, a Cheshire dancing-master, in 1723, and produced at the Haymarket, April, 1729, the author himself taking the part of Lord Flame. Its prologue was written by Amos Meredith, and the epilogue by John Byrom. It was published by subscription, with a dedication to Lady Delves, in 1730, and a second edition, addressed to Lord Walpole, appeared the ensuing year. It was bitterly satirized by Fielding's *The Author's Farce* (1729).

HURON, hū'rŏn. A city and the county-seat of Beadle County, S. D., 120 miles east of Pierre; on the Great Northern and the Chicago and Northwestern railroads (Map: South Dakota, G 5). It is a division headquarters of the Chicago and Northwestern Railroad, with machine-shops, roundhouses, etc., and has flour-mills and grain-elevators, carriage and wagon shops, a brick-yard, a creamery, and other industries. Population, in 1890, 3038; in 1900, 2793.

HURON. An Indian tribe. See WYANDOT.

HURÓN. The name of certain animals of the family Mustelidæ. See GRISON.

HURON, LAKE. One of the five Great Lakes on the northern frontier of the United States, lying between Lake Superior on the northwest and Lake Erie on the southeast, connected with Lake Michigan on the west, and bounded on the southwest by Michigan and on the north, east, and south by the Province of Ontario (Map: United States, J 2). It is the third in size of the Great Lakes, having a total area of 22,322 square miles, and being about 250 miles long and 190 miles wide. A large arm of the lake in the east, extending far into Ontario, is known as Georgian Bay. Lake Huron receives the waters of Lake Superior through the Saint Mary's River, and those of Lake Michigan through Mackinaw Straits. Its outlet is the Saint Clair River, flowing into Lake Saint Clair, which is connected by Detroit River with Lake Erie. The general direction of the lake lengthwise is from north-northwest to south-southeast. The surface is 9 feet above the level of Lake Erie, 335 feet above Lake Ontario, and 582 feet above the sea, with occasional fluctuations as in the other lakes. Its depth varies from 200 to 700 feet. The waters are very clear and cold, especially in the northern part, and abound in fish, of which the whitefish is the most important. There are few harbors on the west side, but vessels find shelter in Saginaw Bay, about 70 miles north of the outlet, and also in Thunder Bay, as much farther north. Presque Isle is also a fair harbor, and there is good shelter under the south side of the island of Mackinaw. The lake is subject to violent storms, but navigation is safe from May 1st to December 1st. Mackinaw has long been an important post for fur trade with the Indians. Bay City, at the head of Saginaw Bay, is an important lumber depot, and copper-mines have been opened in the upper portions of Manitoulin Bay. Excellent grindstones are cut from the sandstone near Thunder Bay. The main body of water is unbroken by islands, but there is a group of islands in the north, most of them belonging to Canada, the largest of which is Grand Manitoulin. There is much geological evidence to the effect that Lake Huron was formerly deeper and more extensive than at present. See GREAT LAKES.

HURONIAN SERIES. See PRE-CAMBRIAN FORMATIONS.

HURRICANE. See STORM; WIND.

HURRUR. See HARAR.

HURST, JOHN FLETCHER (1834—). A Methodist Episcopal bishop and author. He was born in Dorchester County, Md., graduated at Dickinson College in 1854, and studied theology at the universities of Halle and Heidelberg. After his return to America he held a pastorate in New Jersey from 1858 until 1866. Again going to Germany, for three years he taught theology at the Mission Institute in Bremen, and Frankfort-on-the-Main, and then traveled extensively in Europe, Syria, and Egypt. In 1871 he was chosen professor of historical theology in the Drew Theological Seminary, Madison, N. J., becoming president of the institution two years later. In 1880 he was elected bishop, and has spent much time visiting missions and conferences in Europe and India. In 1891 he was chosen chancellor of the American University, Washington. He translated several theological works from the German, and wrote numerous works on Church history, including a *History of Rationalism* (1865); *Martyrs to the Tract Cause* (1873); *Our Theological Century* (1876); *Bibliotheca Theologica* (1883); and a *History of the Christian Church* (1897-1900).

HURTADO, o͞or-tä'dō, LUIS DE TOLEDO (c.1530-c.1589). A Spanish poet and romancer, born at Toledo. He was the author of *Palmerin de Inglaterra* (1547), a famous romance which ranks next to *Amadis of Gaul.* It was exceedingly popular, and was immediately translated into French, Italian, and Portuguese. Hurtado also wrote: *Tragedia Policeana* (1548); *Comedia de Preteo y Tibaldo* (1552); and *Egloga selviana*

(1553), a pastoral comedy. Consult the study by Vasconcellos (Halle, 1883).

HURTADO DE MENDOZA, dā mān-dō'thā, GARCIA, Marquis of Cañete (1535-1609). A Spanish soldier and administrator, born at Cuenca. He fought in Italy and Germany, but by 1557 was Governor of Chile, where he took part in the local wars. Three years afterwards he was back in Spain, whose battles he fought in Portugal, but he returned to South America as Viceroy of Peru in 1590. He sent out expeditions which resulted in the discovery of the Marquesas Islands, called after him; but he resigned his post in 1596.

HURTER, hōōr'tĕr, FRIEDRICH EMANUEL VON (1787-1865). A Swiss-Austrian historiographer, born at Schaffhausen, and educated there and at Göttingen. He was pastor at Beggingen (1808), and at Löhningen, and in 1835 was made dean and antistes of the Reformed synod. After the publication of his *Geschichte Papst Innocens' III. und seiner Zeitgenossen* (1834-42) he became a Roman Catholic (1844). At about the same time he published *Die Befeindung der katholischen Kirche in der Schweiz seit 1831* (1842-43)), and *Geburt und Wiedergeburt* (1845), an apologia for his conversion. In 1846 he settled at Vienna, and was made historiographer to the Emperor of Austria. Under the liberal rule of Pillersdorf he resigned this position, but was reappointed in 1851. His other historical works include: *Geschichte des ostgothischen Königs Theodorich* (1807); *Denkwürdigkeiten aus dem letzten Decennium des 18. Jahrhunderts* (1840); *Philipp Lang, Kammerdiener Rudolfs II.* (1851); *Zur Geschichte Wallensteins* (1855); and *Wallensteins vier letzte Lebensjahre* (1862). Consult Hurter (his son), *Friedrich von Hurter und seine Zeit* (Gratz, 1876-77).

HUSBAND AND WIFE. A man and woman married to each other. The modes of contracting marriage, with the accompanying ceremonies, and the impediments to marriage will be more properly described under the head of MARRIAGE (q.v.), and the mode of dissolving the marriage has been already described under DIVORCE (q.v.). The effects of marriage upon the rights of the parties and upon their property will here be described.

The effect of marriage at common law may be viewed under two heads: first, as regards the persons and the personal rights of the married persons, and, secondly, as regards their property. (1) AS TO THE PERSON. By marriage at common law the husband became legally bound to support the wife in a manner consistent with his resources and social position. He also became bound to pay all debts contracted by her before the marriage, and when sued with the wife became responsible for her torts committed either before or during the coverture. In all other respects he remained in precisely the same position as before marriage. Independently of his wife he could sue and be sued, enter into contracts, and bind himself as fully after as before marriage, and he could even make a will and bequeath all his property to strangers regardless of the wife. As regards the person and personal rights of the wife, however, there was a material difference. Her person is said to be merged in that of her husband, and for many purposes they were treated as one person in the eye of the law. The wife could neither sue nor be sued independently of the husband. Her contracts were void even when made with her husband. Even the personal property she had before marriage became her husband's absolutely, and he could dispose of it at will. She had no power to make a will of real estate, and her will disposing of personal property owned by her before her marriage could be effective only when authorized or consented to by the husband at her death. As the husband, however, was bound to support the wife, she had authority in law without his consent to pledge his credit for necessaries supplied by third persons. This obligation, being imposed by law, was not properly a contract, but a quasi-contract (q.v.). Necessaries are any articles of personal use, as food or wearing apparel, which are suited to the rank and position in life of the husband, and with which the wife is not provided. Therefore, if goods were ordered by the wife which were not necessary, the husband was under no legal liability to pay for them unless he expressly or impliedly ratified his wife's act in purchasing them. Thus he could not keep the goods and refuse payment. If, for example, he saw his wife wearing an expensive dress which he knew he did not himself order or pay for, and did not at once repudiate the purchase and return the goods, he would be held to have consented and approved of the purchase. Though the husband is bound to maintain his wife, there were, curiously enough, only circuitous means of enforcing this duty. The wife, for example, could not sue the husband herself, but having an implied authority to order necessaries, the tradesman so supplying them could sue the husband for the price. The wife also might impose liability on the husband by contract for articles not necessaries by virtue of an implied authority as agent of the husband to purchase such articles; thus, a husband might be liable to pay for articles such as he had regularly permitted his wife to purchase on his credit before, although he knew nothing of the particular purchase in question. See AGENT.

The husband, being entire master of his own actions, has the power to decide where to live, and the duty of the wife is to live with him in the same house. So long, then, as the husband and wife continue to live togther, the domicil of the wife is determined by the domicil of the husband. If she ceases to live with her husband she may then acquire an independent domicil. If the wife lives apart from the husband without just cause he is not bound to support her even with necessaries. If, however, she separates from him for just cause, the liability of the husband for necessaries continues. There are, at common law, several just causes for her living apart from her husband. If the husband, for example, treats her with what is deemed cruelty in the eye of the law, as keeping a mistress in the house, or starving her, or assaulting her, she is entitled to leave him, and can order necessaries at his expense from any tradesman willing to supply her. There are, however, many degrees of cruelty and ill usage for which the wife has practically no remedy, and of which the law can take no cognizance. The statement frequently found in the early treatises that the husband has at common law the right to reasonably chastise the wife was probably without authority, and certainly has no support

in modern law. The husband can enforce the wife's antenuptial contracts, and can recover for torts committed toward her either before or after the marriage by joining her with himself as plaintiff in an action. For torts resulting in loss of her services to him or requiring him to provide medical attendance or other necessaries he can recover in his own name and right. He may also recover damages from a third person for unlawful intercourse with his wife, and either husband or wife might recover damages from a third person for alienating the affections of the other. As regards crimes committed by a wife, she is in general liable to be punished for them in the same way as if she were unmarried. But there is a peculiarity as regards crimes committed by the husband and wife jointly in the husband's presence. If the crime be treason or murder, both are punished precisely as if they were unmarried. But in all the lesser crimes the theory, as well as the practice, is that if the wife was a party to the crime, and committed it in her husband's presence, she is presumed by the law to have so acted under the compulsion or coercion of her husband, and is acquitted as a matter of course. The presumption, however, is a presumption of fact only, and may be rebutted by showing that in fact the wife was not coerced by the husband; but in the absence of any direct evidence one way or the other on the subject of coercion it is presumed that the wife acted under this marital coercion, and so she escapes punishment. Another curious anomaly arising from the common-law maxim that husband and wife are one person is that the wife cannot be convicted of stealing her husband's goods. If she absconds with his property, however valuable, she cannot be punished. But this rule is qualified by the circumstance that if she commits adultery, and afterwards absconds with the adulterer, both taking away the husband's goods, the adulterer may be convicted of the larceny, though it is doubtful if she is in that case liable to any punishment. Where the third party does not have in view any adultery with the wife, but joins her in taking away the husband's goods, neither he nor the wife can be punished criminally.

At the common law also husbands and wives may be witnesses for or against other parties in all civil cases, i.e. actions and suits relating to debts, contracts, and wrongs which are not crimes, and in all inquiries of a civil nature. But neither can testify for the other in an action to which the other is a party; but either can be compelled by the opposite party to be a witness. In all cases neither husband nor wife can be compelled to disclose any confidential communication made to him or her by the other spouse during the marriage. As regards all criminal proceedings instituted against either husband or wife, the other spouse is neither competent nor can be compelled to be a witness; but where the husband and wife are not the accused, but are the prosecuting parties, then, inasmuch as the State is presumed to be the prosecutor, and the husband and wife are not parties, they may be both witnesses, subject to the qualification as to not being bound to disclose confidential communications made by and to each other during marriage. There is an exception also to the rule that neither can be a witness against the other in criminal proceedings—viz. where the wife charges her husband with an assault or other crime of greater degree upon her person, she is in that case only a competent witness against him, for otherwise the crime might go unpunished. Moreover, in all proceedings instituted in consequence of adultery of the husband or wife, neither of the married parties is competent or can be compelled to be a witness.

(2) As to the Property of the Married Persons. As regards the husband, he not only remains sole owner of his property, and, subject to the wife's right of dower, can do what he likes with it, but he becomes absolute owner of her personal property of every kind which is capable of being reduced to possession. As will be hereafter explained, he also becomes a qualified owner of her choses in action (q.v.) and her chattels real. The legal title of the wife's real estate remains in the wife, but she cannot convey it without the husband joining in the conveyance by *fine and recovery* (q.v.), and the rents, issues, and profits of her real estate belong absolutely to her husband. Owing to the common-law rule that the husband is entitled to the services of the wife, he becomes entitled to her earnings acquired by rendering service to others. It will thus be seen that during the coverture the wife cannot, at common law, acquire any personal property, and her title to real property acquired before or after her marriage is subject to the rights of the husband, as stated. But as regards the wife the case is different. The old rule as to the wife's personal property becoming the husband's absolutely after marriage suffered qualification when such property consisted not of money or chattels, but of what are called chattels real, such as leases and mortgages. (See Chattels.) In such a case they become so far the property of the husband that he can sell them during his life, but he cannot bequeath them by will; and on his death they remain hers, while on her death they become his. Again, where the wife's personal estate before marriage consists of mere rights of action, or debts due to her, they become so far his that he can at any time sue for them, and so reduce them into possession, and make them his own absolutely; but he cannot bequeath them by will, and if he does not sue for them in his lifetime they survive to the wife after his death. As regards the wife's real estate—i.e. her lands and houses held in freehold—the husband does not acquire any legal interest in the title by the marriage, but, as has been pointed out, he acquires the right to the rents, issues, and profits, and consequently the right to dispose of the real estate during the coverture; and, if the wife bear him a living child, upon her death he becomes entitled to a life interest in her real estate, known as tenancy by the curtesy (q.v.). Upon marriage the wife also acquires an inchoate right to dower in real estate of which the husband may be seized or which he may thereafter acquire—that is, a life estate or interest in one-third of all such real estate. This right becomes complete only upon death of the husband before the wife, but it cannot be impaired by any act of the husband during the coverture or by the wife herself except by joining with her husband in a conveyance by fine and recovery. (See Dower.) All real estate conveyed to husband and wife together, unless otherwise defined by the instrument of conveyance, is deemed to be an estate known as an estate by the entirety. Its peculiarity is that while the husband is entitled to the rents, issue, and profits during coverture,

neither can convey the title without the other, and the survivor becomes entitled to the property absolutely. On the death of one of the parties to the marriage the property is disposed of as follows: if the husband dies his will may, subject to the wife's right of dower, dispose of his whole property to strangers irrespective of the wife. But there are some things his will cannot take away from her, as, for example, her leases, choses in action not reduced to possession, and her real estate. To these may be added her paraphernalia, so called, which consists of her personal apparel and jewels; but even these may be taken by her husband's creditors if there be a deficiency of assets. When the wife dies before the husband he becomes entitled to all her personal estate, of whatever description, even though she leave children of the marriage; and it must be recollected that she can at the common law, generally speaking, make no will which has any effect if the husband chooses to repudiate it. The wife's real estate passes to her heirs unless a child has been born of the marriage, in which case the husband is entitled to curtesy in the entire estate. The English courts of chancery, by application of the doctrine of uses and trusts (q.v.), mitigated to some extent the harshness of the common-law rules relating to married women. By an ante-nuptial agreement between the parties to the marriage, sometimes called a marriage settlement, not only all the property she may have had before marriage, but property to which she may afterwards be entitled, may be given to trustees to hold for her separate use. The agreement may give her a practically unlimited right over the property thus settled upon her which equity would enforce, and she may thus receive regularly the income of the trust and use of it for her own purposes. She may bind her separate estate by contract, and even dispose of it by will. Courts of equity will also in a proper case enforce agreements made between husband and wife, and in certain cases will enforce a conveyance made by the husband to the wife when made for the purpose of providing for the wife. The various rights with reference to separate property thus created and enforced by courts of equity are known as married women's separate estates.

Statutory Modification of the Common Law. The preceding statement is an outline of the rights and liabilities of the husband and wife according to the common-law rules. Half a century ago public attention was first directed toward the essential injustice of the common law to married women. The agitation which followed took fast hold upon the public conscience, and ultimately found expression both in England and the United States in a series of statutes known as married women's enabling acts. New York was the first State to adopt this reform, by an act framed in 1848, and its example was followed by other States in rapid succession. The various statutes relating to the subject have been repeatedly revised, and their scope widened by amendment, until at the present time in most jurisdictions, though the statutes differ in minor particulars, married women are on a substantial equality with their husbands with reference to both personal rights and rights of property, and each is practically independent of the other with reference to all matters outside the obligation of the status marriage or the marriage contract itself. The effect of modern statutory law will be best understood by briefly mentioning some of the more important exceptions to the foregoing statement. In probably all jurisdictions the husband is still under obligation to support his wife, and to provide her with necessaries, and the wife, by acting as his agent, may still bind the husband by contract. As the husband no longer acquires any interest in the wife's personal property or choses in action, he is not subject to the corresponding obligation to answer for her torts and contracts, they being an obligation of the wife alone, for which she may be separately sued. Either may sue or be sued independently of the other. While the husband may no longer take the wife's earnings, he is in a general sense still entitled to the wife's services, so long as she continues to give them to him; and he may sue in his own right to recover for torts causing loss of her services or expenditure by him for necessaries, and either may sue for alienation of the affections of the other. The law of domicil of the husband and wife remains unchanged. The wife still has dower in the husband's real estate, and in some of the Southern and Western States she has by statute a homestead in the husband's lands. In many States the husband may acquire curtesy in the wife's real estate, but in some, like New York, the wife may defeat his right by conveyance or will. In some States, as New Jersey, the wife cannot convey her real estate as freely as the husband may, but must be examined apart from her husband by a notary, commissioner, or judge before making the conveyance, who must ascertain whether the conveyance is freely made without coercion by the husband. Estates by the entirety are now generally obsolete, the husband and wife taking as co-tenants, or tenants in common. In nearly all jurisdictions statutes of distribution (q.v.) have been enacted, by which either party to the marriage may acquire a part of the personal property of the other in case of his or her death without having disposed of the personal property by will. In other particulars these statutes follow closely the analogy of the law of inheritance. Provision has also been made by statute in most jurisdictions for directly compelling the husband to support the wife by means of a quasi-criminal proceeding brought at her instance. The same result may be obtained by the various statutory forms of judicial separation (see Divorce), by which the husband may be compelled to pay the wife certain sums of money, or alimony (q.v.).

Scotland. The law of husband and wife in Scotland as regards their personal rights and disabilities, and the property during the marriage, does not substantially differ from the law of England, but the following points may be noticed: As regards their persons and personal rights and crimes the law is the same. It is often said that in Scotland the movable property of both husband and wife becomes a kind of joint-stock property, called *goods in communion;* but this phrase has no meaning except with reference to the principle of the division of the property after the death of one of the parties and the dissolution of the marriage. The husband is, as in England, entire master, except that he cannot on his death-bed bequeath more than a share of the property away from the wife. The wife's movable property becomes the husband's, and her

heritable property remains subject to the husband's life-rent. When she disposes of her heritable property she must ratify the deed by going before a magistrate, and acknowledging that she acts of her own free will. When the husband deserts her she may, as in England, obtain a judge's order to protect her earnings and moneys, and she has a preferable right to a reasonable provision out of any property to which she may succeed (Conjugal Rights Amendment Acts, 1861 and 1874). By the Married Women's Property (Scotland) Act, 1877, the produce of a wife's industry or skill is excluded from the rights of her husband, and his liability for her antenuptial debts is restricted to the amount she brought into the marriage. A wife has, in Scotland, the power to bind her husband for necessaries; but the husband can, by a process of inhibition, give notice to tradesmen not to supply her at his expense, and this notice will be binding on all the King's subjects.

CIVIL LAW. In the early period of the Roman law the power of the husband over his wife and her property was absolute, as the *patria potestas*. Whatever property the wife acquired, both before and after marriage, became the property of the husband; but in case the wife survived the husband she was entitled to share her husband's property equally with the children. At a later period, but before the time of Justinian, owing possibly to the lack of any formal marriage, we find a fully developed system of law relating to married women which, unlike the common law, was based upon the theory that husband and wife were in law distinct persons having independent rights and liabilities. The wife remained responsible for her own debts. She could sue and be sued independently of her husband, and her husband could not subject her property to any disability. While there were some restrictions upon the power of women to contract, there was no distinction in this respect between married women and unmarried women. The husband, as at common law, was bound to support the wife; but as compensation for this liability his wife or her family was required at the time of the marriage to provide the husband with the *dos* or dowry. The increase from the *dos* was the husband's property. He could also dispose of the *dos* so far as it was personal property, but not if it were real estate; and in the case of termination of the marriage by death or divorce, the *dos* was required to be returned to the wife. Corresponding to the *dos* was the *donatio ante nuptiam* or the *donatio propter nuptiam*, a gift made by the husband to the wife before the marriage. Not much is known of these, but it seems probable that the *donatio* was not required to be equal to the *dos*, but was given as a provision for the wife after her husband's death, she having lost the right to share equally in her husband's property with the children of the marriage. These rules of law might, however, be freely modified by antenuptial contracts, which were enforced much as courts of equity enforced antenuptial contracts entered into at common law.

COMMUNITY PROPERTY. Occupying an intermediate ground between the common law and the civil law relating to the husband and wife is the law of community property. The notion of a community of interests by husband and wife in all property acquired during the coverture seems to have been derived from the civil law and the mediæval customary law, and is now incorporated into the Code Napoleon and most of the other European codes as fixing the rights of husband and wife in the abuse of contracts. The most important peculiarity of community property is the partnership of husband and wife in all property acquired by them during the coverture, and under some systems in property acquired before the marriage. The husband is the *curator* of the wife, who has no power to contract independently of her authority; but she retains her joint interest in the community property; and after her husband's death is entitled to one-half the community property, the other half passing to the heirs. The husband has the same right in case of the wife's death. See COMMUNITY OF PROPERTY.

GANANCIAL SYSTEM. For the particular doctrine of community property belonging to the Spanish law, and adopted in New Mexico, and to some extent in Arizona, California, Nevada, Idaho, Texas, and Washington, see GANANCIAL SYSTEM.

The criminal law relating to husband and wife remains substantially unchanged. The husband and wife are now generally competent witnesses in all civil actions with the exception of an action for divorce brought by one against the other, in which case neither is allowed in most jurisdictions to testify against the other or to acts of adultery; and in no case is either allowed to testify as to any confidential communication made to or received from the other during coverture. In case of testimony as to a transaction with a deceased person by or against whose representative an action is brought, a husband or a wife, because of his or her interest in the other spouse's property, may be an interested witness, and so be barred from testifying on that ground. (See EVIDENCE.) The competency of husband and wife to testify in criminal proceedings remains as at common law. Consult: The *Commentaries* of Kent and Blackstone; Hammick, *Marriage Laws of England* (2d ed., London, 1887); Macqueen. *Rights and Liabilities of Husband and Wife* (3d ed., London, 1885); Schouler, *Domestic Relations;* the statutes of the various States in the United States; and the authorities referred to under DOMESTIC RELATIONS.

HUSBANDRY, PATRONS OF. See GRANGE.

HUSBANDS, hŭz'bandz, HERMAN (?-1795). An American revolutionist. He was born in Pennsylvania, but settled in North Carolina, and was a member of the Legislature of that Colony. In 1768 he became one of the leaders of the 'Regulators' (q.v.), an organization formed to redress grievances. After several times coming into conflict with Governor Tryon, at last, in 1771, his force of 2000 Regulators was defeated, and Husbands fled from the State, settling near Pittsburg. He was a member of the Pennsylvania Legislature in 1778, and at the time of the 'Whisky Insurrection' (q.v.) of 1794 was a member of the Committee of Safety with Albert Gallatin and others.

HUSCHKE, hōōsh'ke, GEORGE PHILLIP EDUARD (1801-86). A Prussian jurist, born at Münden, and educated at the universities of Göttingen and Berlin. At Göttingen he was made instructor in Roman law (1821). Afterwards he was professor of law at Rostock (1824) and at Breslau (1827).

He took a prominent part in ecclesiastical politics, and was so strong a partisan of the Lutheran communion that his opponents brought criminal suit against him for inciting an insurrection, but unsuccessfully (1835). Later he held high ecclesiastical offices in the gift of the State, and was made Privy Councilor. As a jurist he combined the historical and philological methods. His more important works are: *Studien des römischen Rechts* (1830); *Die Verfassung des Königs Servius Tullius* (1838); *Ueber den Census und die Steuerverfassung der frühern römischen Kaiserzeit* (1847); *Gaius. Beiträge zur Kritik und zum Verständnis seiner Institutionen* (1855); *Jurisprudentiæ Antejustinianæ quæ Supersunt* (5th ed. 1886); and the valuable works on the Italic dialects: *Die oskischen und sabellischen Sprachdenkmäler* (1856); *Die Iguvischen Tafeln nebst den kleinern umbrischen Inschriften* (1859); *Zu den altitalienischen Dialekten* (1872); and *Die neue oskische Bleitafel* (1880).

HUSEMANN, hōō'ze-mán, THEODOR (1833-1902). A German pharmacologist, born in Detwold and educated at Göttingen, Würzburg, Berlin, and Prague. He practiced medicine for five years, and in 1860 went to Göttingen, where he became docent (1865) and professor (1873) of pharmacology and toxicology. He wrote: *Handbuch de Toxikologie* (1862-67) and *Die Pflanzenstoffe in chemischer, physiologischer, pharmakologischer und toxikologischer Hinsicht* (1871), both with his cousin AUGUST (1833-77), who was professor at Chuv; contributed to Maschka's *Handbuch der gerichtlichen Medizin* (1882) and to the Penzold Stintzing *Handbuch der speciellen Therapie* (1895); and wrote a *Handbuch der gesamten Arzneimittellehre* (3d ed. 1872) and a study on the pharmacopœias of the sixteenth century, *Die Köluischen Pharmakopöen und ihre Verfasser* (1899).

HUSH, hush. See HUSI.

HUSI, hōō'sê, *Rum. pron.* hōōsh, or **HUSH**. The capital of the Rumanian District of Falciu, Moldavia, situated a short distance west of the Pruth, and 38 miles south-southeast of Jassy (Map: Balkan Peninsula, G 1). It has a fifteenth-century cathedral and a theological seminary. Population, in 1889, 12,660; in 1899, 15,484.

HUSKISSON, WILLIAM (1770-1830). An English statesman. He was born in Worcestershire, and in 1783 sent to Paris to study medicine. He took part in the storming of the Bastille, and as a member of the Club of 1789 delivered before his associates a speech on the currency. After his return to England in 1792 he received a subordinate appointment under the Tory Government, and formed an intimate acquaintance with Pitt and Canning. As Under-Secretary of War (1795-1801), he did most of the work of that office. In 1796 he entered Parliament, and, with the exception of two years, remained a member for various constituencies to his death. He held several offices under Pitt, with whom he retired in 1801. In 1804 he was appointed Secretary of the Treasury in the new Pitt Cabinet, and on Pitt's death in 1806 he lost his office, but was restored to it by Mr. Perceval in 1807. In 1814 he was made Chief Commissioner of the Woods and Forests; in 1823 president of the Board of Trade, and in 1827 Secretary of State for the Colonies. Through his exertions the old restrictions on the trade of the Colonies with foreign countries were removed. He also obtained the removal or reduction of many import duties, considerable relaxation of the navigation laws, and is in fact mentioned as the great pioneer of free trade. His death, September 15, 1830, was caused by injuries received that day at the opening of the Liverpool and Manchester Railway. Consult: *Speeches*, with biographical memoir (3 vols., London, 1831); from the comprehensive views they exhibit, as well as from their full and accurate details, these speeches are valuable to students of political economy; Wright, *Life of Huskisson* (privately printed, 1831); Hansard, *Parliamentary Debates;* Greville, *Memoirs: A Journal of the Reigns of George IV. and William IV.* (London and New York, 1874-75).

HUSS, HENRY HOLDEN (1862—). An American composer, born in Newark, N. J. He studied first with his father, George J. Huss, and in 1882 entered the Munich Conservatory, Germany, taking up the study of counterpoint, composition, and instrumentation, and the organ under Rheinberger. During his stay in Germany he studied the pianoforte under Giehrl, and conducting under Abel. In 1885 he became a resident of New York, and subsequently became well known throughout the country as a composer, pianist, and teacher. His compositions, many of which have a European reputation, include a scena for soprano and orchestra, *Cleopatra's Death;* bagatelles, anthems, intermezzi, songs, part songs, and very charming chamber music.

HUSS, JOHN (c.1370-1415). A Bohemian religious reformer. He was born at Husinetz (or Husinec), Bohemia, northwest of Budweis. His baptismal name was Jan; from his birthplace he was called Johannes de Hussynecz, or, in English, John Huss. The day and year of his birth are unknown. His parents were Czech peasants. He studied at the University of Prague, where he soon made a reputation for scholarship, became M. A. (1396), university lecturer (1398), dean of the philosophical faculty (1401), and was rector in 1402 and 1403. In philosophy he was a realist. He became a priest in 1401. Owing to the marriage in 1382 of Anna, sister of King Wenceslas, to King Richard II. of England, there was much intercourse between Bohemia and England. So the writings of the great English theologian, Wiclif (died 1384), came into Bohemia. Huss read them eagerly, and availed himself of permission to lecture upon them in the university. He went further, and translated them into Bohemian, and the world has given Huss credit for writings which were merely translations from Wiclif. He also defended Wiclif's opinions, not only in the lecture-room, but from the pulpit. As he was a very popular preacher in the Bethlehem Chapel in Prague, and confessor to the Queen and a scholar of high repute, this stand attracted wide attention.

Wiclif had, however, not escaped the charge of heresy, and so in 1403 Huss was forbidden by the university authorities to discuss forty-five sentences or theses which he had derived mostly from Wiclif; and in 1409, when the Pope, Alexander V., had issued his bull against the teachings of Wiclif and the Archbishop of Prague had burned Wiclif's writings, Huss felt the effect of the opposition he had stirred up on the part of the

hierarchy, the priests, and the monks by denouncing, in imitation of Wiclif, the corruption of the Church. In 1410 he and his followers were put under the ban. Undeterred, he kept on preaching as before. In 1411 Pope John XXIII. proclaimed a crusade against King Ladislas of Naples, and promised indulgences to the volunteers. Huss the next year gave out a university debate upon the question of indulgences, which only widened the breach between himself and the university authorities and the clergy. In 1412 a Papal interdict was issued against him. In reply he wrote his book *On the Church*, again drawing heavily from Wiclif, and appealed from the Pope to a general council and to Christ; and then, feeling no longer safe in Prague, he withdrew to the castles of certain friendly noblemen. In 1414, obedient to a summons, but under the protection of King Wenceslas, and with a safe conduct to go and *return*, given by the Emperor Sigismund, he went to the general council which had been convened in Constance.

His journey thither was a triumph, and he entered the city (November 3d) in great state. At first he was a free man, but on November 28th he was apprehended on the trumped-up charge of attempting to leave the city, and cast into prison, in spite of the indignant protests of the Bohemian and Polish nobles. He may have fancied that he would have opportunity to defend his views in open debate, but he quickly learned that the council intended to try him as a heretic. He was, however, long kept in suspense, for it was not till June 5, 1415, that he was first formally accused. On June 8th thirty-nine charges were exhibited against him, some of which he acknowledged as fairly based upon his teachings, while others he declared to be misrepresentations. Being required to recant his alleged errors, he refused to do so until they should be proved to be errors. On June 18th the articles of his condemnation were prepared; on June 24th his books were burned; on June 31st his attempts to come to an understanding with his prosecutors failed, and on Saturday, July 6th, he was condemned to be burned at the stake for heresy. The same day the sentence was executed, and the martyr's ashes were thrown into the Rhine. The Emperor, probably influenced by the fact that condemned heretics had no claim to protection, did not interfere, as he might have done. The death of Huss caused sorrow and indignation throughout Bohemia, and led to the so-called Hussite War. See HUSSITES.

A critical edition of Huss's writings, distinguishing between his own works and his translations from Wiclif, is lacking. The best we have is F. Palacky's *Documenta Magistri Joannis Hus* (Prague, 1869). The works of Huss in Bohemian were published by K. J. Erben (Prague, 1865-68). E. de Bonnechosa published a French translation of his letters (Paris, 1846), from which an English translation was made (London, 1846); F. B. Mikowec prepared one in German (Leipzig, 1869). Nowotny began a German translation of his sermons (Görlitz, 1855). For his biography, consult: Gillett (Boston, 1863-64), and Wratislaw (London, 1882); for his relations to Wiclif, Loserth, *Wiclif and Huss*, translation (London, 1884).

HUSSARS, hŭz-zärz'. Light cavalry. Originally a distinct type of Hungarian mounted troops, receiving their name, it is said, from the circumstance of their origin, Matthias Corvinus having in 1458 raised a body of cavalry to operate against the Turks by taking one man out of every twenty inhabitants; hence the use of the word husz-ár, in Hungarian, *the twentieth*. The demand for cavalry possessing greater mobility than the dragoons, as yet the only type, led to the formation of light-cavalry regiments on the hussar model. Nearly two-thirds of the entire cavalry strength of Great Britain consists of hussar and lancer regiments, the general proportion throughout Europe being almost as great. The original Hungarian hussars had several peculiarities of dress and equipment, the most conspicuous of the former being a loose jacket suspended in part from the shoulders, a feature still preserved in several countries. See CAVALRY.

HUSSEIN AVNI PASHA, hų-sĭn' ăv'nê pä-shä' (1819-76). A Turkish general and statesman, born at Dost Koj, near Isparta, in Western Asia Minor, and educated after his sixteenth year in Constantinople. In 1853 he entered the General Staff under Omar Pasha, and with him directed the fortification of the Balkan passes. He commanded a division in the war with Montenegro (1859-60), became General of the Guard (1864), and in 1867-69 put down the rising in Crete. As a reward for this service he was made Minister of War, from which post he was retired in 1871, after the death of Âali Pasha, his protector. In 1872, on the accession of Midhat Pasha to the Grand-Viziership, he returned to Constantinople from his exile at Isparta, became Grand Vizier in 1874, and Governor of Smyrna in 1875. In the same year he was again Minister of War for six weeks, and in May, 1876, was a leader in the plot which deposed Abdul Aziz and put Amurath V. on the throne. Less than a month later he was assassinated by an officer, Hassan Bey, at a Ministerial meeting.

HUSSITES. The followers of John Huss (q.v.). Honoring him as a martyr, about 450 Bohemian nobles formed a league, protesting against the action of the Council of Constance which had condemned Huss to be burned, and bidding defiance to decrees of bishops and the Pope. The symbol of their confederacy was the cup, the use of which in the Lord's Supper they extended to the laity, as had already been done with the approbation of Huss. King Wenceslas of Bohemia was constrained to grant them the use of many churches. After his death (August, 1419) the majority refused to recognize as King his brother, the Emperor Sigismund (q.v.), who had broken his safe-conduct given to Huss. The so-called Hussite wars followed. For eight years (1420-27) the Hussites, led by their generals Ziska (q.v.) and Procopius (q.v.), were victorious against the forces sent against them by the Emperor and the Pope, and in 1429 and 1430 they carried terror into the countries of Germany bordering on Bohemia. Convents and churches were reduced to ashes, and priests and monks were slain. From the beginning the Hussites had included two parties—the more conservative, called Calixtines (q.v.), or Utraquists, more in sympathy with the Church, and hoping for an ultimate reconciliation, and the radical, called Taborites (q.v.), who went much further in rejecting doctrines and practices of the Church. A third faction, intermediate between the two, called Orphans, also

developed. In 1431 the Council of Basel (q.v.) undertook to conciliate the Hussites, and succeeded in coming to an agreement with the Calixtines by the 'Compactata of Prague' in 1433, after which the latter acknowledged Sigismund as King and made peace with the Church. The Taborites and Orphans were completely defeated in a battle near Böhmischbrod, May 30, 1434, and soon disappeared as a political power, but continued to exist as the Bohemian Brethren (q.v.).

HUSTINGS (AS. *hūsting*, from Icel. *hūsþing*, council-place, from *hūs*, AS., OHG. *hūs*, Ger. *Haus*, house + *þing*, thing, assembly, OHG. *ding*, Ger. *Ding*, thing; connected with Goth. *þeihs*, Lat. *tempus*, time). An English term applied to the place or platform where, before 1872, members of Parliament were nominated for election, or from which a candidate addressed his constituents. The term is still applied to any electioneering platform. A court of hustings formerly existed in many English cities for the trial of suits brought for the recovery of land situated within the city limits. Such a court still survives in London; but its authority, which at one time extended to all actions between citizens, has now practically disappeared. The hustings court existed in the towns of Virginia founded during the eighteenth century. Thus the charter of Norfolk Borough, incorporated in 1736, established a hustings court to be held once a month, with jurisdiction over actions of ejectment, trespass, and writs of dower, as well as all other actions, personal and mixed, involving not more than £20. A hustings court is still one of the municipal tribunals of Richmond. It is held by a judge elected in the same manner as the circuit judges, and has original and exclusive jurisdiction of most criminal offenses committed within the city limits.

HUTCHESON, Francis (1694-1746). A moralist of the eighteenth century, born August 8, 1694, in the County of Armagh, Ireland. His father was a Presbyterian minister. He studied for the Church at the University of Glasgow, but after a short term of preaching he was induced, in 1719, to open a private academy in the city of Dublin, which proved highly successful. In 1725 he published his *Inquiry into the Original of Our Ideas of Beauty and Virtue*, etc., which was the means of introducing him to the notice of many influential personages, such as Archbishops King and Boulter, and Lord Granville, then Lord Lieutenant of Ireland. This work was followed, in 1728, by his *Essay on the Nature and Conduct of the Passions and Affections*, and in the year after he was appointed professor of moral philosophy in the University of Glasgow. Here he died, in 1746. His largest and most important work, *A System of Moral Philosophy*, was published at Glasgow in 1755 by his son, Francis Hutcheson. From the period of Hutcheson's lectures, according to Dugald Stewart, may be dated the metaphysical philosophy of Scotland. But it is as a moral philosopher, rather than as a metaphysician, that Hutcheson is noteworthy. His system is, to a large extent, that of Shaftesbury, but it is more complete, coherent, and clearly illustrated. Hutcheson emphasized the importance of 'calm benevolence,' and was a strong opponent of the doctrine that it has a selfish origin. Equally important with benevolence in his system is the moral sense, "which does not impel toward good actions, but merely judges the moral quality of actions and gives its approval to benevolence;" the latter is the mainspring of good conduct. All action prompted by benevolence is formally good; but to be naturally good it must be an action which "procures the greatest happiness for the greatest numbers." In this respect he was a forerunner of the English Utilitarians. Consult Fowler, *Shaftesbury and Hutcheson* (London, 1882); Albee, *History of English Utilitarianism* (London, 1902); Martineau, *Types of Ethical Theory* (Oxford, 1886); Scott, *Francis Hutcheson* (Cambridge, 1900).

HUTCHINS, Thomas (1730-89). An American geographer. He was born in New Jersey; entered the British Army at an early age, and participated in the French and Indian War. Being in London in 1779, he was imprisoned on suspicion of favoring American independence; but escaped by way of France, went to Charleston, S. C., entered the Continental Army, and was appointed 'geographer-general' by General Greene. He was the author of several geographical works, including a *Topographical Description of Virginia, Pennsylvania, Maryland, and North Carolina* (1778), and *History, Narrative and Topographical Description of Louisiana and West Florida* (1784).

HUTCHINSON. A city and the county-seat of Reno County, Kan., 235 miles southwest of Kansas City, Mo.; on the Arkansas River, and on the Atchison, Topeka and Santa Fe, the Missouri Pacific, and the Chicago, Rock Island and Pacific railroads (Map: Kansas, D 3). It has a fine court-house, Riverside and Hutchinson parks, a public library, and the State Industrial Reformatory, the building covering fifteen acres of the entire 640 included in the grounds. The city is the centre of an agricultural and stock-raising district, and has an important wholesale trade, and extensive manufactures of salt, large deposits of rock salt being found here. Settled in 1872, Hutchinson was incorporated two years later. Its government is administered under a charter of 1872 which provides for a mayor, elected biennially, and a unicameral council. Population, in 1890, 8682; in 1900, 9379.

HUTCHINSON, Anne (c. 1590-1643). A religious enthusiast, of American celebrity, born in Lincolnshire, England, 1590 or 1591. She was a daughter of Rev. Francis Marbury, married William Hutchinson, 1612, and emigrated to Boston, Mass., in 1634. Living in a community prone to religious excitement, she claimed to be a medium of divine revelation, and held meetings for women, in which she set forth the doctrine that those who were in the covenant of grace were not under the covenant of works, which was considered as Antinomian by the State clergy, and likely to have sad practical consequences. Great controversies arose, and a synod was called, in which her teachings were condemned, and she was banished from the Colony. She and her friends now obtained from the chief of the Narragansett Indians liberty to reside in Rhode Island, where they set up a community on the highly commendable principle that no one was to be 'accounted a delinquent for doctrine' (1638), and founded the town of Portsmouth. After the death of her husband (who shared her opinions), in 1642, she removed to the west of

Stamford, Conn., which was then Dutch territory, and there in September, 1643, she and her whole family of fifteen persons were taken prisoners by the Indians, and all but one daughter murdered. Consult: her life in Sparks's *Library of American Biography*, vol. xvi.; Adams, *Three Episodes in Massachusetts History* (Boston, 1893).

HUTCHINSON, JOHN (1615-64). An English regicide, born in Nottingham, and educated at Cambridge. After a short study of the law at Lincoln's Inn, he identified himself with the Parliamentary side in the struggle against the King, became a member of the committee for Nottinghamshire, and throughout 1644 and 1645 acted as Governor of both Nottingham and Nottingham Castle, successfully holding them against repeated Royalist attacks, attempted bribery, and internal dissensions. In 1646 he succeeded his father, Sir Thomas Hutchinson, as a member of the Long Parliament, and two years afterwards he sat as one of the King's judges, and signed the royal death-warrant. He served under Cromwell in the Council of State until 1653, when he retired from politics, and refused further office under the Protector. He seems to have worked for a restoration of the Long Parliament, and during its short session, from May to October, 1659, he returned to his seat. He was a member from Nottingham to the Convention Parliament in 1660, but was immediately expelled as a regicide, though his life was spared through the intercession of relatives. In 1663 he was arrested as an accessory to the Yorkshire Plot, and, despite meagreness of evidence against him, was imprisoned in the Tower. In May, 1664, he was removed to Sandown Castle in Kent, where he died from fever in the following September. His wife LUCY (1620-c.1680), was very influential in saving his life when the Restoration took place, and after his death wrote a *Life of Colonel Hutchinson* (first published in 1806).

HUTCHINSON, JOHN (1674-1737). An English theological writer. He was born at Spennithorne, near Middleham, in Yorkshire. For some time he was steward of the household of the Duke of Somerset, and left his service to devote himself to religious studies, the Duke procuring for him a sinecure appointment from the Government. In 1724 he published the first part of a work called *Moses' Principia*, in which he defended what he regarded as the Mosaic cosmogony, and assailed Newton's theory of gravitation. He continued to publish a succession of works till his death, in London, August 28, 1737. The leading principle of his religious system is that the Holy Scriptures contain the elements not only of true religion, but of all rational philosophy, which, however, was to be derived only from the original unpointed Hebrew; and for that purpose, it was subjected to strange critical or rather fanciful processes. His works at one time exercised a considerable influence, and his followers, called 'Hutchinsonians,' included some persons of considerable learning and celebrity. His works appeared in 12 volumes (London, 1748), with life by Spearman in supplement (ib., 1765).

HUTCHINSON, THOMAS (1711-80). An American loyalist, the last royal Governor of the Province of Massachusetts Bay. He was born in Boston, where his father, the great-grandson of Anne Hutchinson (q.v.), was a wealthy merchant and ship-owner. He graduated at Harvard in 1727, entered his father's counting-room, early showed remarkable aptitude for business, and by the time he was twenty-four had accumulated considerable property in trading ventures on his own account. The social prominence of his family, as well as his own position in the business world, made him, while still a young man, a person of considerable importance in the community. In 1737 he was elected a member of the Boston Board of Selectmen. Later in the same year he was chosen a representative to the General Court of the Colony, and at once took a strong stand in opposition to the views of the majority with regard to a proper currency. His proposal to borrow silver in England to redeem the outstanding bills of credit, and his opposition to the revival of the Land Bank, made him unpopular with the people, and impelled his constituents in town meeting to draw up 'instructions,' disregard of which led to his retirement in 1740. In that year he went to England as a commissioner to represent Massachusetts in a boundary dispute with New Hampshire. In 1742 he was reëlected to the General Court, and was thereafter chosen annually until 1749, serving as Speaker from 1746 to 1749. He continued his advocacy of a sound currency, and when the British Parliament reimbursed Massachusetts in 1749 for the expenses incurred in the Louisburg expedition, he proposed the abolition of the bills of credit, and the utilization of the Parliamentary repayment as the basis for a new colonial currency. The proposal was finally adopted by the Assembly, and its good effect on the trade of the Colony at once established Hutchinson's reputation as a financier. On leaving the General Court he was appointed at once to the Governor's Council; in 1750 he was chairman of a commission to arrange a treaty with the Indians in the District of Maine; and he served on boundary commissions to settle disputes with Connecticut and Rhode Island. In 1752 he was appointed judge of probate, and a justice of the Common Pleas. In 1754 as a delegate from Massachusetts to the Albany Convention (q.v.) he took a leading part in the discussions, and favored Franklin's plan for colonial union, although doubting its practicability. In 1758 he was appointed Lieutenant-Governor, and in 1760 Chief Justice of the Province. In the following year, by issuing writs of assistance (q.v.), he brought upon himself a storm of protest and criticism. His distrust of popular government as exemplified in the New England town meeting increased. Although he opposed the principle of the Stamp Act (q.v.), considered it impolitic, and later advised its repeal, he accepted its legality, and as a result of his stand, his city house was sacked by a mob in August, 1765, and his valuable collection of books and manuscripts destroyed. In 1769, upon the resignation of Governor Bernard, he became Acting Governor, serving in that capacity at the time of the 'Boston Massacre' (q.v.), March 5, 1770, when popular clamor compelled him to order the removal of the troops from the city. In March, 1771, he received his commission as Governor. His administration, controlled completely by the British Ministry, increased the friction with the patriots. The publication, in 1773, of some letters on colonial affairs written by Hutchinson, and obtained by Franklin in

England, still further aroused public indignation, and led the Ministry to see the necessity for stronger measures. The temporary suspension of the civil Government followed, and General Gage was appointed military Governor in April, 1774. Driven from the country by threats in the following May, and broken in health and spirit, Hutchinson spent the remainder of his life an exile in England. There, still nominally Governor, he was consulted by Lord North in regard to American affairs, but his advice that a moderate policy be adopted, and his opposition to the Boston Port Bill, and the suspension of the Massachusetts Constitution, was not heeded. His American estates were confiscated, and he was compelled to refuse a baronetcy on account of lack of means. He wrote a *History of Massachusetts Bay* (vol. i. 1764, vol. ii. 1767, and vol. iii. 1828), a work of great historical value, calm, and judicious in the main, but entirely unphilosophical and lacking in style. His *Diary and Letters* were published in 1884-86. Consult also: Hosmer, *Life of Thomas Hutchinson* (Boston, 1896); and the chapter "Thomas Hutchinson, the Last Royal Governor of Massachusetts," in Fiske, *Essays, Historical and Literary*, vol. i. (New York, 1902).

HUTCHINSON, Thomas Joseph (1820-85). An English explorer, born at Stonyford, Ireland. He studied medicine and, after a trip to West Africa in 1851, was chief surgeon on the Niger Expedition (1854-55). After two years as English consul at the Bight of Biafra and Fernando Po, he became Governor of the latter place (1857), and in 1861 was transferred to the consulate at Rosario in Argentina, where a year later he took part in the Salado Expedition. In 1870 he was appointed consul at Callao, and three years later retired to his Irish property. He wrote: *Narrative of the Niger Tshadda Binuë Exploration* (1855); *Impressions of Western Africa* (1858); *Ten Years' Wandering Among the Ethiopians* (1861); *Buenos Ayres and Argentine Gleanings* (1865); *Parana and South American Recollections* (1868); *Two Years in Peru* (1874); and *Summer Rambles in Brittany* (1876).

HUTCHISON, John (1832—). A Scottish sculptor, born in Edinburgh. He learned his trade there as a wood-carver, but was attending the art school at the same time, and graduated as a sculptor after studying for some time at Rome. His early work was exhibited in the Royal Scottish Academy, but his first appearance in the corresponding London Gallery was in 1862. Apart from purely imaginative work, he made statues of Robert Bruce, John Knox, Norman McLeod, Queen Victoria, and the Prince Consort, as well as of other personages less notable, while he left his mark conspicuously upon his native city in the figures representing four of Scott's characters in the monument to Sir Walter on Princes' Street.

HUTIA, o͞o-tē'ä (Sp., from the native name). A West Indian rodent or hog-rat, of the family Octodontidæ, differing from rats in having four grinders on each side in each jaw, with flat crowns. The tail is round and slightly hairy, and is used for support in sitting erect, as by kangaroos, and for aid in climbing trees. They make much use of their fore paws as hands. They are closely allied to the coypu (q.v.), but are not aquatic, and make their home in the woods. The best-known species is the hutia-couga (*Capromys pilorides*) of Cuba, which is about 22 inches long to the root of the tail. The fur is long, coarse, and yellowish brown, with the paws and ears blackish. Another Cuban species is the hutia-carabali (*Capromys prehensilis*), the tip of whose tail is prehensile. The hutia-couga is a skillful climber, and lives in dense forests. Its food is chiefly fruits, leaves, and bark; but it also eats the flesh of small animals, particularly that of a kind of lizard. It is easily tamed, and the Cubans consider its flesh a delicacy, for which reason it is much hunted by the natives. The smaller hutia-carabali is said to live chiefly in the tops of trees.

Jamaica has a short-tailed hutia (*Capromys brachyurus* (see Plate of Cavies, etc.), locally called 'coney,' which has become rare; and Ingraham's hutia (*Capromys Ingrahami*) inhabits the Bahamas. Consult Poey, *Memorias* (Havana, 1860-62).

HUTTEN, hu̇t'ten, Philip von (c.1515-46). A German adventurer, and relative of Ulrich von Hutten (q.v.). He was one of the 600 adventurers collected from all parts of Europe who went out under George Hohermuth (better known as George of Speyer) to conquer the Province of Venezuela, which had been granted by Emperor Charles V. to the great Augsburg family of Welser (q.v.). When Hohermuth died in 1540, Hutten became Captain-General, and the next year, in company with young Bartholomäus Welser, eldest son of the head of the family, left Coro with a well-equipped force to seek the mythical El Dorado (q.v.). After wandering about for five years, the remnant of the expedition returned to Venezuela to find a new Governor in power. Juan de Caravajal had been appointed by the Audiencia of Santo Domingo to preserve order in Venezuela, but as the years went by with no news of Hutten and his followers, he began to feel secure in his position. Consequently, the return of the adventurers was anything but welcome to him. When he saw how diminished they were in number he thought to force from them an acknowledgment of his authority. In this, however, he was unsuccessful, as he also was in an attempt to seize them. In fact, this last effort was well nigh disastrous to himself, for he was wounded by Welser, and forced to pledge the Germans safe passage to the coast. Relying upon Caravajal's word of honor, the adventurers took no precautions against attack, and were easily captured by the treacherous Spaniard, who, after keeping Hutten and Welser in chains for a time, had them beheaded. Hutten seems to have been a man of higher character than most of those with whom he was associated. He left a narrative of his adventures entitled *Zeitung aus Indien* (1785).

HUTTEN, Ulrich von (1488-1523). A scholar, poet, and reformer of the German Renaissance, one of the most celebrated of the Humanists. He was descended from an ancient and noble family, and was born at the Castle of Steckelberg in Hesse, April 21, 1488. At the age of ten he was placed in the neighboring monastery of Fulda, but, disliking this mode of life, fled in 1505 to Cologne, where he met Hoogstraten, Johannes Rhegius, and other scholars of the day. In 1506 he came to Erfurt, but soon after rejoined Rhegius at Frankfort-on-the-Oder. There he took his master's degree and

Ars Versificatoria. During these years he led the life of a wandering poet, subsisting on the bounty of those who admired his talents or feared his mordant wit. In 1512 he went to Pavia to study law. He had been there only a short time when the city was plundered by the Swiss, and Hutten was deprived of all he possessed. For a short time he served as a soldier in the Imperial army, but soon returned to Germany, where he boldly entered into a quarrel with the Duke of Württemberg, who had murdered a kinsman of Ulrich's, and brought about the Duke's punishment. In the dispute between Reuchlin (q.v.) and the Dominicans, Hutten came to the support of the former, and displayed no small learning and great power of satire. He went again to Italy in 1515, to take the degree of doctor of laws, and returned to his native country in 1517. He was crowned with the poets' laurel crown at Augsburg by the Emperor Maximilian, who conferred on him the honor of knighthood. While in Italy Hutten had become imbued with a fierce hatred for the Papacy, which he bitterly attacked in his preface to an edition of Laurentius Valla's *De Donatione Constantini*, published in 1517. In the following year he accompanied his patron, Albert, Archbishop of Mainz, to the Diet of Augsburg, where Luther had his famous conference with Cajetan. Subsequently he established a small printing press of his own, and employed himself in putting forth pamphlets written in the German language violently attacking the Pope and the Roman clergy. The Archbishop Albert denounced him at Rome, whereupon Hutten took sides with Luther, whom he had hitherto affected to despise. Persecuted by his enemies, he availed himself of the protection of Franz von Sickingen, but was forced to flee from the latter's castle after a two years' residence (1520-22). Going to Basel, he was coldly received by Erasmus, who did not approve of his extreme measures, and a breach took place between the two men which culminated in a great literary quarrel. From this time Hutten was compelled to adopt a wandering life. He died August 23, 1523, on the island of Ufnau in the Lake of Zürich. Hutten was more open in the expression of his opinions than any other man, probably, of his age. He did much to prepare the way for the Reformation and to promote it. He was a master of the Latin language, and excelled in satirical and passionate invective. His literary life is generally divided into three periods: (1) Period of Latin poems (1509-16); (2) period of letters and orations (1515-17); (3) period of dialogues and letters in Latin and German (1517-23). In all he published some forty-five different works, but his most noteworthy contribution to literature was his portion of the immortal *Epistolæ Obscurorum Virorum* (q.v.). Hutten's collected works, *Opera Omnia*, were published at Leipzig in seven volumes (1859-70) under the editorship of Böcking. Among several biographies by German authors that by Strauss (6th ed., Bonn, 1895), abridged in English by Sturge (London, 1874), is especially to be recommended. Consult also: the monographs by Reichenbach (Leipzig, 1877), and Schall (Halle, 1890); and Szamatólski, *Ulrich von Hutten's deutsche Schriften*

HUTTER, hut'tẽr, **Leonhard** (1563-1616). A German Lutheran theologian, born at Nellingen, near Ulm. He studied at the universities of Strassburg, Leipzig, Heidelberg, and Jena, and after lecturing at Jena for several years, answered a call to Wittenberg. He was one of the most resolute and influential representatives of the Lutheran faith, and was known as Redonatus Lutherus. He attacked the Calvinist doctrines in his *Concordia Concors* (1614), which he wrote as an answer to Hospinian's *Concordia Discors* (1607).

HUTTON, **Charles** (1737-1823). A self-educated English mathematician, born at Newcastle-on-Tyne, of humble parentage. He received most of his education in a school at Jesmond, where, at the age of eighteen, he became master. The number of pupils having increased, he, in 1760, opened a mathematical school in Newcastle, and also taught mathematics at the Head School of the city. Among his pupils was John Scott, afterwards Lord Eldon, Chancellor of England. In 1770 he was engaged by the city of Newcastle to draw up an accurate map of the city and the suburbs. He became professor of mathematics in the Royal Military Academy at Woolwich (1773), and the following year was made a fellow of the Royal Society. He made important contributions to the *Philosophical Transactions*, and in 1778 gained the Copley medal for his papers on "Force of Exploded Gunpowder," and "Velocities of Balls." He was appointed by the Royal Society to determine the mean density and mass of the earth. His report appeared in the *Philosophical Transactions* for 1778. In 1779 he was made foreign secretary of the Royal Society, but resigned in 1783. Owing to failing health, he resigned his professorship in 1807, and was granted a pension of £500 a year. He was editor of the *Ladies' Diary* from 1774 to 1817. The most important of his works are, besides those mentioned above: *The Diarian Miscellany* (1775); *Mathematical Tables* (1785); *Mathematical and Philosophical Dictionary* (1795); *A Course of Mathematics* (1798 and subsequent editions); *Recreations in Mathematics and Natural Philosophy*, from the French of Montuela (4 vols., 1803); "On Cubic Equations and Infinite Series," in the *Philosophical Transactions* for 1780.

HUTTON, **Frederick Remsen** (1853—). An American mechanical engineer, born in New York City, and educated at Columbia College, and the School of Mines, where he became assistant on being graduated, and in 1891 professor of mechanical engineering. In 1883 he had been elected secretary of the American Society of Mechanical Engineers, and in 1892 became an associate editor of the *Engineering Magazine*, and in 1893 became an editor of *Johnson's Cyclopædia*. Hutton wrote reports on machine tools for the Census of 1880; and *Mechanical Engineering of Power Plants* (1897).

HUTTON, **James** (1726-97). An eminent British geologist. He was born in Edinburgh, and educated at the university in that city. After serving a year's apprenticeship in a law office, he relinquished his plan of joining the legal profession, and entered upon the study of medi-

cine, taking courses at Edinburgh, Paris, and Leyden. In 1750 he returned to Scotland, and for several years was engaged in agricultural pursuits. Upon removing to Edinburgh in 1768 he came in contact with Ferguson, Black, and other savants, who encouraged and directed his scientific investigations. The results of a long and careful research into geological processes were formulated in a paper entitled "Theory of the Earth," which he read before the Royal Society in 1785, and afterwards amplified and published as *The Theory of the Earth, with Proofs and Illustrations* (1795). This work, although attracting little notice at the time, established a place for its author among the foremost thinkers in the realm of geological science. One of the fundamental principles of Hutton's theory was based on the internal heat of the earth, which has shown itself in past ages by the intrusion of molten rocks into the crust, and by upheaval of the superficial strata. This view was combated by the followers of Werner, but it is now generally accepted as correct. He further developed the principle that the study of geological phenomena should be based upon observation of changes going on at the present time, and thus in a way originated the doctrine of uniformitarianism (q.v.), afterwards elaborated and expounded by Lyell. The great value of Hutton's work was not fully appreciated until several years after his death, when Playfair brought out the "Illustrations of the Huttonian Theory." Hutton contributed frequently to the "Transactions of the Royal Society of Edinburgh," and also published several extended works, among the most important of which are: *Dissertations on Different Subjects in Natural Philosophy* (1792); *Investigation of the Principles of Knowledge* (1794); and *A Dissertation upon the Philosophy of Heat, Light, and Fire* (1794).

HUTTON, Laurence (1843—). An American essayist and critic, born in New York City. He was educated privately and at the age of nineteen entered commercial life, which proved uncongenial. Various visits to European cities strengthened an inborn taste for letters, and after acting from 1872 until 1874 as dramatic critic of the New York *Evening Mail*, he devoted himself entirely to literature. From 1886 till 1898 he was the literary editor of *Harper's Magazine*. He was one of the organizers of the Authors' Club, and of the International Copyright League. The private collection of literary curiosities gathered by him is unique, one of the most complete in the world. In 1892 he received the degree of A.M. from Yale, and in 1897 from Princeton. His writings on dramatic subjects include: *Plays and Players* (1875); *Curiosities of the American Stage* (1887); *Memoir of Edwin Booth* (1893); and with Brander Matthews, *Actors and Actresses of Great Britain and of the United States* (1886-87). He edited the *American Actor Series* (1881-82); compiled other books on subjects connected with the American stage; and published a group of delightful literary guide-books including *Literary Landmarks of London* (1887); of *Edinburgh* (1892); of *Jerusalem* (1895); of *Venice* (1896); of *Florence* (1897); of *Rome* (1897).

HUTTON, Richard Holt (1826-97). An English journalist and critic. He was the son of a Unitarian minister, and was born June 22, 1826, in Leeds, Yorkshire. The family removed to London in 1835. Hutton was educated at University College School, and subsequently at the college itself, with a view to the Unitarian ministry. After two semesters in Germany, he returned to London; and finding no adequate sphere in the ministry, he became principal of University Hall. Resigning on account of ill health, which necessitated a trip to the West Indies, he studied law. Under the influence of F. D. Maurice he entered the Church of England. In 1861 Meredith Townsend bought the *Spectator*, and called in Hutton to aid him in conducting it. As editor of this paper for twenty-five years Hutton exerted great influence. Liberal but not radical in tone, it became in his hands the organ of the very best contemporary thought. As a critic Hutton came to speak with much authority. His best work is represented by *Essays, Theological and Literary* (1871), containing under the second division essays on Goethe, Wordsworth, Shelley, Byron, Browning, George Eliot, and Clough; *Essays on Some Modern Guides of English Thought* (1887), treating of Carlyle, Newman, Matthew Arnold, George Eliot, and F. D. Maurice. He also wrote a life of Scott (1878), and edited the *Biographical Studies of W. Bagehot* (1881). Hutton died September 9, 1897, at Crossdepe. Consult Hogben, *R. H. Hutton, a Monograph* (Edinburgh, 1900).

HUXLEY, Thomas Henry (1825-95). An English naturalist and comparative anatomist. He was born at Ealing, now a suburb of London, May 4, 1825. He studied in the Medical School of Charing Cross Hospital, and in 1845 was graduated as M.B. and medalist at the University of London. In 1846 he was appointed assistant surgeon on the *Rattlesnake* of the Royal Navy, commanded by Capt. Owen Stanley, which was to survey the region of the Great Barrier Reef, east and north of Australia. Imbued with a passion for natural history, Huxley devoted himself to the study of the marine animals seen and collected during the four years of this survey service. His most important research, "On the Anatomy and the Affinity of . . . the Medusæ," was published during his absence and placed its author in the front rank of biologists. He demonstrated that the body of the medusa is essentially built up of an inner and an outer membrane, which he asserted were the homologues of the two primary germinal layers in the vertebrate embryo. (See Embryology.) This discovery stands at the basis of modern philosophical zoölogy, and of a true conception of the affinity of animals.

In 1850, on his return to England, Huxley began a hard struggle against adversity and discouragement. Disappointed in the hope that the Admiralty would provide for the publication of his notes and drawings, he published the more important in the *Philosophical Transactions* (1851), and in the same year was elected a fellow of the Royal Society, which in 1852 gave him its medal. In 1854 he succeeded Edward Forbes as professor of natural history and paleontology at the Royal School of Mines. This was in the line of direct advancement, for his great ability as an educator and administrator, as well as in original research, brought him to many posts of honor, such as, in 1855, the Fullerian professor-

the presidency of the Geological Society; in 1870, the presidency of the British Association for the Advancement of Science, and a seat on the first school board of London; in 1871, the secretaryship of the Royal Society, of which he became president in 1883; in 1872, the lord rectorship of Aberdeen University; in 1881, the professorship of biology in the Royal College of Science (an expansion of the earlier chair in the Royal School of Mines); in 1892 Privy Councilor. He served on no fewer than ten royal commissions, of which the most important were that of Inquiry into the Sea Fisheries (1864-65), and that on Scientific Instruction, and the Advancement of Science (1870-75).

Huxley's gifts of exposition were as remarkable as his powers of research. His scientific lectures, like his papers, were models of clearness, as well as accuracy, and he was both cogent and eager in debate, and fascinating in popular address. In 1858 he delivered the 'Croonian' lecture on the "Origin of the Vertebrate Skull," in which he disposed forever of the hypothesis that the skull is, homologically, an expanded section of the vertebral column. The very next year *The Origin of Species* was published. Convinced by its arguments, Huxley threw himself heart and soul into their support, adducing much telling corroboration from his own investigations. His series of lectures to London workingmen in 1860 had this for their theme, and did much to further the acceptance of the new doctrines. They were the basis of the powerful book *Man's Place in Nature*, and were succeeded by many addresses, essays, and debates, influential in informing the public and overcoming both scientific objections and religious alarm. It may fairly be said that science as contained in the doctrines of organic evolution, and especially in the views of Darwin, is almost as much indebted to the lucid exposition and bold championship by Huxley as to the originators of the theories. Nevertheless Huxley accepted Darwin's hypothesis of natural selection with a qualification. He pointed out the lack of evidence that any group of animals has, by variation and selective breeding, given rise to another group in the least degree infertile with the first; but he believed this objection might disappear under prolonged observation and experiment. As to Lamarck's theory of use-inheritance (q.v.), he declared, in 1890, his absolute disbelief, as the evidence then stood.

Huxley came to America in 1876, and delivered in New York three lectures on Evolution, taking as his texts the series of fossil horses. During that visit he delivered the opening address at Johns Hopkins University. Huxley's contributions to science were of the widest range, and embraced every department of biology. His exposition of the relations of protoplasm as the physical basis of life is particularly masterful. He was not only a man of science, but a publicist. His services were always at command for the promotion of political, social, and moral reform—first and chiefly for the cause of national education. His devotion to labors thus entailed, added to professional toil, did much to undermine his health, which for some

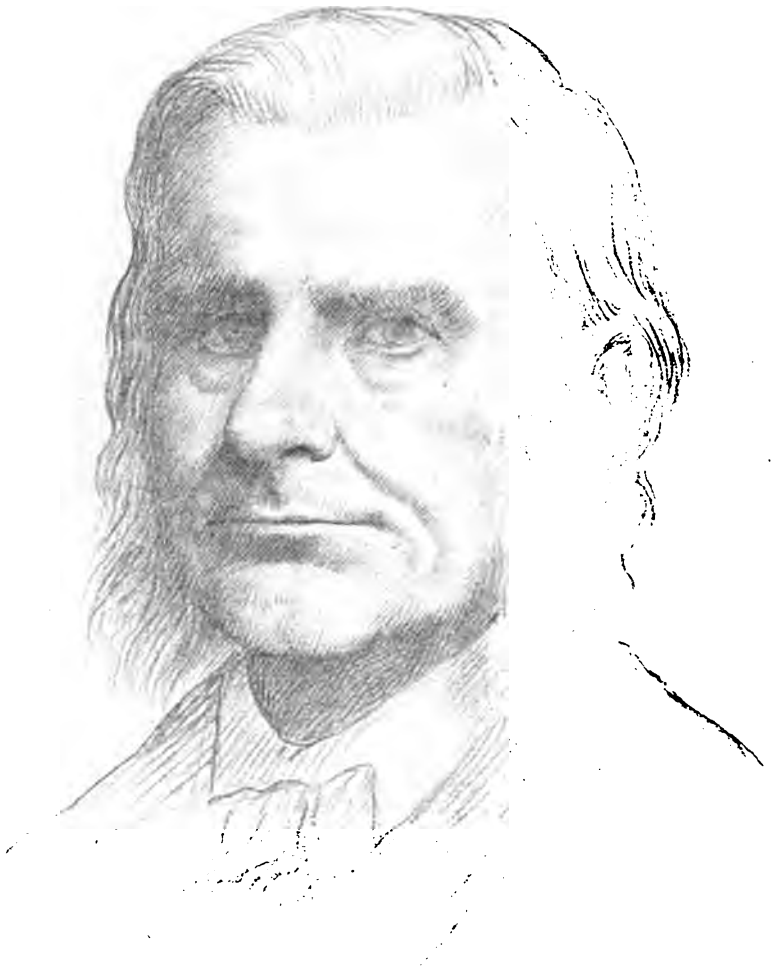
was made permanent in a series of books, of which the following is a complete list: *Oceanic Hydrozoa* (1859); *Evidence as to Man's Place in Nature* (1863); *Elementary Physiology* (1866; 4th ed. 1885); *Lay Sermons, Addresses, and Reviews* (1870; 3d ed. 1887); *Anatomy of Vertebrated Animals* (1871); *Critiques and Addresses* (1873); *Elementary Biology* (with Dr. H. N. Martin) (1875; 2d ed. 1876; 3d ed., edited by G. B. Howes and D. H. Scott, 1877); *American Addresses* (1877); *Anatomy of Invertebrated Animals* (1877); *Physiography* (1877); *Hume* (1878); *The Crayfish: An Introduction to the Study of Zoölogy* (1880); *Collected Essays* (9 vols., 1893-94). These contained some reprinted material as follows: *Method and Results; Darwiniana; Science and Education; Science and Hebrew Tradition; Science and Christian Tradition; Hume, Man's Place in Nature; Discourses, Biological and Geological; Evolution and Ethics*, and other essays. Four volumes of Huxley's *Scientific Memoirs*, edited by Sir Michael Foster and Prof. E. Ray Lankester, were published between 1898 and 1902. An authorized collection of his minor writings appeared in eight duodecimo volumes (New York, 1897-1900).

His *Elements of Biology* became the model for a large number of laboratory manuals, and his *Crayfish* is a classic of the methods of the investigator and the instructor combined. Whatever his theme, the weight and honesty of his thought and the distinction of his style make his works part and parcel of the best books of his time.

Consult: *Life and Letters of Thomas Henry Huxley*, by his son, Leonard Huxley (2 vols., London, 1900), which contain a complete list of his writings and of the honors awarded him; *Thomas Henry Huxley: A Sketch of His Life and Work*, by P. Chalmers Mitchell (London, 1900); *Thomas Henry Huxley*, by Edward Clodd (London and New York, 1902).

HUY, ụ'ē'. A strongly fortified town of Belgium, in the Province of Liège, situated amid lofty rocks on both banks of the Meuse, 18 miles by rail from Liège (Map: Belgium, D 4). Its citadel, dating from 1822, is partly excavated in the solid rock and commands the passage of the river. The Church of Notre Dame, a graceful Gothic edifice, was begun in 1311 and restored after having been partially destroyed by fire in the sixteenth century. The town contains distilleries and paper-mills, and in the vicinity are iron-works and coal-mines. Population, in 1890, 14,486; in 1900, 15,061. In one of the suburbs of Huy was formerly situated the Abbey of Neufmoustier, founded by Peter the Hermit, who was also interred within it. Huy was taken repeatedly by the Dutch and French in the many wars which swept over this region, and was last captured by Marlborough and Coehoorn in 1703.

HUYDECOPER, hoi'dē-kō'pĕr, BALTHASAR (1695-1778). A Dutch poet and critic, born at Amsterdam. One of his first books, *Proeve van taal- en dichtkunde op Vondel's Herscheppingen van Ovidius* (1730), or annotations to Vondel's translation of Ovid's *Metamorphoses*, is an important contribution to classical study. So is



THOMAS HENRY HUXLEY
FROM THE PORTRAIT BY A. LEGROS

in 1788. As a dramatist he was not so successful. Among his plays are a translation of Corneille's *Œdipe*, and *Achilles* (1719), an original drama, for some time very popular. He also made a verse translation of the *Satires* and *Epistles* of Horace (1737).

HUYGENS, hī'gĕnz, *Dutch pron.* hoi'gĕns, CHRISTIAN (1629-95). A celebrated Dutch mathematician, physicist, and astronomer. He was born at The Hague, the second son of Constantijn Huygens van Zuylichem, a poet and secretary and counselor to the Princes of Orange. He studied at Leyden and Breda, devoting himself at first to law, and then pursuing the study of mathematics. At the invitation of Minister Solbert of France, he settled in Paris, being given rooms in the Royal Library and made a member of the Academy. After the revocation of the Edict of Nantes he returned to Holland, where he lived the rest of his life. His early work, *Theoremata de Quadratura Hyperbolis, Ellipsis, et Circuli, ex Dato Portionum Gravitatis Centro* (1651), is an example of the talent which lay at the foundation of all his scientific achievements. This was followed by his *De Circuli Magnitudine Inventa* (Leyden, 1654), reprinted in Rudio, *Archimedes, Huygens, Lambert, Legendre* (Leipzig, 1892), the object of each work being to expose the fallacies of Gregoire de Saint-Vincent. He also worked on the doctrine of probabilities already founded by Pascal and Fermat and published *De Ratiocinatione in Ludo Aleæ* (1656). Huygens was the first to apply the pendulum to clocks and to use the device to determine the acceleration of gravity. A complete description of Huygens's apparatus is contained in his great work, *Horologium Oscillatorium, sive de Motu Pendulorum* (1673). He also developed and gave precision to the investigations of Galileo upon accelerated motion under the action of gravity; and there is no doubt that to his studies and discoveries his great successor, Newton, in preparing his magnificent development of the principle of accelerating force, was largely indebted. Newton was a student and admirer of his works, and assigns to him, along with Sir Christopher Wren and Wallis, the distinguished epithet of *hujus ætatis geometrarum facile principes.*

Huygens was the first to construct powerful telescopes, and in 1655 discovered the ring of Saturn and the fourth satellite of that planet. In 1659 he published an account of these discoveries in a work entitled *Systema Saturnium.* In the end of this work is described an invention of great importance in astronomy; namely, the micrometer (q.v.), by which small angles between objects viewed by a telescope are accurately measured.

In 1660 Huygens visited England, where he was admitted a member of the Royal Society. Huygens was the originator of the wave theory of light; and this theory, now accepted, was first stated by him in 1678, in his *Traité de la lumière* (first printed in 1690; modern German translation in *Ostwald's Klassiker No. 20,* Leipzig). In this theory light is conceived to be a form of motion in the medium through which it passes. (See LIGHT.) Later (1690) he was able not then be explained by the undulatory theory, and led Newton to adopt the emission theory. Huygens was in error, however, in believing that the vibrations were longitudinal rather than transverse. The undulatory theory, however, did not gain general acceptance until the nineteenth century, when the experiments of Young and Fresnel placed it on a firm basis.

A new edition of Huygens's collected works has been published by the Holland Academy of Sciences in six volumes (The Hague, 1888-95). For his biography, consult Bosfcha, *Christian Huygens,* German translation by Engelmann (Leipzig, 1895).

HUYGENS, CONSTANTIJN (1596-1687). One of the greatest writers in Dutch literary history. He was born at The Hague. His father was secretary to the State Council, and from childhood he was trained to diplomacy and in every polite art. Intellect in him was joined to beauty and strength. He studied at Leyden, London, and Oxford, and became a warm friend of Dr. Donne. Returning to Holland in 1620, he was sent on a diplomatic mission to Venice and twice to London (1621-23). Meantime he had published *Batava Tempe,* a versified series of local legends and scenes, and a volume of satires, *Costelick Mal.* Then followed (1625) a large volume of miscellaneous poems, *Otia, Ledighe uren.* That year he was made private secretary to the Stadtholder, and in 1630 member of the Privy Council, wherein he long used political power with vigor and wisdom. In 1634 he translated Donne's poems, and on the death of his wife (1637) composed *Dagwerck,* a sort of didactic elegy suggesting the manner of Tennyson's *In Memoriam. Hofwijck,* a poem on moral life, appeared in 1654. A collected edition of his poems appeared as *Korenbloemen* in 1658; his solitary drama, *Trijntje Cornelis,* in 1659. Although Huygens was not the greatest of Dutch poets or of Dutch statesmen, he was, in the combination of his qualities, one of the most dignified and brilliant talents of the days of Holland's greatness. As a poet he had more feeling for form and mastery of language, more ease and facility, than any other in his language. Consult Jorissen, *Constantijn Huygens* (Amsterdam, 1871).

HUYGENS'S PRINCIPLE. See LIGHT.

HUYSMANS, ų'ês'măn', JORIS-KARL (1848—). A French novelist, born in Paris, of a Flemish family, some members of which had achieved distinction as painters at Antwerp in the seventeenth century. He began literary life as a disciple of the crassest realism, as one may see by his contribution to *Les Soirées de Médan.* (See ZOLA.) His novels present every stage of an evolution from sensual materialism, through spiritualism and Satanism to Christian mysticism, in which there is indeed a curious strain of the sensual and material still. *Marthe* (1877) is a study of sordid prostitution, coinciding significantly in date with Goncourt's *Fille Eliza* and Zola's *L'assommoir.* In *Les sœurs Vatard* (1879) Huysmans shows himself still a dilettante of moral anguish, sordid wretchedness, and contemptible vice. *En ménage* (1881) is a cynical commendation of marriage and *A vau-l'eau*

transfigures or transforms reality enchants him," he makes his hero say. After this there are some barren years save for the insignificant *En rade* (1887) and *Un dilemme* (1887). Then *Là-bas* (1891) carries the psychic evolution a step further in a morbid treatment of astrology and Satanism. This recrudescence of the occult and reassertion of the extra-natural suggests a fascinated contemplation of religious mysticism, and in *En route* (1896) we find Huysmans indeed 'on the road' toward such Christianity as may be consistent with pessimism. From this point the progress is steady and the course plain. *La cathédrale* (1897) carries the reader to the door of a Benedictine retreat, and *L'oblate* (1898) ushers him within. All this latter work is full of "fingering spiritual muscles to see if they are growing;" it is thoroughly morbid, but thoroughly characteristic, too, of a French generation weary of material progress and of all problems save those that defy solution. Yet in spite of glaring errors of taste, in spite of a recondite vocabulary and of a studied absence of structural unity, these novels are perhaps the frankest and subtlest analyses of the progress of a pilgrim soul since Bunyan's Christian allegory. And they are essentially autobiographic; for Huysmans, like his hero, retreated for some time to a Trappist monastery, and became an unprofessed member of the Benedictine community at Solesmes, "too much a man of letters to be a monk, too much a monk to stay among men of letters," as is said of Durtal in the conclusion of *En route*, which is to English readers the most attractive of all his works and "one of the most characteristic novels of our quarter century." It is well translated by Kegan Paul.

HUYSUM, hoi'sụm, JAN VAN (1682-1749). A celebrated Dutch painter of flowers and fruits. He was born at Amsterdam, April 15, 1682, and required the rudiments of his art from his father, JUSTUS (1659-1716), a landscape painter of considerable talent. Jan at first devoted himself to landscapes, in the classic style, smooth and lifeless, and only later in life began to paint fruits and flowers, studying especially the works of De Heem and Abraham Mignon (q.v.). His work differed from that of his predecessors in that he preferred to paint upon a light background. He surpassed in mellowness, purity, and delicacy of coloring, and in the exquisite disposition of his lights and shadows. He was fond of introducing birds' nests with eggs, dewdrops, insects, butterflies, and like motifs, rendered with such realism as almost to produce an illusion. The tissue of his flowers and the soft down of his fruit are incomparable in delicacy. His works were very popular and commanded the highest prices. He died at Amsterdam, February 7, 1749. Huysum's masterpieces are to be found in the chief German and Dutch galleries, especially those of Berlin and Amsterdam; the Louvre is the richest of all, having ten pieces, and there are excellent examples in the English private collections.

HUZVARESCH, hōōsh-vä'rĕsh. See PAHLAVI.

HWANG-HO, hwäng'hō'. See HOANG-HO.

B.C. 2356. Like Fuh-hi (q.v.) and many more of the great leaders of Chinese primitive times, his birth was miraculous, and many wonderful things are attributed to him. The year B.C. 2697 is given as the first of his reign, and as he ruled under the influence of the element *earth*, he became known as the 'Yellow Emperor,' a circumstance which, if he ever lived, might point to the region now known as Shen-si (q.v.) as the location of his realm. There the earth is yellow, the atmosphere is tinged with yellow, and trees, houses, etc., are covered with the yellow dust from the mantle of loess (q.v.) which covers half the province. Yellow is still the Imperial color. He is said by the Chinese to have regulated the calendar, and to have introduced in the sixty-first year of his reign the sexagenary cycle by which successive days have ever since been designated, the application of the cycle of years dating only from the Han dynasty (which began in B.C. 206). He is also credited with having introduced a decimal system, the arts of wood, pottery, and metals, boats and wheeled vehicles, and many other beneficent things. To Hwang-ti's wife is due the credit of having been the first to instruct the people in the rearing of silkworms. That Hwang-ti was a virtuous ruler and his reign a prosperous one are vouched for by the statement that both the Fū-hwang and the K'i-lin (qq.v.) appeared in his court. He died at the age of 111, and was succeeded by Shao-hao, B.C. 2597. See the *Chinese Repository*, vol. xi.; Mayer, *Chinese Reader's Manual* (Shanghai, 1874); De la Couperie, *The Western Origin of Chinese Civilization* (London, 1884); and Dyer Ball, *Things Chinese* (London and New York, 1893).

HWEI-SANG, hwā'säng' (c.420-c.505). A Buddhist monk, who traveled to the land Fusang, which has been identified by some with Mexico. In 499 Hwei-sang came to King Chow, the Imperial city of the dynasty of Tsi, and in 502 told the Emperor the story of his travels in Fusang, a country to the east, so called from a plant, the *fusang*. His story was taken down in writing; its principal point was that Fusang had been converted to Buddhism by monks from Cabul in 458. The identification of Fusang with Mexico was first made by De Guignes in 1761, in the *Mémoires de l'Académie des Inscriptions et Belles-Lettres*, vol. xxviii., and was laughed at. In later times (1862-63) Gustav d'Eichtal upheld the theory, and (1875) so did Charles G. Leland. (Consult his *Fusang, or the Discovery of America.*) But the strongest impetus given to this belief was by Vining, *An Inglorious Columbus* (1885), and by John Fryer (1901), in *Harper's Magazine* (vol. ciii., p. 251 sqq.), and in *Harper's Encyclopædia of United States History*, "Hui Shen," which should be consulted. He finds traces of Buddhist art in the idols of the Aztecs: of *lama* in the Aztec *tlama;* of *Gautama*, in *Guatemala, Huatomo, Guatemotzin;* of *Sakhya* in *Oaxaca, Zacatecas, Sacalepec, Zácatlan, Sacapulas*, and *Taysacca;* of a correspondence between *Fusang* from *fusang*, and *Mexico* from *maguey* (or agave); while he explains away all difficulties by mistakes in the report of Hwei-sang's

HYACINTH (from OF. *hyacinthe*, from Lat. *hyacinthus*, from Gk. *ὑάκινθος*, *hyakinthos*, hyacinth; of doubtful etymology, hardly connected with Lat. *juvenis*, Skt. *yuvan*, Eng. *young*), *Hyacinthus*. A genus of bulbous plants of the natural order Liliaceæ, with linear radical leaves and many flowers on leafless scapes. The blossoms are either erect, spreading, or drooping, and arranged in loose or dense racemes. The genus comprises about thirty species, of which three are natives of Southern and tropical Africa, and the rest of Asia Minor, Syria, and Persia. The few cultivated species are native to the region east of the Mediterranean Sea, and among them *Hyacinthus orientalis*, which has become naturalized in Southern Europe, is by far the most important. The numerous varieties have single and double flowers of many different colors. The hyacinth has long been in cultivation, and about the beginning of the eighteenth century it stood almost first in popularity among florists' flowers, and many new varieties were produced. Then, as now, Holland, owing to its favorable climatic and soil conditions, was the principal hyacinth-growing country. Hyacinths are grown in the open, under glass, and as house plants. For outdoor growth, a good, well-drained garden soil is required. Well-rotted cow manure is the best fertilizer for hyacinth-beds, and horse manure should never be used. Neither should the bulbs be brought in direct contact with freshly applied manure. The bulbs, planted from September to November, are usually placed from six to eight inches apart, and about five inches deep in beds spaded to the depth of twenty inches. The main root-growth is made during the fall. In winter the beds are protected with litter, leaves, or well-rotted manure. The plants flower early in the spring. In the summer when the leaves have withered, the bulbs are taken up and stored in dry soil or sand until planting time. For winter flowering the bulbs are started in the dark, and later on the plants are brought to bloom in the forcing house. As house plants, they are grown in hyacinth glasses with water only. Roman hyacinths are a form of *Hyacinthus orientalis* which produce three or four small flower-spikes instead of a single large one. Two other species, *Hyacinthus amethystinus*, or Spanish hyacinth, and *Hyacinthus ciliatus*, are also cultivated to a small extent. There are a number of other plants commonly called hyacinths, which belong to other genera of Liliaceæ. Among these are the grape or globe hyacinth and the musk-hyacinth of the genus Muscari; the *Hyacinthus candicans* of gardeners, which is Galtonia candicans; the wild or wood hyacinth of Great Britain (also

DUTCH HYACINTH.

to the order Pontederiaceæ. See Colored Plate of AQUATIC PLANTS.

HYACINTH. The brownish or reddish transparent variety of zircon, especially that found in Ceylon, frequently used as a gem. The name is also applied to similarly colored transparent minerals, chiefly to the hessonite variety of garnet.

HYACINTHE, ē'ā'săNt', PÈRE. See LOYSON, CHARLES JEAN MARIE.

HY'ACIN'THUS (Lat., from Gk. *'Υάκινθος*). According to the usual story, the son of Amyclas, and beloved by Apollo. While throwing the discus the god accidentally struck and killed the boy. Later writers said that Zephyrus, also a lover of Hyacinthus, by his blast turned the discus from its course against Hyacinthus. His grave was shown at Amyclæ, and on the throne of the image of Apollo, which stood over the grave, was represented the reception of Hyacinthus and his sister into Olympus. The Hyacinthia, celebrated in his honor for three days each spring, were among the greatest Laconian solemnities, and Amyclæ the most sacred place in Laconia. From the blood of Hyacinthus sprang the hyacinth, with the lament AI on each leaf. This flower seems to be a species of iris; but is almost certainly not our hyacinth.

HYADES, hī'ā-dēz (Lat. nom. pl., from Gk. *'Υάδες*, rainy). In German mythology, nymphs of Dodona, associated with the fructifying effect of moisture. They were the nurses of the newborn Bacchus, and were rewarded by Zeus by being placed among the stars near the head of the Bull. Their number varies from two to seven. According to another account they were daughters of Atlas and Æthra or Pleione, and sisters of the Pleiades, and were changed into stars after their death from grief at the loss of their brother Hyas, who was killed by a snake. The rising of these stars in spring and autumn was looked on by the Greeks and Romans as a sign of wet weather. The name was sometimes rendered by the Romans *Suculæ*, little pigs, either by mistaken derivation from *ὗς*, sow, or because the Roman name, for which a derivation from *succus*, moist, has been assigned, existed independently of the Greek term.

HYÆ'NODON. An extinct dog-like creodont mammal, fossil skeletons of which have been found in the late Eocene and early Miocene terrestrial deposits of North America and Europe. It was the latest and most specialized member of the Creodonta. Its head is very elongate with a strong posterior crest, the lower jaw is long and slender, and the canine teeth of both jaws are prominent. The body was of slender build, the legs rather short, the feet semi-plantigrade, each foot with five clawed toes. The finest examples are from the White River formation of Nebraska, Montana, and Dakota.

HY'ATT, ALPHEUS (1838-1902). An American naturalist. He was born at Washington, D. C., and was educated at the Maryland Military Academy, at Yale College, and the Lawrence Scientific School, Cambridge, from which he graduated in 1862. He served as a volunteer

throughout the Civil War, rising to the rank of captain. He afterwards renewed his studies, becoming curator of the Essex Institute in 1867. He was the principal founder of the American Society of Naturalists; organized a seaside laboratory at Amusquam, Mass.; took part in the organization of the Marine Biological Laboratory at Wood's Holl, Mass.; and assisted in the founding of the Peabody Academy of Sciences, and became its curator in 1869. He was also one of the founders of the *American Naturalist*. In 1870 he became custodian, and in 1881 curator, of the Boston Society of Natural History, and in 1881 was appointed professor of zoölogy and paleontology at the Massachusetts Institute of Technology and at Boston University.

He was elected a member of the National Academy of Sciences in 1875; was a corresponding member of the Geological Society of London; and in 1898 received the degree of LL.D. from Brown University, and was a vice-president of the American Academy of Arts and Sciences, Boston. His work as a paleontologist was masterly; besides making many innovations in the classification of the nautiloids and ammonites (q.v.), the final results form the most valuable contribution to the philosophy of biology. He was the founder of the new school of invertebrate paleontology. In systematic zoölogy he will be remembered for being next to the first one to refer the sponges to a distinct phylum. He also proposed many new genera, families, and numerous suborders of fossil cephalopods. He discovered the law of acceleration in the evolution of Cephalopoda, and the mechanical causes of their evolution; of his work on the fossil pond-snails of Steinheim and the origin of their various forms, Sir R. Owen wrote that it was "a model of the way and aim in and by which such researches should be conducted."

Hyatt wrote, besides many shorter articles: *Observations on Freshwater Polyzoa* (1866); *Revision of North American Porifera* (1875-77); "The Genesis of the Tertiary Species of Planorbis at Steinheim," in *Memoirs of the Boston Society of Natural History* (1880); *Genera of Fossil Cephalopods* (1883); *Larval Theory of the Origin of Cellular Tissue* (1884); *The Genesis of the Arietidæ* (1889). He has edited *Guides to Science Teaching*, and revised the part of the Zittel-Eastman *Text-book of Paleontology* on Nautiloids and Ammonoids. These works make him prominent among the new school of American zoölogists, led by Cope and Packard, which called itself 'Neo-Lamarckian.' Professor Hyatt died at Cambridge in 1902.

. **HYATT**, JOHN WESLEY (1837-?). An American inventor. His education was very meagre, and while yet in his teens Hyatt started upon his career as an inventor. His first important invention (1865) was that of a composition billiard-ball which, by reason of the scarcity of ivory, became very popular. Four years later, by his discovery of a means for dissolving pyroxylin under pressure, he laid the foundations for the present immense celluloid industry. Undoubtedly Hyatt's greatest contribution to science, however, was the scheme he devised in 1881 for the purifying of large bodies of water. The success of his method has been attested by the general use made of it both in the United States and abroad.

HYBLA (Lat., from Gk. Ὕβλη). The name of two towns in Sicily. Hybla Major was situated on the seacoast, not far from Syracuse, and Hybla Minor at the foot of Etna. Both were originally cities of the native inhabitants, and were afterwards Hellenized. From one of these came the Hyblæan honey, rendered so famous by the poets.

HYBODUS, hīb'ō-dŭs (Neo-Lat., from Gk. *ὕβος, hybos*, hump + *ὀδούς, odous*, tooth). An extinct genus of cestracionts sharks found fossil in the Triassic and Jurassic rocks. Finely preserved skeletons of this shark have been found in the Liassic deposits of England. These fish had blunt heads, jaws armed with nine to ten rows of sharp, conical teeth, fins armed with long, sharp, anterior spines, and the skin was covered with shagreen, consisting of small pointed plates. Two sharp curved spines on each side of the head behind the eyes are present on the males only, and perhaps served as offensive organs. The species varied from three to six feet in length. See SHARK; TRIASSIC SYSTEM.

HYBRID (from Lat. *hybrida, hibrida, ibrida*, hybrid), in plants. The progeny of parents which belong to different species or races. See HYBRIDITY.

HYBRIDITY. The phenomenon of the sexual crossing of two individuals belonging to distinct species. A hybrid is the product of this crossing, and is contrasted with a mongrel, or the product of individuals belonging to distinct races or varieties of the same species. The importance of hybridity is threefold:

(1) *A Test of Species.*—Hybridity has been used by Cuvier and others as a test of species, as contrasted with varieties. It has been asserted that hybrids are sterile, whereas mongrels are fertile. So long as infertility of descendants is used as a criterion of species, this tenet is unassailable; the difficulty arises from the fact that the strict application of the criterion leads us to deny specific distinctions to animals that are commonly regarded as such—e.g. the dog and wolf, dog and jackal, the hare and rabbit, various species of Bovidæ or oxen, sheep and goat, and, among plants, various forms of Rhododendron, Gladiolus, Dianthus, Nicotiana, etc. Focke says concerning plants: "Many hybrids, especially those between unlike lines of descent, are infertile, most show a diminished fertility, some a *nearly normal fertility.*" It may be concluded, therefore, that the Cuvierian definition of species will not hold. While fertile hybrids are thus not common, the capacity for hybridization in the first generation is widespread.

The question arises, Why are hybrids so often sterile? Various hypotheses have been proposed, but none can be said to be proved. Darwin's hypothesis is thus summarized: "The sterility of first crosses and of their hybrid progeny has not been acquired through natural selection. In the case of first crosses it seems to depend on several circumstances; in some instances on the early death of the embryo. In the case of hybrids, it apparently depends on their whole organization having been disturbed by being compounded from two distinct forms, the sterility being closely allied to that which so frequently affects pure species when exposed to new and unnatural conditions of life. He who will explain these latter cases will be able to explain the

change in coloration or form, they will, by virtue of correlation, affect also the germ cells, and may give rise to a certain amount of infertility. Now the infertility will be beneficial whenever new species arise in the same area with the parent form, because it would result in a destruction of both of the adapted forms. Consequently, whenever two species which are at the same time adapted and infertile arise, they will retain their respective adapted conditions and will survive. Finally, Catchpool and Romanes have independently suggested an explanation that is worthy of consideration—it is that the sterility of species is not something acquired, but is primary. Whenever from any cause two lots of individuals of one species become partly infertile *inter se*, those lots are, as it were, segregated. Each of them can develop its own way and give rise to a distinct species. If the species were not thus sterile at the beginning, differentiation would be difficult.

(2) *Relation to Inheritance.*—Hybridity is important for the study of the laws of inheritance. Since the parents are more unlike, the nature of their combinations is still more interesting than in the case of ordinary sexual reproduction. Hybrids are particularly apt to show a reversion to an ancestral condition, especially when opposing characters are intermingled. The following rules concerning hybrids have been formulated by Focke: (a) "All the individuals formed by the crossing of two pure species or races are, if they have been produced and grown under the same conditions, exactly like each other as a rule, or they differ hardly more than specimens of one and the same species are apt to do." This proposition is subject to many exceptions. In certain crosses the female element is predominant in the progeny; in others the male. Especially in cases of alternative heritage (see HEREDITY) the hybrids may be of two types, the one resembling more the one parent, the other type the other parent. (b) "The characteristics of the two crosses may be different from those of the parent species. They differ most from both parent species in size and luxuriance, as well as in fertility." In the case of alternative heritage an interesting rule was worked out by Mendel. He finds that one of the species is prepotent (p), the other subpotential (s). The hybrids will be either of the p or the s species, and the relative proportion will be p 75 per cent., s 25 per cent. If, now, self-fertilization occur, 50 per cent. of the plants will produce either p or s progeny in the proportions 75 per cent. p, 25 per cent. s. All the descendants of p and s breed true. The consequence of Mendel's 'law of dichotomy' in hybrids is that the proportion of the pure races is constantly increasing in the successive generations descended from a hybrid. "Malformations and curious forms are much more common, especially in the flower parts of hybrids, than in individuals of a pure descent." Double flowers appear to be formed especially easily in hybrids. Hybrids are frequently infertile, because the pollen is imperfectly formed.

(3) *Utility.*—Hybridity has great practical utility in agriculture. Many varieties of our domesticated plants have arisen from artificial crossed, the leaves of the second or third generation are often highly variable. This great variability, on the other hand, renders any favorable variation liable to be lost unless great pains are taken to fix the desired quality by in-and-in breeding, or unless the quality can be reproduced vegetatively—i.e. by cuttings and grafts. The diminished fertility of some hybrids is agriculturally advantageous in the case of plants that can be reproduced vegetatively. Some of the advantageous results of hybridization are as follows: (a) Increased Size and Vigor. The hybrid between the English walnut and the California black walnut is of exceptional value, "for it grows twice as fast as the combined growth of both parents. The wood is very compact, with lustrous silky grain," etc. Another hybrid of the black walnut and the California black walnut produces fruit of much larger size than that of either parent. These are illustrations of a common result of hybridization—increased size and vigor. (b) Increased Hardiness. The production of hardy races of plants is very important, because it carries farther north the limits of agriculture and increases the area of cultivation. Every few years the orange and lemon trees of the Gulf States and California are greatly damaged by freezing weather. The Japanese trifoliate orange is hardy, but has fruit of small size. It is hoped that a hybrid may be obtained between it and the ordinary orange which shall have increased hardiness without loss of size or flavor in the fruit. (c) Adaptation to Warmer Climate. The Kieffer and LeConte pears, which have revolutionized pear agriculture by extending the range of profitable pear-growing hundreds of miles southward, are said to be hybrids between the common pear and the Chinese sand pear. (d) Increased Resistance to Disease. When the vast grape industry of France was threatened with destruction on account of the ravages of the bug Phylloxera, immune American species were crossed with the French species and immunity was gained by them. Similarly, the black-rot disease in grapes has been fought by introducing the blood of immune races. (e) Increased Percentage of Starch, Sugar, etc. By hybridization the production per acre of the potato has been doubled, and the starch percentage increased from 15 to 26. While the percentage of sugar in the sugar-beet has been hitherto chiefly increased by selection, there seems to be a chance for improvement by hybridization. A hybrid cinchona produces three to four times the ordinary percentage of quinine. (f) Change of Season and Duration of Life. By hybridization plants have arisen fruiting at unusual times, like Burbank's blackberry and raspberry hybrids. A fairly successful attempt to make the pansy perennial resulted from crossing the garden pansy with the perennial Viola cornuta. (g) Acquisition of Odor. The fragrance of the pansy has been improved by crossing with odoriferous Alpine species. (h) Improvement of Quality and Flavor. This result is illustrated by the case of smoking tobaccos, in which the superior-flavored Havana race has been crossed with other races having larger leaves, so that a greater quality of well-flavored leaf has been produced. Alto-

In connection with the artificial production of hybrids, the phenomenon of 'xenia' has recently attracted much attention. This term is applied to cases in which characters of the pollinating parent appear directly in the fruit or seed. It was once thought that only the embryo could show hybrid characters, which would become evident, therefore, only upon the germination of the seed. In cases of xenia, however, the regions of the seed outside of the embryo show hybrid characters, so that it is evident that they too have been influenced by the pollinating parent. The crossing of the races of maize has proved to be most favorable for studying this phenomenon. If a race of maize normally producing white grains be pollinated by one producing red grains, the resulting grains will show the red coloration in various ways. The same result is also obtained in crossing races of sweet and dent corn. This phenomenon was inexplicable until the recent discovery of 'double fertilization' among flowering plants. This phrase means that both of the male cells were brought by the pollen-tube to the ovule function—one fertilizing the egg, which then produces the embryo, the other uniting with the 'endosperm nucleus,' which then produces the endosperm or food substance of the seed about the embryo. It is evident, therefore, that where double fertilization occurs in connection with hybridizing, the endosperm as well as the embryo is a hybrid, and that the resulting seed may show characters of the pollinating parent. See ANGIOSPERMS; FERTILIZATION; PLANT-BREEDING.

METHODS OF HYBRIDIZING.—The methods of hybridizing plants are simple. If the flower is hermaphroditic its stamens must be cut away before they are ripe—usually before the corolla opens—and the flower must be tied up in a paper bag. When the stigma is ripe the pollen is placed on it, and the bag tied over the flower again and not removed until the seed begins to form. If the flower bears no stamens, it requires, of course, no operation except the tying up while in the bud to prevent the access of foreign pollen. Among animals, much less experimentation in producing hybrids for commercial purposes has been done.

HYBRIDITY IN ANIMALS.

The number of animal hybrids known to have been produced or to actually exist is not large. The only special work on hybrids is that of Suchetet, the first volume (1001 pages) being devoted to birds alone.

Of hybrids produced by nature we have on record comparatively few examples, but the number is probably quite considerable. It is known that fish, especially the Salmonidæ, readily hybridize. There are on record over a hundred cases of hybrids among insects, and the number probably runs into the thousands. Of amphibians, species of diverse frogs have been seen mating, but it is not definitely known that such unions have given rise to hybrids. Natural hybrids among birds have been described—e.g. between the flicker of the Eastern United States and the Mexican flicker, between two species of warblers of the genus Helminthophila, between species of geese, various European grouse, and certain Asiatic pheasants. carried to maturity; the resulting pluteus stages are more or less monstrous. In one case early larval hybrids between species of two different classes of echinoderms, starfish and sea-urchins, were produced. The cases of fertile hybrids of birds and mammals mentioned below were produced in captivity; besides these there have been instances of hybrids between the brown and polar bear, the leopard and jaguar, the lion and tiger, the sea-lion and fur-seal, between the zebra and horse, the horse and ass, and the common ass and varieties of the kiang.

Hybrids are also known to occur between the dog and fox (Darwin), but this case is doubted by Ewart.

VARIATIONS OF HYBRIDS. Darwin has shown that hybrids are more variable and have a greater tendency to vary than the products of pure race of both parents. He also has shown that the products of hybrids are much more variable than the hybrids themselves.

RESULTS OF RECENT EXPERIMENTS. As a result of experiments by Standfuss on thousands of specimens of the higher Lepidoptera, the following results have been obtained:

(1) The intercrossing of two species may result in anything, from complete sterility to the production of the normal number of fertile eggs. These extremes may even occur as the result of crossing different individuals of the same two species. Hence a cross must not be pronounced infertile on the evidence of a single failure.

(2) Individual differences in the structure of the genital apparatus may prevent effective crossing between some members of two given species, though other members of the same two species may pair freely.

(3) Some crossings have resulted entirely in male, others entirely in female, offspring. A third class has given both sexes in various proportions.

As regards the fertility of hybrids, in no case observed by Standfuss or known to him has the female of a true hybrid been shown to be fertile. But the occurrence of undoubted cases of fertility in male hybrids has been proved by crossing the male hybrids with the females of both parent species, and in one case with the female of a third species.

The silk-moth hybrids of Philosamia cynthia and Philosamia ricina, the arrhindy moth, two closely allied species, are also said to have been fertile for eight generations.

FERTILITY OF THE HYBRIDS. It is well known that the mule is infertile, and though there are reported to be three cases where a mule has produced young, they are doubtful. Ewart, in referring to the instance of the Paris Jardin de l'Acclimatation mule, doubts whether these animals are mules, quoting Ayrault's opinion that the Paris mule was an ordinary mare. Darwin states that he knows of no thoroughly well authenticated cases of perfectly fertile hybrid animals, though he adds: "I have reason to believe that the hybrids from Cervulus vaginalis and Reevesii and from Phasianus colchicus with Phasianus torquatus are perfectly fertile." The hare and rabbit are supposed to have fertile offspring; the hybrids of the common and Chinese

geese (*Anser cygnoides*) are fertile, as are hybrids between the common duck and the pintail duck. The crossed offspring from the Indian humped and common cattle interbreed. Caton has hybridized the Virginia deer with the Ceylon deer and the Acapulco deer, and says that the hybrids seem perfectly healthy and prolific. The Indian dog and coyote are said by Coues to interbreed, and on the upper Missouri dogs have been seen having every appearance of being such hybrids. Hybrids of hares and rabbits have continued fruitful for generations; the same is true, says Hertwig, of hybrids obtained from the wild buck and the domesticated she goat. The American bison is known to breed with the domestic cattle, and it seems to be a well-established fact that the hybrids are fertile. Ewart states that the Indian buffalo and the American bison produce fertile hybrids with the wild ox of Europe. Among fishes, fertile hybrids have been obtained from the carp and goldfish, and from the charr and the brook trout.

Relative Strength of Hereditary Influences. The three following conclusions rest on an elaborate series of experiments by Standfuss with three European species of Saturnia moths:

(1) The freshly hatched hybrid larva closely resembles that of the female parent, but with the process of growth a resemblance to that of the male parent gradually increases.

(2) The extent of approximation toward the male parent depends on the relative phylogenetic age of the two species, the older being able to transmit its properties, whether of structure or habit, better than the younger.

(3) In reciprocal pairing, the male is able to transmit the characters of the species in a higher degree than the female. This influence, however, is less regular and potent than that spoken of in the preceding paragraph.

The result of crossing a parent species with a local race, or with an aberration of the same species, is as follows:

(1) When the normal form of a species (*Grundart*) is crossed with a gradually formed local race of the same species, the result is a series of intermediate forms. (2) On the other hand, when the normal form is crossed with a sporadic aberration, the result in many cases is that the issue divides itself sharply between the normal form and the sport, intermediate forms being absent.

In commenting on these results, Dr. F. A. Dixey remarks: (1) The experiments afford fresh illustrations of the manner in which the physiological isolation of an incipient species may be brought about. (2) They show that the statement of Focke as to the great variability of the offspring resulting from the crossing of a plant hybrid with one of the parent species holds good in the case of insects. (3) What Standfuss speaks of as the prepotency of the phylogenetically older of the parent species is probably only another expression of the principle established by Darwin that in many cases crossing causes reversion to a remote ancestor. (4) The general conclusion as to the prepotency of the male parent accords so far with one result of Galton's investigation of the late Sir E. Millais's breed of basset hounds. (5) The result of crossing a parent species with a gradually formed local race, though less in degree, is much the same in kind as that of crossing two distinct species. (6) The result of crossing the normal form of a species with a sporadic aberration of the same species appears to show that the latter stand biologically on an entirely different footing from the regularly developed variety, even though it may indicate (as alleged by Eimer and by Jordan) the direction in which variation for that species is possible. With Standfuss's instances may be compared the well-known case of the 'otter sheep,' which similarly, when crossed with a sheep of ordinary breed, gave no true intermediates. (7) Certain experiments with aberrations of this kind, of which exact numerical records have been kept for several generations, are of special interest in connection with Galton's law of heredity. See Galton, *Natural Inheritance*, p. 134 (London, 1889).

In still later experiments by Standfuss (1898) he shows that the crossing of two distinct species gives rise to a *zwischenform*, but not to a *mittelform*. The latter may, however, exist as a temporary stage in larval growth. This depends on the following principles: (1) The freshly hatched larva closely resembles the female parent; (2) with the process of growth a resemblance to the male parent gradually increases; (3) the final extent of approximation toward the male parent depends on the relative phylogenetic age of the two species, the older being able to transmit its properties, whether of structure or habit, better than the younger; (4) in reciprocal pairing the male is able to transmit the characters of the species in a higher degree than the female; (5) when the normal form of a species (*Grundart*) is crossed with a gradually formed local race of the same species, the result is a series of intermediate forms; (6) when the normal form is crossed with a sporadic aberration, the result in many cases is that the issue divides itself sharply between the normal form and the sport, intermediate forms being absent.

Hence, according to Standfuss, adds Dixey, "the process of species formation must be gradual; for when two distinct species are crossed the issue does not split up into two parental forms, as in the case when one parent is a suddenly formed aberration. On the contrary, the behavior of the issue of two distinct species is very similar in kind to that of a species crossed with a local race or variety which is being gradually established by the accumulation of slight changes. It would seem, therefore, that although an aberration or sport may be perpetuated by inheritance, it can never acquire distinct specific rank. No doubt, however, it may, if selected, eventually replace the original form of the species."

Dixey also makes the interesting suggestion that these sporadic color aberrations "seem to have many points of resemblance with the color varieties in domestic animals, such as the 'lemon and white' and 'tricolor' of the basset hounds, or the well-known tortoise-shell, tabby, and black of cats. The fact that these domestic varieties exist side by side in the same race, and even in the same litter, and that true intermediates are rare or absent, seems to suggest that they originally appeared as sports, and that their perpetuation has been insured or favored by artificial selection."

Zebra Hybrids. In his *Penycuik Experiments* (1899) Ewart states that he bred nine zebra hybrids by crossing mares of various sizes and breeds with a Burchell zebra stallion 'Matopo.'

The hybrids are interesting because of the curious blending of characters, derived apparently partly from their actual and partly from their remote ancestors, and because they shed new light on many questions of general interest, such as the origin of stripes, reversion, interbreeding, and prepotency.

REVERSION. He concludes that "some of the hybrids in make and disposition strongly suggest their zebra sire, others their respective dams; but even the most zebra-like in form are utterly unlike their sire in their markings. It is not a matter of taking after a grandparent, but after an ancestor in all probability thousands of generations removed, an ancestor probably far more like the Somali than any of the Burchell zebras." (This confirms Standfuss's conclusion stated above.) Ewart adds (p. 21): "The reversion may be to recent, remote, or intermediate ancestors, and the tendency will in most cases be to revert to sports that here and there mark the route along which the development has proceeded."

He also, by breeding pigeons, restored the rock pigeon, or primitive form. "In the case of my most typical bird there is, as far as an external examination can show, practically complete reversion." Reversion, he says, "seems to lead to a form of rejuvenescence." He regards polydactylism in the horse as in part due to reversion to the Hipparion or the three-toed fossil horse. As he well puts it, the cases of reversion that he cites "must be more or less accurate restorations of their comparatively remote ancestors." Reversion also indicates that in some cases "varieties and breeds which have, through interbreeding, undergone senile degeneration, may be regenerated without the loss of their best and most prized characteristics."

PREPOTENCY. It is generally assumed that an old species or variety is prepotent over a more recent species or variety. It is impossible to say whether zebra hybrids in their markings take after a remote zebra ancestor, or after an ancestor common to both zebras and horses, or after a hypothetical mid-parent combining the characters of the less remote ancestors of both zebras and horses. There is, however, no difficulty in seeing that while some zebra hybrids, apart from their stripes, closely resemble the zebra parent, others take after their horse parent, thus showing that the wild sire is not necessarily the most prepotent. "But even when the hybrids are distinctly horse-like they never repeat recently acquired peculiarities, such as a blaze, or short ears, high withers, or a small head and long neck."

He believes that sports and certain marked variations are often prepotent; and also that inbreeding (see CROSS-FERTILIZATION) is "common among wild animals, and that by inducing prepotency it plays an important part in the origin of species." It may be here observed that Ewart's experiments lead him to reject telegony (q.v.), and to explain such occurrences by cases of reversion. The zebra hybrids are also interesting as being "in some respects almost intermediate between their parents." Each parent, he says, hands on its most fixed individual characters. His zebra hybrids are neither new creations nor yet intermediate forms.

Sterility in Hybrids.—Ewart concludes that, as there is no hard and fast line between species and varieties, there can be "no fundamental difference between a hybrid and a cross, nor yet any *a priori* reason why any given hybrid should be sterile, or any given cross fertile." "Sterility has doubtless been acquired in some cases slowly, in others abruptly, but how it has been acquired it is impossible in most cases even to guess."

MENDEL'S LAW. Great interest has been excited among biologists by Mendel's law, and his discovery of certain principles of heredity which will prove of much practical value to breeders of plants and animals, and lend a new phase to the theory of heredity and also of evolution, since the results thus far obtained point to discontinuing evolution and the absence of intermediate forms. Mendel's original paper was published at Brünn, Austria, in 1865, but was overlooked until De Vries in 1900 published an exact counterpart of Mendel's theory, while Correns and also Bateson hit upon the same law. As stated briefly by Spillman, it is as follows: In the second and later generations of a hybrid, every possible combination of the parent character occurs, and each combination appears in a definite proportion of the individuals. A parent character which is fully developed in the hybrid is said to be 'dominant;' if it is apparently absent it is said to be 'recessive.' A case in illustration is thus stated by Bateson: "In breeding crested canaries, the kind of crest desired for exhibition can, according to canary-fanciers, be produced most easily by mating crested birds with non-crested, or 'plain-heads,' as they are called. If it be supposed that the crested character is usually dominant, we have a simple explanation. When crested birds are bred together, a number of birds are produced whose crests are coarse and stand up, and others without crests. The latter are the recessives; the former we may suppose to be the pure dominants." The fact that the hornless breeds of goats will give off some horned offspring is probably due to the fact that they are what Bateson terms 'heterozygotes,' under what is usually called 'reversion.' From the analogy of cattle, it may be anticipated that the hornless form is dominant. Consult Bateson, *Mendel's Principles of Heredity*, with a translation of Mendel's original papers on hybridization (London, 1902).

Mendel's more important discoveries are also thus stated by Castle: "(1) His law of dominance; when, for example, the offspring of two parents differing in respect of one character all resemble one parent, and possess therefore the dominant character, that of the other parent being latent or recessive. (2) In place of simple dominance, there may be manifest in the immediate hybrid offspring an intensification of character, or a condition intermediate between the two parents; or the offspring may have a peculiar character of their own (heterozygotes). (3) A segregation of characters united in the hybrid takes place in their offspring, so that a certain per cent. of these offspring possess the dominant character alone, a certain per cent. the recessive character alone, while a certain per cent. are again hybrid in nature."

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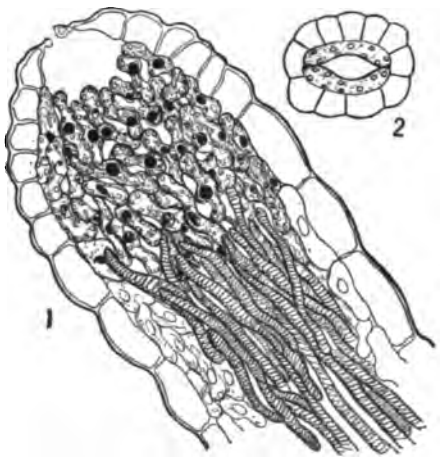
HYBRIDIZING. See PLANT-BREEDING.

HYDAS'PES. The ancient name of the river Jhelum, in Northwestern India. See JHELUM.

HYDATHODE, hī'dăth-ōd (from Gk. *ὕδωρ, hydōr*, water + *ὁδός, hodos*, way). In botany an organ that exudes water. Usually hydathodes occur at the tips of the main veins or branch veins of leaves, and commonly appear to the unaided eye as leaf-teeth. At the apex of the organ is a pore which has been variously called water-pore and water-stoma. These pores differ from ordinary stomata in the absence of turgor movements, often in size and in their function; they are passageways for liquid water rather than for water vapor. Hydathodes commonly occur in connection with the vascular system, and may be regarded as a sort of safety apparatus to prevent injection of the air-space with water at times when root-pressure is high and transpiration low.



(1) Longitudinal section through leaf-tooth of Chinese primrose (*Primula Sinensis*), showing the divergent tracheids, terminating the vascular bundle, the loose epithem, and the terminal pore.
(2) Surface view of a water-stoma (terminal pore of a leaf-tooth).

HY'DATID (Gk. *ὑδατίς, hydatis*, water-vesicle, hydatid, from *ὕδωρ, hydōr*, water; connected with OChurch Slav. *voda*, Skt. *udan*, water, and ultimately with Goth. *watō*, OHG. *wazzor*, Ger. *Wasser*, AS. *wæter*, Eng. *water;* AS. *wæt*, Eng. *wet;* OHG. *ottar*, Ger. *Otter*, AS. *otor*, Eng. *otter*). The bladder-worm. It is allied to the tapeworm, but differs in being bladder-like, and similar in shape to the 'cysticercus' of the tapeworm. The heads bud on special brood-capsules in such a way that their invagination is turned toward the cavity of the vesicle. About 5000 eggs are developed in a single segment (proglottis). The six-hooked embryos develop, are expelled from the dog, the first host, and find their way in drinking-water or in food into the human intestines, whence they bore into the liver, their favorite habitat, or are carried along the blood-vessels into some other organ, where they develop into bladder-like bodies or 'hydatids' (*Echinococcifer echinococcus*). By the fourth week the young is ½ mm. (1-50 inch) in length, and it is probably many months before the echinococcus heads are entirely developed. The worms become sexually mature in from seven to nine weeks after this stage is reached, when the milk-white worms may usually be found imbedded in the mucus of the duodenum and upper part of the small intestines, with their heads attached to the villous surface of the intestine. The parent vesicle may grow as large as a man's head. The cyst in which the bladder-worm lies, and which is caused by it, is called a 'hydatid cyst.'

There are two forms of this hydatid, one (*Echinococcifer hominis*) living in man, and the other (*Echinococcifer veterinorum*) in domestic animals. When these echinococcus cysts remain sterile, as they frequently do, they are called 'acephalocysts.' "Another, and indeed pathological form," says Sedgwick, "is the so-called 'multilocular' echinococcus, which was for a long time taken for a colloid cancer. It is also found in mammalia (in cattle), and here presents a confusing resemblance to a mass of tubercles. The echinococcus disease (*hydatid plague*) was widely spread in Iceland. This disease, likewise, seems endemic in many places in Australia."

HYDE. A manufacturing town in Cheshire, England, seven miles east-southeast of Manchester (Map: England, D 3). Since the extension of the cotton trade, it has rapidly increased in size. Besides numerous cotton factories, print and iron works, there are considerable manufactures of machinery and hats. Coal abounds in the neighborhood. The neighboring district is densely peopled, and has abundant means of communication, by railway and canal, with all the important towns in the vicinity. Hyde is mentioned as a village in the reign of King John; it was incorporated as a municipal borough in 1881. It owns its water, markets, cemetery, and maintains free baths, library, hospital, and fire brigade. Refuse is consumed by a destructor, and sewage is chemically treated for fertilizing purposes. Population, in 1891, 30,700; in 1901, 32,800.

HYDE, ANNE (1637-71). The first wife of James II. of England. She was the eldest daughter of the Duke of Clarendon, and was born at Cranbourne Lodge, the house of her grandfather, Sir Thomas Aylesbury, in Windsor Park. When she was twelve years old she went to Holland with her mother and sisters, and in 1654 was appointed maid of honor to the Princess of Orange, at whose Court she was a great favorite. It was while accompanying the Princess on a visit to Paris in 1656 that she first met James, then Duke of York. She became engaged to him about a year before his return to England in the spring of 1660, and in spite of the most vehement opposition from all quarters, was privately mar-

less attempts were made, by attacking her character, to influence the Prince to put her aside. Although they were more or less prone to quarrel, Anne even being accused of poisoning one of her husband's mistresses, she influenced him for good in many ways. She was an accomplished and attractive woman, though not by any means handsome, and she maintained her position with regal dignity. She joined the Roman Catholic Church soon after 1667, and converted her husband to that faith. Her daughters, however, were educated as Protestants. Anne and Mary, who became Queens of England, were her only children that lived beyond infancy.

HYDE, DOUGLAS (1860—). An Irish scholar and writer, son of the Rev. Arthur Hyde of Frenchpark, County Roscommon. He was educated at Trinity College, Dublin. In 1891 he was interim professor of modern languages in the State University of New Brunswick, and he was afterwards made examiner in Celtic to the Royal University of Ireland.

Hyde early took up the study of Irish literature, and in particular the collection and publication of Gaelic songs and folk-tales, and his labors in the preservation of native folk-lore constitute his most valuable services to Celtic scholarship. His *Literary History of Ireland* is noteworthy as being really the first attempt to write a comprehensive and systematic history of Gaelic literature. He is a skillful writer of prose and verse in both English and Gaelic, and under his assumed name, 'An Craoibhin Aoibhinn,' he is well known among the Irish-speaking people. His translations of modern Gaelic lyrics are often particularly happy in rendering at once the simple feeling and the complicated metrical structure of the native poetry. He took a prominent part in the organization of the popular movement for the preservation of the Irish language. He was made president of the Gaelic League (q.v.) in 1895, and of the Irish Text Society at its foundation. In 1894-95 he was president of the Irish National Literary Society. He was also made a member of the Royal Irish Academy. His principal works are the following: *Leabhar Sgeuluigheachta* (1889); *Cois na Teineadh: or Beside the Fire* (1891); *Love Songs of Connaught* (1894); *The Three Sorrows of Story-Telling* (1895); *The Story of Early Irish Literature* (1897); *An Sgeuluidhe Gaodhalach* (1898-99); *A Literary History of Ireland* (1899); *The Lad of the Ferule*, etc. (vol. i. of the publications of the Irish Texts Society, Dublin, 1899); and *Ubhla de'n Chraoibh* (1900). Part of his *Songs of Connaught* were contributed to the Dublin *Nation*. In the same way his edition of the *Poems of Raftery* has been published in the Dublin *Weekly Freeman*.

HYDE, EDWARD. See CLARENDON, EDWARD HYDE, Earl of.

HYDE, EDWARD (c.1650-1712). A Colonial Governor of North Carolina. He was appointed by the proprietors to be Governor of the Albemarle District in the Province of North Carolina, but on his arrival in August, 1710, found that the Governor of the Province, from whom he was the office of Governor, which he did, and with the aid of Governor Spottswood of Virginia succeeded in putting down Carey's rebellion. Soon after, however, the North Carolina Indians, led by the Tuscaroras, went on the war-path and massacred many of the settlers. Hyde called on the neighboring Colonies of South Carolina and Virginia for aid, and on January 28, 1712, a body of South Carolina and North Carolina militia under Colonel Barnwell defeated the Indians on the Neuse River, about twenty miles from Newbern. Before these Indian troubles were settled Governor Hyde died, during an epidemic of yellow fever.

HYDE, THOMAS (1636-1703). An English Orientalist, born at Billingsley in Shropshire. Educated at Cambridge, he was an assistant to Walton in an edition of his *Polyglot Bible*. Besides correcting the Arabic, Syriac, and Persian texts, he transcribed in Persian characters the Persian translation of the Pentateuch which had been printed in Hebrew letters at Constantinople, and appended a Latin version of his own. In 1658 Hyde entered Queen's College, Oxford, to which he was shortly after made Hebrew reader. In the following year, after graduating as M.A., he was chosen under-keeper and finally librarian-in-chief of the Bodleian Library. In 1660 he was made a canon of Salisbury; in 1678 archdeacon of Gloucester. He succeeded Pococke in 1691 as Laudian professor of Arabic; and soon after, on the deprivation of Altham, became regius professor of Hebrew and Canon of Christ Church. Worn out by his unremitting labors, he resigned his librarianship in 1701, and died at Oxford. Hyde's most important work was the *Historia Religionis Veterum Persarum eorumque Magorum* (1700; 2d ed. 1760). A number of other works were collected and published in 1767 under the title *Syntagma Dissertationum et opuscula*.

HYDE PARK. An inclosure of nearly 400 acres in London, England, about two and one-quarter miles west of Saint Paul's Cathedral (Map: London, E 6). It derives its name from Hyde Manor, which belonged to the Abbey of Westminster. It became the property of the Crown on the dissolution of the monasteries, in the reign of Henry VIII. Ben Jonson speaks of the show of coaches which it presented in his time; and it was constantly resorted to on the morning of May Day for the sports comprehended under the term Maying. In the seventeenth century it contained deer; races, military reviews, and duels were held there. After the Restoration it became the favorite drive and promenade which it has ever since continued to be. It also serves as the place of large popular meetings. It has nine carriage entrances, and among its prominent features are: the Serpentine, an artificial sheet of water constructed by order of Queen Caroline in 1730, Rotten Row, the Ladies' Mile, the Marble Arch, the Hyde Park corner gateway, and the colossal statue of Achilles, erected in honor of the Duke of Wellington.

HYDE PARK. A town in Norfolk County, Mass., including the villages of Readville, Clarendon Hills, Hazlewood, and Fairmount; eight

over 14,000 volumes; and extensive manufactures of cotton, woolen, and rubber goods, paper, dyestuffs, looms, morocco, tools and machinery, and curled hair. Hyde Park was incorporated in 1868; its government is administered by town meetings. Population, in 1890, 10,193; in 1900, 13,244.

HYDE PARK. A village in a town of the same name, and the county-seat of Lamoille County, Vt., 28 miles north of Montpelier; on the Lamoille River, and on the Boston and Maine Railroad (Map: Vermont, D 3). It is the centre of a farming and lumbering district, which also possesses considerable mineral wealth, and has extensive leather interests. Population (village), in 1900, 422; (town), in 1890, 1633; in 1900, 1472.

HYDERABAD, more properly, **HAIDARABAD**, hī'dĕr-ȧ-bȧd', or NIZAM'S DOMINIONS. A large native State of southeastern India, bounded on the north by Berar and northeast by the Central Provinces, on the southeast by Madras, and on the west by Bombay (Map: India, C 5). Area, 82,698 square miles. The surface is an elevated plateau 1800 to 2000 feet above sea-level, diversified by mountain, valley, and plain, and watered by the Godavari with its affluents the Dudna, the Manjara, and Pranhita; the Kistna with its affluents the Bhima and Tungabhadra; and the Wardha with its affluents the Painganga and Wainganga. The climate is fairly healthful; the annual precipitation registers 28 to 32 inches. The geological formation is a base of granite, gneiss, and talc slate, superimposed by clay, limestone, sandstone, hornblende, feldspar, and in some districts columnar basalt. Iron and coal are mined, and gold, garnet, and diamond beds, which formerly supplied the Golconda treasury, still exist, although modern mining operations for the precious minerals have hitherto been unremunerative. The soil is comparatively fertile, but sparsely cultivated. Cotton, maize, wheat, millet, and rice are the chief agricultural products, and tobacco, sugar-cane, and indigo are also grown. Fruit culture, market gardening, pasturage of cattle and of sheep, and horse-breeding are other agricultural branches. Bad seasons, notably in 1900, have resulted in famine. There are domestic manufactures of silk, woolen and cotton fabrics, carpets, and leather. Raw silk, cotton, hides, dyestuffs, gums, and resins are exported, and cereals, cloth goods, hardware, salt, and timber are imported. Good military roads traverse the State, and in 1901 there were 715 miles of railroad open. The ruler of Nizam is a Mohammedan, as are also the Government officials, although the subjects are chiefly Hindus. There is a British Resident and adviser at Hyderabad, the capital. The annual revenue is about 39,000,000 rupees. The population, in 1891, was 11,537,040; in 1901, 11,141,142, or 135 to the square mile; of the population in 1901, 9,870,839 were Hindus; Mohammedans numbered 1,155,750; Christians, of whom half were Roman Catholics, 22,996; Jains, 20,345; Sikhs, 4335; and Parsis, 1463. A native army is maintained, consisting of 7660 men, infantry, artillery, and cavalry, officered by British soldiers. Education made considerable progress. Hyderabad, formerly attached to the dominions of the Rajahs of Terlingana and Bijanagur, in 1512 became a separate kingdom, but in 1687 lapsed into a province of the Mogul Empire. In 1730 Azof Jah, one of Aurungzebe's warriors, was nominated Nizam-ul-Mulk—Regulator of the State—and Subahdar of the Deccan, and eventually made himself independent. After his death in 1748, the throne was contested by his son, Nazir Jung, supported by the British East India Company, and his grandson, Mirzafa Jung, whose cause was espoused by the French under Dupleix. The latter triumphed until Mirzafa was murdered by Patan chiefs. Anarchy reigned until Nizam Ali, who ascended the throne in 1761, was defeated by the British, and signed the Treaty of 1766, which ceded the Northern Circars to the East India Company. The subsequent misrule of Nizam Ali's successors increased the territorial debt, which was liquidated by a further cession of land to the East India Company, with the stipulation that part of the revenues should maintain the Nizam's contingent, a subsidiary force of 8000 men for the protection of his dominions. During the mutiny of 1857 an unsuccessful attack was made on the British Residency at Hyderabad; the Nizam and his troops, however, remained faithful to the British, and the State has since been distinguished for its loyalty to the Imperial power. Consult Grible, *The History of the Decoan* (London, 1896).

HYDERABAD, or **HAIDARABAD.** The capital of the Nizam's Dominions (q.v.), India. It stands on the Musi River, in latitude 17° 22′ N., and longitude 78° 32′ E., 1800 feet above the sea (Map: India, C 5). It is an important railroad and commercial centre, and its well-stocked and extensive bazaars are particularly picturesque. The splendid building of the British Residency stands on the opposite side of the river, the stream being here bridged by nine spacious arches of squared granite connecting the Residency with the Nizam's palace. The city is surrounded by a fortified wall six miles in circuit. The most conspicuous building is the principal mosque, fashioned after the model of the Kaaba at Mecca; while at the meeting of the four principal streets of the city rises another remarkable edifice, the Char Minar or College with four minarets, resting on connected arches, through which run the four converging thoroughfares. Water is supplied from huge tanks, one of which, close to the British cantonment of Secunderabad, measures three miles by two; another is said to be 20 miles round. The city owns its water-works, and maintains schools, a hospital, and pleasure grounds with a zoölogical section. Population, with suburbs, in 1891, 415,039; in 1901, 448,466.

HYDERABAD. The chief city of a district of the same name in the Sindh Division, Bombay, British India, four miles east of the left bank of the Indus (Map: India, A 3). The ancient capital of the Sindh Kingdom, it has been famous from earliest times for its manufactures, including arms of various kinds, lacquered ware, gold and silver articles, and silks. It is an im-

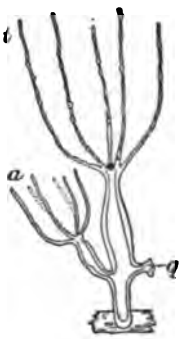
wide streets, public buildings, and a market place. The cantonments containing model barracks are to the northwest of the town. Population, in 1891, 58,048; in 1901, 69,378.

HYDER ALI, hī'dĕr ä'lē (more accurately, *Haidar 'Alī*) (c.1720-82). Ruler of Mysore, and one of the greatest Mohammedan princes of India. He is said to have been originally a sepoy in the French Army, which may explain the friendship which he always felt for the French. He won the favor of the minister of the Rajah of Mysore by the valor which he displayed at the siege of Trichinopoly in 1749, and, by a rapid rise not infrequent in the East, soon became the power behind the throne. Hyder Ali, in 1759, dispossessed his master, allowing him, however, to retain his title, while he himself took that of *daïva*, or regent. He then conquered Calicut, Bednor, Kananur, and other neighboring States; and in 1766 his dominions included more than 84,000 square miles. He waged two wars against the British, in the first of which (1767-69) he was completely successful, although deserted by his confederate Nizam Ali, a former friend of the English, and a treaty of peace was signed under the walls of Madras. According to the terms of this treaty, as he claimed, Hyder Ali asked the English in 1772 to help him against his old foes, the Mahrattas, who had already defeated him in 1764, but his request was refused. When a conflict broke out between the English and the French in 1778, he sought his revenge. With his son, Tipu Sahib, he entered the Carnatic in 1780, and proceeded to devastate it. After inflicting two severe defeats on the English, he was routed by Eyre Coote at Porto Novo. Two years later he died very suddenly. Consult Bowring, *Haidar Alí and Tipú Sultán*, Rulers of India Series (Oxford, 1893).

HYDRA, hī'drȧ *or* ē'drȧ (Lat. *Hydrea*, Gk. Ὑδρέα). An island of Greece, situated off the eastern coast of Morea, from which it is five miles distant (Map: Greece, E 4). It is about 11 miles long and three miles broad, and has an area of 22 square miles. The shores are rocky and steep, and the interior, rising to about 1800 feet in height, is destitute of vegetation and of water. On the northwest coast is the town and seaport of Hydra, the white, flat-roofed houses of which are ranged on the side of a hill. The streets, owing to the irregularity of the site, are steep and uneven, but remarkably clean. In ancient times the island of Hydra was a dependency of the city of Hermione, and was later ceded to the Trœzenians. During the fifteenth and sixteenth centuries it was settled by fugitives from Albania, Argolis, and Attica. In the Grecian War of Independence the Hydriotes took a most active part, and none were more liberal in their contributions to the patriotic cause. In 1825 the population was estimated at 40,000. At the time of the outbreak of the Revolutionary War, 1821-29, the islanders were considered the richest in the archipelago. They possessed the carrying trade of the Black Sea, and shipped to England, the Baltic, and even to America. Since the Revolution, however, more accessible ports have risen to be the centres of Greek commerce, and Hydra has greatly declined. The

monster, offspring of Typhon and Echidna, dwelling on a hill near the spring Amymone in the marshes of Lerna near Argos. The hydra had many heads, of which the central one was immortal. The number of heads varies from 9 to 50, or even 100. In works of art she is shown with from 3 to 12 heads, except in Hellenistic times, when the hydra is often represented as a serpent with a woman's head. Hercules cut off the heads, while his companion, Iolaus, seared the stumps with a brand, as otherwise two heads grew wherever one was cut off. The immortal head was buried beneath a huge rock. The hero dipped his arrows in the blood and thereby made the wounds which they inflicted incurable. The hydra with its poisonous breath seems a personification of the malarial vapors arising from the swamps of Lerna.

HYDRA (Lat., from Gk. *ὑδρα*, water-snake, Skt., Lith. *udra*, OChurch Slav. *vydra*, OHG. *ottar*, Ger. *Otter*, Eng. *otter*, with Gk. *ὑδωρ*, *hydōr*, water). A minute polyp or hydrozoan, common in still, fresh waters. It possesses a gelatinous, subcylindrical body, which, from its contractility, undergoes various alterations of form. One end expands into a disk or foot, which adheres to a leaf or twig; while a mouth surrounded by a circlet of tentacles, varying from five to twelve or more in number, is at the opposite end. These tentacles are exceedingly contractile; at one moment they are thrown out as long, delicate threads, at the next, drawn up into minute wart-like knobs. Numerous thread-cells project from their surface, the larger ones possessing a sheath and three recurved darts or barbs, and terminating in a large and extremely slender filament. The mouth leads into a capacious cavity, excavated throughout the entire length of the animal, which, exclusive of its tentacles, seldom exceeds three-fourths of an inch. The food of the hydra consists of such minute living organisms as come within the reach of its tentacles, and by these apparently fragile threads, which the animal projects like a lasso, crustaceans, worms and the like are seized, which would be deemed at first sight superior to their captor in strength and activity. The tentacles, however, exert through the action of the thread-cells a powerful benumbing or paralyzing influence. The prey when mastered, but often when still alive, is thrust into the internal cavity, where the nutritive parts are absorbed by the hydra, while the indigestible parts are expelled through the mouth.



HYDRA VIRIDIS.
t, tentacles; *q*, a bud; *a*, young hydra, developed from a bud.

Although the hydra is usually found adhering to submerged supports, it is not permanently fixed. It often moves on surfaces under water somewhat after the manner of a leech, and occasionally the disk is protruded above the water, and thus acts as a float. Sometimes, especially

mode of increase. Minute tubercles appear on the body of the parent animal, which, as they increase in size, gradually become perforated at their free extremity, and acquire tentacles. The pedicel by which they originate by degrees becomes thinner, and finally gives way, leaving the young hydra perfectly independent. One of the most remarkable points in the history of this animal is its power of being multiplied by mechanical division. If a hydra be cut into two or even more pieces, every one will in time assume the form and functions of the original animal. Several species of hydra have been described, which differ in size, color, and other respects. Two species are common in America, in still water in nearly all parts of the country. One of these (*Hydra viridis*) is bright green in color, while the other (*Hydra fusca*) is grayish-brown. The green hydra is notable because its color is due to the presence of chlorophyll, the coloring matter characteristic of plants. Both may easily be reared in aquariums.

HY'DRAGOGUES (from Lat. *hydragogus*, Gk. *ὑδραγωγός*, water-carrier, from *ὑδωρ*, *hydōr*, water + *ἀγωγός*, *agōgos*, carrying, from *ἀγειν*, *agein*, to lead). Active purgatives which give rise to large, watery stools. The most important are colocynth, elaterium, gamboge, jalap, croton oil, and scammony. These are all powerful drugs, and tbeir administration requires skilled advice.

HYDRANGEA, hī-drăn'jē-ȧ (Neo-Lat., from Gk. *ὑδωρ*, *hydōr*, water + *ἀγγεῖον*, *angeion*, pail). A genus of about 25 species of ornamental deciduous shrubs of the natural order Saxifragaceæ, natives of North and South America, China, and Japan. The flowers are white, pink, or bluish,

HYDRANGEA.

and small, but are borne in large, showy corymbs or panicles, the exterior flowers of which are sterile. The pink varieties, when grown on some soils, produce bluish flowers. The hardier cultivated hydrangeas are *Hydrangea paniculata*, used as specimens or in borders, *Hydrangea arborescens*, and *Hydrangea radiata*. *Hydrangea Hortensia*, or *Otaska*, is a rather for the most part by cuttings and division, but sometimes by seed.

HYDRAS'TIS (Neo-Lat., from Gk. *ὑδωρ*, *hydōr*, water + *δρᾶν*, *dran*, to act), or WARNERIA. A genus of plants of the natural order Ranunculaceæ, allied to Anemone, the members of which have flowers destitute of petals, and succulent or baccate fruit, collected into a head. The only known species, *Hydrastis Canadensis*, a perennial herbaceous plant, with tuberous roots, and head of fruit resembling a raspberry, is common in watery places in Canada, and among the Alleghanies as far south as the Carolinas. Its root is used for dyeing yellow, and also in medicine as a tonic. Yellowroot, orangeroot, and goldenseal are its American names.

HY'DRATE (from Gk. *ὑδωρ*, *hydōr*, water). A name applied to substances whose molecules contain either one or more entire molecules of water; or, synonymously with the term hydroxide, to metallic compounds whose molecules contain one or more hydroxyl groups (OH). Thus, for example, the question has been discussed, whether substances exist in aqueous solution in the form of 'hydrates,' or not; that is to say, whether the dissolved molecules are associated into definite groups with those of the solvent. In the same sense a substance containing water of crystallization is sometimes spoken of as a hydrate, and its crystals as 'hydrated crystals,' particularly when they are to be distinguished from the 'anhydrous crystals' of the same substance. On the other hand, chemists often use such terms as potassium hydrate, or calcium hydrate, in the same sense as they use the terms potassium hydroxide and calcium hydroxide. The hydrates, or hydroxides, of the metals are true chemical compounds. The assumption that substances are *chemically* combined with their water of crystallization, while corroborated by many facts, has not yet been brought into harmony with the doctrine of valency (q.v.), and cannot therefore be granted unconditionally.

HYDRAULIC CEMENT. See CEMENT.

HYDRAULIC ELEVATORS. See ELEVATORS.

HYDRAULIC ENGINE. See HYDRAULIC-PRESSURE ENGINE.

HYDRAULIC FORGING. See FORGE, FORGING.

HYDRAULIC JACK. See JACK.

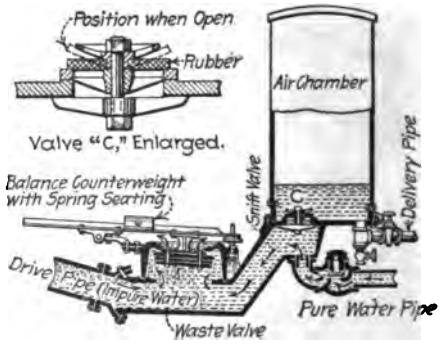
HYDRAULIC PRESS (from Lat. *hydraulicus*, Gk. *ὑδραυλικός*, *hydraulikos*, pertaining to the water-organ, from *ὑδραυλις*, *hydraulis*, water-organ, from *ὑδωρ*, *hydōr*, water + *αὐλός*, *aulos*, pipe). An apparatus for obtaining a heavy pressure for compacting fibrous substances, raising heavy weights, etc., by means of water under pressure. The first design of a working hydraulic press is credited to Joseph Bramah, and for this reason such machines are sometimes called Bramah presses. The operation of the hydraulic press is based upon the principle of hydrostatics that a pressure exerted on any part of the surface of a liquid is transmitted undiminished to all parts of the mass and in all directions. Thus, if we have a cylinder filled

plunger, this pressure will be transmitted undiminished by the water, and will exert a total pressure of $1 \times 12 \times 12 = 144$ pounds.

The essentials of a hydraulic press are, therefore, a small cylinder containing a plunger, to which pressure is applied, connected by pipe with a large cylinder containing a plunger, which transmits the multiplied pressure to the object to be pressed or lifted. It is evident, furthermore, that the two cylinders may be located any desired distance apart, the only limit being that at which the pipe and cylinder friction reduces the available pressure for performing work below practicable amounts. (See TRANSMISSION OF POWER.) In modern practice the pressure pump commonly feeds into a hydraulic accumulator (see ACCUMULATOR), and the press cylinder is operated from the accumulator and not directly from the pump. The construction of hydraulic presses varies with the purposes for which they are employed. Hydraulic presses for baling hay and cotton and expressing the oil from seeds, etc., are built substantially as follows: Four iron pillars are erected at the corners of a horizontal square, and carry a cast-iron cap rigidly fastened to their tops. The under face of this cap forms the surface against which the material is pressed. At the bottom of the four pillars there is a similar casting which has a circular hole in the centre down through which passes the cylinder casting for the plunger. The plunger has an upward motion in the act of pressing, and carries on its top a head or platen consisting of a square casting. The material to be pressed is placed between the lower face of the top casting and the upper face of the platen. Often a boxing is placed around the four sides of the space in which the head moves to prevent the material being pressed from squeezing out laterally. The construction of a press for hydraulic forging differs from the above as follows: The cylinders and plungers are carried by the top casting or column cap and the plungers work downward in the act of pressing; the bottom casting carries the anvil; the plungers carry a die for the head; and two or more cylinders are provided for raising the plunger and die for a fresh stroke. Generally, also, two pressure plungers and cylinders are employed instead of one. Forging presses are made of all sizes, from that required in pressing out articles like revolver cartridge cases to those used in forging steamship shafts and armor plates. Armor-plate presses having a capacity of 14,000 tons are in use.

HYDRAULIC PRESSURE ENGINE. A motor in which water is made to do work by means of its pressure only acting on a piston or plunger reciprocating in a cylinder, or, in some cases, on a revolving piston similar to those employed in a rotary steam-engine. In the case of a turbine the pressure of a column of water is, in the first instance, employed in giving motion to the fluid itself, and after this motion has been produced the energy due to it is utilized in doing work. In the case of the pressure engine the only pressure expended in giving motion to the fluid is that needed to make the water follow the piston and escape from the motor, and to secure efficiency this piston should be and was of the rotary type. This engine was never actually used, and was replaced by a reciprocating engine designed by the same engineer. Since Sir William Armstrong's invention a great variety of hydraulic pressure engines have been invented, the majority of which are of the reciprocating type. Hydraulic pressure engines are particularly adapted to the use of high-pressure water in comparatively small quantities, and where these conditions prevail they have a considerable field of usefulness, particularly as secondary motors for operating mechanical contrivances, such as the opening machinery for swing bridges, cranes, hoists, etc. For further information consult Bodmer, *Hydraulic Motors, Turbines, and Pressure Engines* (New York, 1889). See TURBINE.

HYDRAULIC RAM. Primarily, a device by which the momentum of water flowing by gravity in a pipe is utilized to lift a portion of itself through another pipe to an elevation greater than the source of supply. The flow of water in the main or drive pipe is automatically checked by the closing of a valve at its foot. When the valve is open the water escapes freely and flows to waste, but very soon a sufficient momentum is attained to close the valve. The confined water then lifts another valve, opening into an air-chamber mounted over the foot of the drive-pipe. The water partially fills this chamber, and in so doing compresses the air therein until the pressure in the chamber just balances that of the column of water in the drive-pipe. The valve at the foot of the drive-pipe then opens, and the process is repeated. The pressure of the compressed air in the air-chamber forces the water in the bottom of the chamber out through a small supply pipe to the desired ele-



RIFE HYDRAULIC RAM.

vation. A snifting valve is provided to supply air to the chambers to make good the losses due to absorption of air by the water. Theoretically, 100 gallons of water falling 15 feet would raise 15 gallons 100 feet, and other quantities and heights in like proportion; but some water is wasted during each cycle, and there is more or less friction to be overcome, depending on the design of the ram and the length and diameter of the pipes. An efficiency of 75 per cent. would be high. With the increase in the ratio of the fall of the driving water to the elevation to be overcome, the efficiency decreases, particularly

hydraulic ram as 1½ to 10 feet fall of drive water and a lift of not over 250 feet, but with so great a lift a large proportion of the water will be wasted. The ram, as described, was invented by Joseph Michael de Montgolfier, of France, in 1796; but in 1772 an Englishman named John Whitehurst built a machine embodying the same principle, except that the valve at the foot of the drive-pipe had to be closed by hand. His device was described in the *Philosophical Transactions* for 1775. Many improvements have been made in the machine of Montgolfier, the most important of which, perhaps, aim to lessen the shock of the operation of the valves. Springs have been used to that end; the drive-pipe valve has been counterweighed, and a portion of the air compressed in the chamber has been used to drive a small air-motor, so connected as to aid in the gentle closing of the valve at each cycle. Another improvement is the equipment of rams so that a supply of dirty water may be used to lift clean water, either when the supply of the latter is scanty, or is not available under a sufficient head. Finally, hydraulic rams are used to drive pumps, when they are properly classed under pumping engines. See PUMPS AND PUMPING MACHINERY.

HYDRAULICS. See HYDRODYNAMICS, and HYDROSTATICS.

HY'DRAZINE, or AMIDOGEN, $H_2N = H_2$. A basic compound of nitrogen and hydrogen, which may be obtained by heating triazo-acetic acid with water. Hydrazine hydrate, $N_2H_4.H_2O$, is a strong reducing agent precipitating metallic silver and platinum from solutions of their salts. With acids it forms crystalline salts, such as the hydrochlorides, $N_2H_4.Hcl$, and N_2H_42HCl, the sulphate, $N_2H_4.H_2SO_4$, etc. The hydrogen of hydrazine may be partly replaced by either hydrocarbon groups, such as methyl (CH_3), ethyl (C_2H_5), phenyl (C_6H_5), etc., or organic acid radicals, such as acetyl (CH_3CO), benzoyl (C_6H_5CO), etc. The most important of these organic derivatives of hydrazine is phenyl hydrazine, $C_6H_5HN = NH_2$. The benzoyl compounds include benzoyl-hydrazine, $C_6H_5CO.HN = NH_2$, and symmetrical dibenzoyl-hydrazine, $C_6H_5CO.HN = NH.COC_6H_5$. The presence of hydrazine in aqueous solutions may be readily detected by the use of a few drops of benzaldehyde, with which it forms a yellow crystalline precipitate of benzalazine, $C_6H_5CH.N = NH_2$. Compounds of similar constitution are formed by the action of hydrazine on other aldehydes. See DIAZO-COMPOUNDS.

HY'DRIDE. A name applied, in chemistry, to the compounds of the metals with hydrogen. Notable hydrides are those of palladium, sodium, potassium, calcium, strontium, barium, and magnesium. The hydrides have, at least as yet, no practical value; but when more thoroughly investigated they will present considerable interest in connection with the doctrine of valency (q.v). The term hydride was formerly employed in connection with certain hydrocarbons.

HY'DRIODIC ACID (from *hydr*-ogen + *iod*-ine), HI. An acid compound of hydrogen and iodine, analogous to hydrochloric acid. It may solution, and is thus employed in a number of chemical processes. It decomposes somewhat easily into its components, hydrogen and iodine, and by giving up its hydrogen acts as a reducing agent. The salts of hydriodic acid are termed *iodides* (q.v.). Hydriodic acid is sometimes used medicinally instead of its salts.

HYDRIOTAPHIA, or URN BURIAL. A quasi-scientific, quasi-religious treatise by Sir Thomas Browne (1658). Its explanatory subtitle is: *A Discourse of the Sepulchral Urns Lately Found in Norfolk*, which leads to the account of the rites of burial of various ages, and ends with an eloquent disquisition on death and immortality. It shows an acquaintance with Dante remarkable for that age, and was greatly admired by Charles Lamb.

HY'DROBRO'MIC ACID (from *hydro*-gen + *brom*-ine), HBr. An acid compound of hydrogen and bromine, analogous to hydrochloric acid. It may be prepared by the action of phosphoric acid upon potassium bromide. In the isolated state it is a colorless gas with an odor resembling that of hydrochloric acid. Like the latter, it is very soluble in water, the solution being sometimes used in synthetic chemistry. The salts of hydrobromic acid are termed *bromides* (q.v.).

HY'DROCAR'BONS (from *hydro*-gen + *carbon*). A class of chemical compounds containing only carbon and hydrogen. Their commercial value is very considerable inasmuch as they form the principal ingredients of petroleum, illuminating gas, caoutchouc, gutta-percha, essence of turpentine, etc. They are the simplest of the compounds of carbon, and the fundamental ideas of organic chemistry have been derived largely from a careful study of their properties and reactions. They are obtained when various organic substances are subjected to a process of destructive distillation, and are subdivided principally into *aliphatic*, or fatty, and *aromatic* hydrocarbons.

FATTY HYDROCARBONS. These form an important class, and are subdivided into the paraffin, olefin, and acetylene series.

(1) *The Paraffins*, or saturated hydrocarbons of the methane series, are very stable compounds and do not react even with the strongest acids and alkalies; hence their name, paraffins, derived from the Latin *parum affinis*, which means 'having little affinity.' Large quantities of them occur in nature as petroleum, natural gas, ozokerite, etc. They are also obtained by the destructive distillation of coal, cannel, shale, etc. When they are arranged in the order of their molecular weights, the following 'homologous series' is obtained:

Methane,	CH_4,	molecular weight 16.
Ethane,	C_2H_6,	molecular weight 30.
Propane,	C_3H_8,	molecular weight 44.
Butanes,	C_4H_{10},	molecular weight 58.
Pentanes,	C_5H_{12},	molecular weight 72.
Hexanes,	C_6H_{14},	molecular weight 86.
Heptanes,	C_7H_{16},	molecular weight 100, etc.

The difference in molecular weight between any two consecutive members of the series is evidently the same. It amounts to 14, the sum of the 'weights' of one carbon atom (which is 12) and two hydrogen atoms (which is 2). To obtain the formula of any member, we may substitute a

transformation of ethane into propane may be actually effected as follows: First, mono-iodo-ethane (C_2H_5I) is obtained by substituting one iodine atom in lieu of one atom of hydrogen in ethane (C_2H_6); then mono-iodo-ethane is treated with methyl iodide (CH_3I) and metallic sodium. The iodine is thus all removed, and the remaining C_2H_5 group unites with CH_3 group to form the compound propane ($C_2H_5CH_3$ or C_3H_8).

The first four members of the above homologous series are liquefiable gases, and each member is more easily liquefied than the one preceding it; the next eleven members are liquids, each having a higher *boiling-point* than the one preceding it; finally, the higher members are solids, each having a higher *melting-point* than the one preceding it. The lower members burn with a pale, scarcely luminous flame; the higher members give a bright light, and paraffin wax, which is a mixture of solid paraffin hydrocarbons, is used for the manufacture of candles. The paraffins are all colorless, chemically inert, and insoluble in water.

The composition of any single paraffin hydrocarbon is expressed, of course, by its own molecular formula. Thus, the formula C_2H_6 shows the chemical composition of ethane; the formula C_3H_8 shows the composition of propane, etc. On the other hand, the composition of the paraffin hydrocarbons in general is expressed by a *typical formula*, in which algebraic symbols stand for the numbers of atoms of the component elements. Thistypical (general)formula is, $C_n H_{2n+2}$. The formula permits readily to calculate the number of hydrogen atoms in any one of the members of the above homologous series, if the number of its carbon atoms is given. Thus, if $n = 1$, then $2n + 2 = 4$, and $C_n H_{2n+2}$ becomes CH_4 (the formula of methane). The highest member of the series that is actually known to chemists contains 60 carbon atoms, and hence, the typical formula tells us, the number of hydrogen atoms in the molecule of that hydrocarbon (called *hexacontane*) is $2n + 2 = 2 \times 60 + 2 = 122$, and its molecular formula is therefore $C_{60}H_{122}$. It is a well-known fact that compounds exist which have the same chemical composition and yet differ in their physical and chemical properties. Such compounds are termed 'isomeric,' and their mutual relations are explained on the assumption that the atoms in their molecules, though the same in kind and number, are differently *grouped*. In the above homologous series, the first three members have no such isomers, i.e. only one variety of each could be obtained; the fourth member, butane, has two isomers (called butane and isobutane); the fifth member, pentane, has three isomers; the sixth, hexane, has five isomers, etc. The higher the molecular weight, the greater the number of isomeric formulas which could be constructed according to the structural theory. Not all of these theoretically possible hydrocarbons have been actually prepared in the laboratory. Most of them have no practical value and are interesting only inasmuch as they go to prove the validity of the 'structural theory' of compounds; but the number of cases of isomerism in which the theory has been found to hold true is so great that

(2) *The Olefins*, or hydrocarbons of the ethylene series, have the characteristic property of directly taking on bromine and other elements to form *additive* products. This shows that the combining capacity of the carbon contained in them is not completely satisfied by their hydrogen; so they are said to be 'unsaturated compounds.'

When arranged in order of their molecular weights, they form the following homologous series:

Ethylene, C_2H_4, molecular weight 28.
Propylene, C_3H_6, molecular weight 42.
Butylenes, C_4H_8, molecular weight 56.
Amylenes, C_5H_{10}, molecular weight 70.
Hexylenes, C_6H_{12}, molecular weight 84, etc.

In this series, too, each member contains one carbon and two hydrogen atoms more than the member immediately preceding it; that is to say, the difference in molecular weight between any two consecutive members of the series amounts to 14. Here, too, as in the paraffin series, a certain amount of regularity is found in the variation of the physical properties of the compounds on passing up the series. The first four members are gases, and each one is more easily liquefied than the one preceding it. Hexylene and the following 13 members are liquids, each one boiling at a higher temperature than the one preceding it. The higher members are solids, and each one has a higher melting temperature than the one preceding it. The olefins are colorless and insoluble in water. They contain a high percentage of carbon and burn with a luminous flame.

The composition of *all* the olefins is expressed by the typical formula of the series, $C_n H_{2n}$. The ratio of the numbers of hydrogen and carbon atoms is the same throughout the series; showing that the different members of the series have all the same percentage composition. They are, however, not isomeric, in the ordinary sense of the term; for their molecules evidently contain different numbers of atoms. Thus ethylene (C_2H_4) contains two carbons and four hydrogens; propylene (C_3H_6), three carbons and six hydrogens, etc. But, beginning with butylene, each single member represents several compounds which must be considered as isomeric, since they have precisely the same molecular composition and yet differ in their properties. The structural theory lets us foresee the existence of three isomeric butylenes, five amylenes, thirteen hexylenes, etc. Again, as in the paraffin series, the higher the molecular weight, the greater the number of isomers possible, according to both theory and experience.

Nascent hydrogen adds itself readily to the olefins (unsaturated), yielding hydrocarbons of the paraffin series (saturated).

(3) *The Acetylene Hydrocarbons*, when arranged in the order of their molecular weights, form the following homologous series:

Acetylene, C_2H_2, molecular weight 20.
Allylene, C_3H_4, molecular weight 40.
Crotonylene, C_4H_6, molecular weight 54, etc.

Like any other homologous series, the acetylene series presents a certain amount of regularity in the variation of the physical properties

of the compounds with increase of their molecular weight.

The acetylenes are unsaturated; in fact, 'doubly unsaturated' compounds (see ACETYLENE), as is shown by their capacity for taking on bromine and other elements to form additive products. The acetylene hydrocarbons burn with a very smoky flame, unless by some method enough oxygen is supplied to burn up completely the large amount of carbon they contain. The general formula of the series is C_nH_{2n-2}. Nascent hydrogen adds itself readily to the acetylene hydrocarbons, yielding still unsaturated hydrocarbons of the ethylene series.

AROMATIC HYDROCARBONS. The principal groups into which these hydrocarbons are subdivided include the *Benzene series*, the *Naphthalene series*, and the *Anthracene series*. The typical formulas representing these three series are, respectively, C_nH_{2n-6}, C_nH_{2n-12}, and C_nH_{2n-18}. Other hydrocarbons, not included in these series, are represented by the formulas C_nH_{2n-8}, C_nH_{2n-16}, C_nH_{2n-22}, etc.; but these are not important enough to be mentioned here. The most important members of the benzene series are benzene (C_6H_6), toluene (C_7H_8), and xylene (C_8H_{10}). The most important substance of the naphthalene series is naphthalene itself ($C_{10}H_8$); that of the anthracene series, anthracene ($C_{14}H_{10}$). All these are described in special articles. Suffice it to mention here that the chief source of aromatic hydrocarbons is the coal-tar (q.v.) obtained as a by-product in the manufacture of coal-gas, and that it is principally from these hydrocarbons that innumerable artificial dyestuffs, drugs, etc., are now made on a very large industrial scale. See also CARBON COMPOUNDS.

The hydrocarbons should not be confounded with the 'carbohydrates,' like sugar, starch, or cellulose, which contain besides carbon and hydrogen also oxygen.

HY'DROCELE (Lat., from Gk. *ὑδρωκήλη, hydrōkēlē*, from *ὕδωρ, hydōr*, water + *κήλη, kēlē*, tumor). The medical term for dropsy of the tunica vaginalis, a serous membrane or sac investing the testes. Hydrocele occurs as a smooth, pear-shaped swelling, fluctuating when pressed, devoid of pain or tenderness, but sometimes causing a slight uneasiness from its weight. The quantity of serous fluid in the sac is usually from 6 to 20 ounces, but it occasionally exceeds 100 ounces. Hydrocele may occur as a result of acute inflammation, but it most commonly comes on without any apparent local cause. It is most frequently met with about or beyond the middle period of life, and generally in persons of feeble power, or with a tendency to gout; sometimes, however, it occurs in young children, either in the same form as in adults, or as what is termed *congenital hydrocele*, when the communication between the tunica vaginalis and the abdominal peritoneum is not obliterated, as it normally should be. Palliative treatment consists in the use of suspensory bandages, strapping, and tapping with a fine trochar. Tapping seldom gives more than temporary relief, the swelling usually regaining its former bulk in three or four months. A cure is sometimes effected after tapping by the injecting of irritating substances, such as tincture of iodine and carbolic acid. The only certain method of cure, however, consists in excision of the tunica vaginalis.

HY'DROCEPH'ALUS (Neo-Lat., from Gk. *ὑδροκέφαλον, hydrokephalon*, water in the head, from *ὕδωρ, hydōr*, water + *κεφαλή, kephalē*, head). A collection of serous fluid in the cranium. If it is within the ventricles of the brain, the condition is known as *internal hydrocephalus*. If beneath the arachnoid membrane, *external hydrocephalus*. The disease may be *primary*, being then usually tuberculous in origin, or it may follow some other disease, in which case it is termed *secondary*. Three types, the *acute*, the *chronic*, and the *congenital*, are described. Hydrocephalus may occur in children or in adults as a secondary lesion resulting from meningitis. In such cases, the bones of the skull having united, there is much less opportunity for distention.

ACUTE HYDROCEPHALUS. This is usually a sudden disease, marked by an acute collection of fluid within the skull, internal or external to the brain ventricles. It may be primary or secondary to such diseases as whooping cough, heart disease, rachitis, tumors within the skull-cavity, or acute fevers, such as pneumonia or typhoid. The symptoms are various, much depending on its cause. The most characteristic symptoms are those due to the pressure on the brain. In addition to the enlargement of the head, there may be much restlessness, inability to sleep, nausea and vomiting, paralysis or convulsions. The pupils are apt to be unequal and sluggish. In the severer cases pressure upon the brain causes death.

CHRONIC HYDROCEPHALUS. This may follow an acute attack, or the disease may begin very insidiously. The symptoms again are those due to pressure. The fontanelles in the skull are apt to bulge, the eyeballs protrude somewhat, the blood-vessels on the outside of the head are apt to be swollen and prominent. Headache is common. A peculiar sidewise shifting movement of the eye, termed nystagmus, is very constant, and crossed eyes are not uncommon. There is usually much restlessness, and if the patients live they are apt to be dull mentally or idiotic. Some of these patients live to middle age, but most of them die young. The treatment requires the greatest medical and surgical skill.

CONGENITAL HYDROCEPHALUS. The distention may be so slight at birth as to be scarcely evident, or the distention may be considerable, or so advanced as to preclude the birth of a living child. After birth the progress of the disease may be gradual or rapid. The lateral ventricles usually show the greatest distention, although all the ventricles may be involved as well as the central canal of the cord. The condition of the brain-tissue depends entirely upon the amount of pressure. It may be little different from normal, or the convolutions may be flattened, or the hemispheres may be reduced to a thin layer under the dura mater. The brain-tissue itself is apt to be soft and flabby, and the base of the brain is usually less affected than the hemispheres. The openings between the bones of the skull are large in size, the bones thin, and tending to bulge forward, making the forehead prominent.

HYDROCHARIDEÆ, hī'drō-kă-rĭd'ē-ē, or **HY'DROCHAR'IDA'CEÆ**. See ANACHARIS and VALLISNERA.

HY'DROCHLO'RIC ACID (from *hydro*-gen + *chlor*-ine), or MURIATIC ACID, HCl. A gaseous compound of hydrogen and chlorine, the

acid. Priestley obtained it similarly and called it *marine acid air*. Lavoisier introduced the view that all acids necessarily contain oxygen, and hence hydrochloric acid was for years believed to contain oxygen. About 1810 Sir Humphry Davy had established the elementary nature of chlorine, and hence the true nature of its hydrogen compound—hydrochloric acid; and within ten years the correctness of his results became generally recognized. (See CHEMISTRY.) Hydrochloric acid occurs in the exhalations from active volcanoes, especially from Vesuvius and the fumaroles of Hecla. It is also a constituent of the waters of certain South American rivers that have their source in the volcanic districts of the Andes. Also it is a constituent of the gastric juices in man and animals, and plays an important part in the digestive process. When sodium chloride (common salt) is decomposed by heating with sulphuric acid, as in the Le Blanc process for making soda, sodium sulphate (Glauber's salt) remains behind, while gaseous hydrochloric acid is evolved. The acid was formerly allowed to pass off into the air, and naturally had a very injurious effect on the vegetation in the vicinity of the manufacturing establishments. At present the acid vapors are carefully collected, and thus hydrochloric acid constitutes an important by-product of the manufacture of soda.

Hydrochloric acid is a colorless gas, with a pungent odor and taste, and fuming strongly in the air. On the application of pressure and cold it can be condensed to a colorless liquid; but the commercial product is usually dissolved in water. The commercial acid is generally colored by the presence of some iron; it also usually contains arsenic and sulphuric acid, from all of which impurities it may be freed by distillation. The acid is used in preparing the chlorides of various metals, for extracting phosphates from bones, in dyeing and tissue printing, and in the manufacture of coal-tar colors. For works on hydrochloric acid, consult the various books on the manufacture of soda ash.

CHLORIDES. The salts of hydrochloric acid are termed chlorides. By far the most important of these is the chloride of sodium or common salt, which is described in a special article. Very similar to it is the chloride of potassium, KCl, which occurs extensively (combined with magnesium chloride) in the mineral carnallite, and in smaller quantities in sea-water. It is manufactured from carnallite, and is purified by recrystallization from water. The chloride of aluminum, Al_2Cl_6, is obtained by treating aluminum oxide with charcoal in a current of chlorine. It is readily soluble in water, alcohol, and ether, but on evaporating its aqueous solution it combines with water to form aluminum hydroxide and free hydrochloric acid. Aluminum chloride is largely used in organic chemistry in the so-called Friedel and Crafts reaction. (See FRIEDEL.) For other chlorides, see BARIUM; CALOMEL; GOLD; MANGANESE; MERCURIC CHLORIDE; and SAL AMMONIAC. See also BLEACHING-POWDER.

HY'DROCOR'ALLI'NA (Neo-Lat., from Lat. *hydra*, water-snake + *corallinus*, coral-red, from *coralium*, coral). An order of Hydromedusæ, in-

cyan-ogen), HCN, or HCy. A chemical compound often called *prussic acid*, from its having been first obtained by Scheele in 1782 from the substance known as Prussian or Berlin blue. Hydrocyanic acid is of equal interest to the chemist, the physician, and the toxicologist. The pure anhydrous acid is a limpid volatile liquid of a strong, penetrating odor resembling that of peach-blossoms or oil of bitter almonds. At low temperatures it solidifies to a crystalline mass that melts at —15° C.; at 18° C. it has a specific gravity of 0.697, and it boils at 26° C. (78.8° F.). Its volatility is so great that if a drop be allowed to fall on a piece of glass, part of the acid becomes frozen through the cold produced by its own evaporation. It burns with a pale-blue flame, reddens litmus paper slightly (its acid properties being feeble), and is very soluble in water and in alcohol. In the anhydrous state it is not affected either by the action of air or by that of light. In the presence of moisture, however, it is decomposed with formation of a brown substance known as azulmic acid. If its aqueous solution is exposed to light, decomposition rapidly takes place, with formation of a number of different substances, including ammonia, formic and oxalic acids, etc.

Hydrocyanic acid is made by heating yellow prussiate of potash (potassium ferrocyanide) with dilute sulphuric acid, the reaction taking place according to the following chemical equation:

$$2K_4Fe(CN)_6 + 3H_2SO_4 = 6HCN + FeK_2Fe(CN)_6 + 3K_2SO_4$$

Potassium ferrocyanide — Sulphuric acid — Hydrocyanic acid — Potassium-iron ferrocyanide — Potassium sulphate

In this manner a more or less dilute solution of hydrocyanic acid is obtained, and by fractional distillation and drying over calcium chloride, the anhydrous acid may be prepared. An aqueous solution of hydrocyanic acid may also be obtained by shaking silver cyanide with dilute hydrochloric acid. Hydrocyanic acid occurs, both free and in combination, in various plants, and it is readily produced by macerating bitter almonds or cherry kernels with water. Bitter almonds, as well as many other vegetable products, contain a glucoside called *amygdalin*, and a peculiar ferment called *emulsin*. When brought into contact with water, the amygdalin is acted on by the emulsin, hydrocyanic acid being formed along with other substances, according to the following equation:

$$C_{20}H_{27}NO_{11} + 2H_2O = HCN + C_7H_6O + 2C_6H_{12}O_6$$

Amygdalin — Hydrocyanic acid — Benzaldehyde — Glucose

The dilute acid of the U. S. Pharmacopœia contains 2 per cent. by weight of anhydrous hydrocyanic acid; while what is known as "Scheele's Prussic Acid" contains from 4 to 5 per cent. of the absolute acid. The presence of hydrocyanic acid in solutions may be best proved by one of the following methods:

(1) To the solution in which the presence of hydrocyanic acid is suspected, caustic potash is added to strongly alkaline reaction, then a few drops of ferrous sulphate are added, and heat is

applied; the solution is now acidified with hydrochloric acid, and some ferric chloride is added. If hydrocyanic acid was present in the original solution, a precipitate of Prussian blue, or at least a blue coloration, is produced.

(2) A few drops of ammonium sulphide are added to the suspected liquid, and the mixture is evaporated on the water-bath; the dry residue is moistened with ferric chloride, when, if hydrocyanic acid was present in the original solution, an intense red coloration is produced.

The quantity of hydrocyanic acid in a solution may be determined by adding to the latter a solution of silver nitrate, separating the precipitated cyanide of silver by filtration, washing, drying, and weighing. The amount of hydrocyanic acid may be readily calculated from the weight of silver cyanide found. We are indebted to the Italians for the introduction of hydrocyanic acid in the materia medica. There are no cases in which it is so serviceable as in those affections of the stomach in which pain is a leading symptom, as in gastrodynia, water-brash, and in cases of intense vomiting. It is also useful in allaying spasmodic cough, and has been employed with advantage in chronic skin-diseases, to allay pain and irritation, no matter what the cause. A mixture of one part of the dilute acid (of 2 per cent. strength) with about 48 parts of water forms a good lotion.

Hydrocyanic acid is one of the most energetic poisons, and is frequently employed both in murder and suicide. A single drop of the pure acid causes instant death if placed inside the eye. When a small poisonous dose (about half a dram of the 2 per cent. acid) has been taken, the first symptoms are weight and pain in the head, with confusion of thought, giddiness, nausea (and sometimes vomiting), a quick pulse, and loss of muscular power. If death result, this is preceded by tetanic spasms and involuntary evacuations. When a large dose has been taken (as from half an ounce to an ounce of the 2 per cent. acid), the symptoms may commence instantaneously, and it is seldom that their appearance is delayed beyond one or two minutes. The patient is insensible; his eyes are fixed, the pupils are dilated and unaffected by light; the limbs are flaccid, and the skin is cold and clammy; the respiration is slow and convulsive, and the pulse is imperceptible.

Hydrocyanic acid causes paralysis of the heart, of the respiratory centre, and of the vaso-motor centre in the medulla. The spinal cord, too, is paralyzed shortly before death. The immediate cause of death is, in most cases, obstruction of the respiration; but in some cases it lies in stoppage of the heart's action.

Where the fatal action is so rapid antidotes are of comparatively little value. Chlorine, ammonia, peroxide of hydrogen, cold affusion, and artificial respiration are the most important agents in the treatment. Cold affusion on the head, neck, and down the spine is a valuable remedy, and it is asserted that its efficacy is almost certain when it is employed before the convulsive stage of poisoning is over, and that it is often successful even in the stages of insensibility and paralysis. One-fiftieth grain of atropine should be injected subcutaneously. Artificial respiration should never be omitted.

Among the compounds of hydrocyanic acid may be mentioned the cyanides of potassium and mercury. The more important ferrocyanides and ferricyanides are described in the articles on hydro-ferrocyanic and hydro-ferricyanic acids (qq.v.).

Potassium cyanide is an extremely poisonous white crystalline substance soluble in water, but insoluble in absolute alcohol. It may be melted without undergoing chemical decomposition; its aqueous solutions, however, readily decompose on boiling. It is made on a large scale by heating yellow prussiate of potash (potassium ferrocyanide), the decomposition of the latter taking place according to the following equation:

$$K_4Fe(CN)_6 = 4KCN + FeC_2 + N_2$$

Potassium ferrocyanide — Potassium cyanide — Iron carbide

The cyanide is separated from the carbide of iron formed along with it, by filtering through hot porous crucibles. Potassium cyanide is largely employed in extracting gold and in electro-plating. In the molten state it acts as a powerful reducing agent, readily setting free metals from their oxides; for example, lead oxide is reduced by it according to the following equation:

$$PbO + KCN = Pb + KCNO$$

Mercuric Cyanide, $Hg(CN)_2$, may be obtained by heating potassium ferrocyanide with mercuric sulphate in water, or by dissolving mercuric oxide in aqueous hydrocyanic acid. It is a colorless substance of a bitter metallic taste, and is moderately soluble in water and in alcohol. When heated it decomposes into metallic mercury and cyanogen gas. It is very poisonous, but is, in highly dilute solution, sometimes useful in syphilis and diphtheria.

HYDRODYNAMICS (from Gk. *ὕδωρ, hydōr*, water + *δύναμις, dynamis*, power, from *δύνασθαι, dynasthai*, to be able). Strictly speaking, that branch of mechanics which is the application of dynamics to liquids; it should therefore include both the statics and the kinetics of liquids; that is, a study of their properties both when they are in equilibrium and when not. In general, however, the former phenomena are treated separately under hydrostatics (q.v.), leaving for hydrodynamics simply the phenomena of kinetics. Further, although gases are easily compressed, while liquids are not, yet, if a gas is flowing slowly and without great fluctuations, it will have properties closely resembling those of a flowing liquid. Consequently hydrodynamics also includes most of the phenomena of the kinetics of gases. If a liquid is flowing regularly through a tube of an irregular cross-section, or if a gas is flowing slowly and regularly through such a tube, the mass of the fluid which passes each point in the tube in a given time must be the same; otherwise there would be a state of compression or rarefaction somewhere in the tube; it follows, then, that where the tube is narrow the velocity must be large, and conversely, like a river flowing first through a lake and then through a narrow channel. If the velocity at any point in the tube is greater than in another, it shows that there must be a force acting in the direction from the second point toward the first, so as to increase the velocity of the moving fluid; but the force must always be produced by a *fall* in pressure, and so the pressure at the second point is greater than at the first. It follows, then, that in a fluid

injector of a boiler, the common atomizer, the 'ball in the fountain' experiment, and many others. If a fluid is flowing through a long pipe, e.g. water or gas in city mains, there is of course always a great amount of friction between the moving fluid and the layer that sticks to the tube. Owing to this, the pressure decreases along the pipe, and the velocity of flow is decreased also.

If an opening is made in the side of a vessel containing a liquid, the latter will make a jet out into air. If the opening is a small one in a *thin* wall, it may be observed that the cross-section of the jet a short distance from the wall is less than that of the opening itself: this place of smallest cross-section is called the 'vena contracta.' If a quantity of liquid of mass m escapes having a velocity v, its kinetic energy is $\frac{1}{2}mv^2$. This energy is evidently due to the fact that the effect inside the vessel is just as if these m grams had been taken off from the free surface; and so, if the centre of the opening is at a depth h below the free surface, the m grams have lost an amount of potential energy mgh. Therefore

$$mgh = \tfrac{1}{2}mv^2;$$
$$\text{or} \quad v^2 = 2gh.$$

This value of the velocity of efflux was first deduced by Torricelli, the pupil of Galileo. This theorem may be stated in a slightly different way. The liquid is forced out owing to a difference of pressure on the two sides of the opening equal to ρgh. (See HYDROSTATICS.) Calling this difference of pressure P, the formula for v^2 becomes

$$v^2 = 2\frac{P}{\rho}.$$

In this form it may be applied to the rate of escape of a gas from a vessel through a small opening in a thin wall. It is seen that the square of the velocity of efflux varies inversely as the density of the gas and directly as the pressure forcing the gas out, that is as the difference of the *partial* pressures of that particular gas on the two sides of the opening, regardless of what other gases are present or what their pressures are. (See EFFUSION.) If the escape of the fluid takes place through a thick wall or through a tube, the phenomena are entirely different, owing to friction. It is observed that the rate of escape is independent—within certain limits—of the material of the tube, showing that there is a layer of the fluid adhering to the inner walls of the tube, thus forming a tube of the fluid through which the flow takes place. The following formula has been found by experiment to hold approximately for capillary tubes:

$$v = \frac{Pr^2}{6\eta l},$$

where r is the internal radius of the tube, l is its length, and η is a constant.

If an obstacle is placed in a stream of liquid or of gas, it experiences certain forces. One of the most interesting cases is that of an oblong solid in a fluid stream; it will tend to place itself with its length at right angles to the current. PROJECTILE.) Other cases of fluid motion are too difficult for discussion here. It should be noted, however, that there are two great divisions of such motions: irrotational and rotational. The former is such that, if a small portion of the fluid were suddenly solidified and freed from the rest of the fluid, it would have simply motion of translation, no rotation. The latter is such that if a small portion of the fluid were suddenly solidified and freed from the rest of the fluid, it would be spinning round a definite axis. It was proved theoretically by Lagrange that if a certain portion of a perfect fluid free from viscosity was set in irrotational motion, it would never have its character changed (if certain conditions are satisfied, as they would be in general). Helmholtz has proved, further, that if a portion of a perfect fluid is moving rotationally, it will always do so; and that it is as impossible to produce this motion in a perfect fluid as it is to destroy it. He showed, too, how lines can be imagined drawn in the fluid so that at each of their points they coincide with the axis of rotation of the portion of fluid at that point. Such a line is called a 'vortex-line;' and a solid tube made up of such lines is called a 'vortex.' A vortex once existing in a perfect fluid moves through it, keeping its identity, i.e. always being made up of the same particles and preserving certain other properties. If two vortices were to collide they would rebound, being perfectly elastic. It is possible to devise many forms of vortices which are stable and can keep their general shape. Many of the properties of vortices can be imitated by smoke-rings, but the air is, of course, not a perfect fluid, and so the vortices do not persist.

HYDRO-FERRICYANIC ACID (from *hydro*-gen + *ferricyanic*), $H_3Fe(CN)_6$. A brown crystalline substance obtained by decomposing potassium ferricyanide with dilute mineral acids, in aqueous solution.

Potassium ferricyanide, or red prussiate of potash, $K_3Fe(CN)_6$, is a dark-red soluble crystalline salt obtained by passing chlorine-gas into solutions of potassium ferrocyanide (see HYDROFERROCYANIC ACID), the transformation of the latter taking place according to the following chemical equation:

$$\underset{\text{Potassium ferrocyanide}}{K_4Fe(CN)_6} + Cl = \underset{\text{Potassium ferricyanide}}{K_3Fe(CN)_6} + KCl$$

Potassium ferricyanide is used principally for making *Turnbull's blue*, or ferrous ferricyanide, $Fe_3[Fe(CN)_6]_2$, which is prepared by mixing potassium ferricyanide with ferrous salts in aqueous solution.

HYDRO-FERROCYANIC ACID (from *hydro*-gen + *ferrocyanic*), $H_4Fe(CN)_6$. A white crystalline substance readily soluble in water and in alcohol. If exposed to the air, it soon assumes a blue coloration. It may be obtained in the free state by decomposing an aqueous solution of its potassium salt with dilute mineral acids.

The *ferrocyanide of potassium*, $K_4Fe(CN)_6 + 3H_2O$, often called yellow prussiate of potash, is a yellow crystalline substance produced when a

solution of potassium cyanide is boiled with ferrous hydroxide, the reaction taking place according to the following chemical equation:

$$6KCN + Fe(OH)_2 = K_4Fe(CN)_6 + 2KOH$$

Cyanide of potassium — Ferrous hydroxide — Potassium ferrocyanide — Caustic potash

On a large scale, potassium ferrocyanide is made from animal refuse, such as dried blood, hair, horn-shavings, etc. These products are charred and then heated to a high temperature with scrap iron and crude potash. By this process the potassium carbonate contained in crude potashes combines with the charcoal and nitrogen of the refuse, and yields potassium cyanide; on the other hand, the scrap-iron combines with the sulphur likewise contained in crude potash, forming sulphide of iron; and when potassium cyanide combines with iron sulphide, potassium ferrocyanide is produced. The chemical transformation taking place during this manufacturing process may, therefore, be represented by the following equations:

1. $K_2CO_3 + 4C + 2N = 2KCN + 3CO$

Potassium carbonate — Carbon — Nitrogen — Cyanide of potassium — Carbon monoxide

2. $6KCN + FeS = K_4Fe(CN)_6 + K_2S$

Cyanide of potassium — Sulphide of iron — Potassium ferrocyanide — Potassium sulphide

Large quantities of potassium ferrocyanide are at present made also from one of the by-products of the manufacture of coal-gas. When coal is heated out of contact with air, part of its nitrogen is obtained in the form of ammonium cyanide. In the manufacture of illuminating gas the cyanogen thus produced is for the most part retained by the iron oxide used in purifying the gas, and when the iron oxide has become useless for the latter purpose, it is employed in making potassium ferrocyanide after another valuable product, ammonium sulpho-cyanate, has been extracted from it with warm water. The mass remaining behind is mixed with lime and heated with steam; the calcium ferrocyanide thus produced is first transformed into potassium-calcium ferrocyanide $K_2CaFe(CN)_6$, by boiling with potassium chloride; finally, potassium ferrocyanide is obtained by heating the potassium-calcium salt with caustic potash.

Potassium ferrocyanide is extensively used for the manufacture of cyanide of potassium and of Prussian blue, as well as for a variety of other purposes.

Prussian blue, or Berlin blue, ferric ferrocyanide, $Fe_4[Fe(CN)_6]_3$, is obtained by mixing potassium ferrocyanide with ferric salts, in aqueous solution.

HY'DROFLUOR'IC ACID (from *hydro*-gen + *fluor*-ine), HF. An acid compound of hydrogen and fluorine, analogous to hydrochloric, hydrobromic, and hydriodic acids. It may be prepared by the action of sulphuric acid upon cryolite (q.v.) in an appropriate apparatus made of lead or of platinum. It may thus be readily obtained in liquid form, or rather in the form of an aqueous solution. The anhydrous acid may be obtained by heating acid potassium fluoride. As thus prepared, hydrofluoric acid is a colorless liquid, boiling at 19.5°C. (67.1°F.). Its vapors are exceedingly poisonous, and the liquid itself, even when mixed with more or less water, causes swellings on the skin that heal with extreme difficulty. Great care must therefore be taken in working with the acid. Solutions of hydrofluoric acid are used in analytical chemistry for breaking up minerals that are insoluble in strong hydrochloric and sulphuric acid; another way of breaking up such minerals consists in fusing them with the carbonates of sodium and potassium, but then, of course, the amounts of these metals in the mineral cannot be determined, and hence it is usually necessary to treat a separate portion of the mineral with hydrofluoric acid. Hydrofluoric acid dissolves glass, forming hydrofluosilicic acid (H_2SiF_6) with its silica, hence its use for making etchings on glass, the acid being, for this purpose, often replaced by its ammonium and certain other salts. (See ETCHING.) The acid is now often kept in bottles made of a wax-like substance called 'ceresine.'

HY'DROFLU'OSILIC'IC ACID. See HYDROFLUORIC ACID.

HY'DROGEN (from Gk. *ὕδωρ*, *hydōr*, water + *-γενής*, *-genēs*, producing, from *γίγνεσθαι*, *gignesthai*, to become). A gaseous element, discovered in 1766 by Cavendish, who called it 'inflammable air.' Paracelsus had already obtained hydrogen by treating iron with dilute mineral acids. But the existence of gases essentially different from air was not generally recognized until about the middle of the eighteenth century, and the properties of hydrogen gas were not definitely known before the researches of Cavendish. Lavoisier recognized its elementary nature, and gave it its present name. In the free state, hydrogen is found in the exhalations from volcanoes, in the gases issuing from the salt beds at Stassfurt and Wieliczka, in gases given off by oil-wells, in the intestinal gases of animals, etc. The spectroscope reveals its existence in the atmosphere of the sun and of many stars, and it has been found 'occluded' in meteorites. In combination it occurs as water, of which it forms very near one-ninth by weight, and as a constituent of almost all organic matter. It may be obtained by the electrolysis of acidulated water; by the action of sodium, potassium, and certain other metals on water; by passing steam over red-hot iron wire, etc. But the most convenient method, and the one generally employed, consists in allowing dilute hydrochloric acid, or preferably dilute sulphuric acid, to act on metallic zinc. Owing, however, to the impurities ordinarily present in zinc, as well as in mineral acids, the hydrogen thus obtained is impure and has a disagreeable odor. A large percentage of hydrogen is contained in ordinary coal-gas, in which it is formed as a product of the destructive distillation of coal (organic matter). Much hydrogen is also contained in ordinary water-gas, in which it is formed by the action of red-hot coal on water-vapor.

Hydrogen (symbol H; atomic weight—either 1, the standard of atomic weights, or 1.01, when the figure 16 for oxygen is adopted as the standard; see ATOMIC WEIGHTS) is a colorless, tasteless, and odorless gas, whose critical temperature is —234.5°C., the critical pressure being 20 atmospheres (300 pounds to the square inch). It was first solidified in 1899, by causing it rapidly to evaporate when in the liquid state. In the gaseous state, it is the lightest substance known, being fourteen and one-half times lighter than atmospheric air, and about 256,000 times lighter than the mineral platiniridium. One liter, at

gaseous hydrogen is assumed to consist of two atoms, and is therefore usually represented by the formula H_2. The gas burns in the air with a non-luminous flame of very high temperature, combining with the oxygen to form water. When pure, though it cannot support animal life, hydrogen is not poisonous, and when mixed with a sufficient quantity of oxygen or atmospheric air, may be inhaled for some time without inconvenience; but it weakens the voice, and renders it high-pitched. Hydrogen gas is capable of being absorbed by certain metals, such as iron, platinum, and especially palladium. Graham, who studied this phenomenon, maintained that when thus 'occluded' hydrogen assumed a true metallic form, and named that form of the element *hydrogenium*. Troost and Hautefeuille, too, believed that hydrogen is capable of forming *alloys* with metals, and some of the alloys obtained by them were found to have the composition of true chemical compounds; for example, the hydride of sodium, Na_2H, and the hydride of potassium, K_2H. If this is true, then hydrogen cannot be assumed to be invariably univalent in its compounds. (See VALENCY.) At ordinary temperatures, hydrogen is chemically inert toward most of the other elements; with chlorine, however, it combines gradually in diffused, and with explosive violence in direct, sunlight. Its mixture with double its volume of oxygen explodes violently if ignited; the explosion is somewhat less violent if instead of two volumes of oxygen, about two and a half volumes of air are mixed with one volume of hydrogen. At elevated temperatures, or when in the nascent state (i.e. while being formed, say by the action of dilute acid on zinc), hydrogen is a powerful reducing agent, i.e. it readily abstracts oxygen from compounds or adds itself to them. Nascent hydrogen is thus often employed in the preparation of organic compounds from given materials. With oxygen, hydrogen forms two different compounds: water, H_2O, and hydrogen peroxide, H_2O_2. With sulphur it combines directly, at the boiling temperature of the latter, forming sulphureted hydrogen, H_2S. The ordinary compound of hydrogen with nitrogen is ammonia, NH_3; another compound of hydrogen and nitrogen, termed hydrazine, has the formula N_2H_4. Hydrochloric acid, HCl, is the compound of hydrogen with chlorine, the two elements combining, as stated above, under the influence of sunlight at ordinary temperatures. At somewhat elevated temperatures, hydrogen similarly combines with the vapors of bromine and iodine, forming, respectively, hydrobromic acid, HBr, and hydriodic acid, HI. For the compounds of hydrogen with phosphorus, see PHOSPHORUS. For its compounds with carbon, see HYDROCARBONS.

Among the ordinary uses of hydrogen may be mentioned its use for the production of high temperatures, as in the ordinary oxy-hydrogen flame. In ordinary illuminating gas, hydrogen acts as a diluent for the light-giving constituents, and its combustion yields much of the heat without which the flame could not be luminous. On account of its great lightness, hydrogen is used to give buoyancy to balloons.

HYDROGEN DIOXIDE, or **OXYGENATED WATER**, H_2O_2. A colorless compound of hydrogen and oxygen containing, for the same amount of hydrogen, twice as much oxygen as water. It was discovered in 1818 by the French chemist Thénard. Minute quantities of it occur in the air, in rain-water, and in snow, and, according to some, in the juices of certain plants. It may be prepared by the action of cold diluted hydrochloric or sulphuric acid on hydrated barium peroxide. It can also be prepared by the action of hydrofluoric, hydrofluosilicic, phosphoric, or compressed carbonic acid on barium peroxide; and it has been prepared on a somewhat large scale by the action of acids on the peroxide of sodium. By any of these methods the peroxide is obtained in the form of a dilute aqueous solution. This may be concentrated by allowing the water to freeze out, or by passing a current of dry air through the solution kept at ordinary temperatures, or by allowing it to evaporate in a vacuum over sulphuric acid. The anhydrous peroxide thus obtained is a colorless, odorless, oily liquid with a harsh, bitter, metallic taste. It remains unfrozen at —30° C., and when heated to the boiling-point of water it decomposes with violence into oxygen and water. When brought in contact with the skin it causes a white blister, which after a time produces an irritating, itching sensation. It is a powerful bleaching agent and is largely used to remove color; it is particularly valuable for bleaching ostrich-feathers, bones, ivory, silver, wood, silk, cotton, etc. Dilute solutions of it under special trade names are employed to produce a light color in hair. It has also been used to restore paintings that have become darkened by age. The peroxide is very useful in medicine and surgery as an antiseptic, rapidly destroying pus and similar discharges, in consequence of which it has been employed in diphtheria. Hydrogen dioxide has the power of freeing water from micro-organisms, which has led to its use in brewing. It also destroys the acid and mold ferments in the wort. If taken internally, it has the effect of improving digestion, and has therefore been used in certain forms of dyspepsia. Ordinarily the peroxide acts as a strong oxidizing agent, owing to the ease with which it parts with half of its oxygen. In certain cases, however, the same property has the effect of causing reduction. This happens, namely, whenever the peroxide is brought into contact with substances like oxide of mercury, or ozone, which readily undergo decomposition. The reduction of such substances is accompanied by the evolution of much heat, great volumes of oxygen being given off by the peroxide itself as well as by the substances undergoing reduction. The peroxide itself is readily decomposed into water and free oxygen by mere contact with certain substances, e.g. gold, without these undergoing any change. Among the substances that have this effect on the peroxide are most alkalies, and hence the peroxide can only be preserved in slightly acid solution. Before using such a solution, a few drops of ammonia may be employed to neutralize the acid.

HYDROGEN SULPHIDE. See SULPHURETED HYDROGEN.

HYDROGRAPHIC OFFICE. A Government institution for the preparation, publication, and distribution of charts, and nautical information. It is a bureau, or office of a bureau, in the Navy Department. The principal hydrographic offices of the world are the British, French, United States, Russian, German, Italian, Japanese, Netherlands, and Spanish. The United States Hydrographic Office is third in the number of different charts published. It was established by act of Congress approved June 21, 1866. Before that date both the navy and merchant marine depended upon foreign offices for their supply. Charts for the navy were supplied through a depot of charts located in Washington, which purchased and kept on hand the charts needed for use. The Navy Department published a few charts prior to the establishment of the Hydrographic Office—notably those of the Wilkes Exploring Expedition—but such publications were exceptional.

The present Hydrographic Office was for a time a branch of the Bureau of Navigation of the Navy Department, but some years since it was transferred to the Bureau of Equipment. It is composed of the divisions of Chart Supply, Chart Construction, Sailing Directions, and Meteorology. The head of the Office, a captain or commander, is styled the *Hydrographer to the Bureau of Equipment*. The chiefs of divisions except that of Chart Construction are naval officers; the chief of the division of Chart Construction is a hydrographic engineer, and in 1901 was an ex-naval officer. On July 1, 1901, the number of engraved chart plates on hand was 1169, in addition to which there were 28 photographic plates. Besides these a considerable number of charts are produced by photolithography for temporary use until the engraved plates can be prepared. The total number of charts published and sold or issued to United States vessels or for governmental purposes during the preceding fiscal year was 62,194.

In addition to charts of the usual character there were published about 50,000 copies of the Pilot Chart (see CHART) of the North Atlantic Ocean, and 21,000 copies of the Pilot Chart of the Pacific Ocean. The Office also issues weekly a pamphlet of several pages called *Notices to Mariners*, which give accounts of all newly discovered dangers and changes in lighthouses, buoys, and aids to navigation reported during the week, and other information of importance to navigators; of these pamphlets 885,725 copies were published during the fiscal year 1900-01. The pilot charts are only issued monthly, and a weekly supplement called the *Hydrographic Bulletin* serves to bring the information up to date. The Office publishes lists of lighthouses, buoys, etc., throughout the world, and volumes called sailing directions, which contain full information in regard to ocean currents, weather, character of the seacoasts of different parts of the world, descriptions of harbors, aids to navigation, and other matters of interest to navigators and mariners generally. The other publications of the Office are *Bowditch's Practical Navigator* (q.v.), *Azimuth Tables*, and similar books for the use of mariners.

For the purpose of gathering and disseminating information of interest to mariners and assisting them as much as possible, branch hydrographic offices have been established in the ports of Baltimore, Boston, Buffalo, Chicago, Cleveland, Duluth, Galveston, New Orleans, New York, Norfolk, Philadelphia, Portland (Me.), Portland (Ore.), Port Townsend, Sault Ste. Marie, San Francisco, and Savannah. Additional branches are contemplated in Porto Rico, Hawaiian Islands, and the Philippines. The charts published by the Hydrographic Office cover the Great Lakes and their coasts and harbors, the Philippines, Samoa, Hawaiian Islands, Guam, Porto Rico, foreign territory, and the oceans. Only general sailing charts of the United States' own coast are published by it, the detail charts being published by the United States Coast Survey.

For further information, consult: Hughes, *Founding and Development of the Hydrographic Office* (Washington, 1887); and *Annual Reports* of the Hydrographer to the Bureau of Equipment (Washington). See HYDROGRAPHY; CHART; and section on Navy under UNITED STATES.

HYDROGRAPHY (from Gk. *ὕδωρ, hydōr*, water + *-γραφία, -graphia*, writing, from *γράφειν, graphein*, to write). That branch of the science of physical geography which treats of the surface waters of the earth particularly with reference to their bearing on navigation. Practically every civilized nation, and particularly all maritime nations, have special governmental departments whose duty it is to survey and chart the navigable waters belonging to the nation, and also the waters of the oceans wherever navigation extends. The hydrographical work performed by these organizations may be divided into two branches: (1) The collection of hydrographic data; and (2) the recording of these data, and marking the records available for the mariners. In the succeeding discussion these two branches of hydrographic work will be considered separately. First, however, it will be interesting to note very briefly the earliest attempts at systematic hydrographic work. The first step in the modern science of hydrography was made in the fifteenth century by Henry, 'The Navigator,' who was the first to construct a sea chart worthy of the name. Not much of importance in the way of hydrographic work was accomplished, however, until Captain James Cook, of the English Navy, commenced his long career of ocean surveying in 1759. Captain Cook's first work was the hydrographic mapping of the Saint Lawrence River from Quebec to the Atlantic Ocean, which he accomplished while stationed with the British fleet coöperating with General Wolfe in the attack upon Quebec. In 1763 Captain Cook was sent to survey the coast waters of Newfoundland, and in 1764 he performed a similar duty for the coast of Salvador, and thereafter he continued similar hydrographic observations wherever he was ordered until his death in 1779. The French had been observers of the operations of Captain Cook, and in 1785 La Pérouse was sent with two ships and a corps of scientists to visit the northwest coast of America and to explore other parts. He made important observations there, and also on the northeast coast of Asia. After spending two years and a half he went to Botany Bay, after which he was never heard from, except that information was obtained seven or eight years afterwards which made it probable that the ships were wrecked on a coral reef on the coast of Mallicollo. La Pérouse had, however, sent duplicates of charts and journals

wrote a work on marine surveying, which was published in an appendix to the narrative of the voyage (1808). This, however, had been preceded by Alexander Dalrymple's essay on marine surveying, published in 1771. Beautemps-Beaupré was placed in charge of the survey of the French coast, where he trained a number of hydrographers, the commencement of a corps of engineers for future exploration and surveying. The work done by these early English and French navigators was imitated by those of other nations, and now, as previously stated, practically every civilized nation has its hydrographic office.

COLLECTION OF HYDROGRAPHIC DATA. The sources from which hydrographic data are gathered are numerous. One of the most important is the system of surveys made directly by the Hydrographic Office (q.v.). Some of the objects of these surveys are the determination of depths for mapping and navigation purposes; the location of buoys, rocks, signals, etc.; the location of channels, the directions and velocities of currents, and the determination of the changes in the same, the measuring of the cross-sections of streams, the mean velocities of the water across such sections, and the slope of the water surface, and the determination of the quantity of sediment carried in suspension, the volume of scour or fill on the bottom, or of the material removed by artificial means as by dredging. The fixed points of reference for the survey are usually on shore, but sometimes buoys are anchored off shore and used as points of reference. The depth of water is determined by taking soundings along certain definite lines, these lines being established from the reference points just mentioned in coast and harbor work, and by the sextant and mariner's compass in deep-sea work. The operation varies in its nature, but consists commonly in rowing a boat at uniform speed and making soundings at regular intervals of time. The steersman keeps the boat true to the line by starting from a known point and steering directly toward another known visible point. In deep-sea sounding the ship keeps to a compass course, the latitude and longitude being established at suitable intervals by the ordinary means. In a harbor survey the soundings are generally taken along two sets of parallel lines, one set crossing the other at approximately right angles, and thus dividing the harbor area into checkerboard divisions. In river work the soundings are usually made along lines crossing the streams transversely at regular intervals.

Numerous modifications of these two methods are practiced. The means used for making the sounding or measuring depth ranges from a long graduated rod in shallow waters to the deep-sea lead. (See LEAD; SOUNDING.) To determine the direction and velocities of currents various means are employed, the most perfect of which are ingenious instruments known as current-meters (q.v.). In these devices a small water-wheel or screw propeller is operated by the current, and registers the number of revolutions made. As the wheels are regulated to make a certain number of revolutions at each speed of current, the registered record shows by a simple calculation the velocity of the current at the point where the thus enable a sample to be brought to the surface by means of the line to which the instrument is attached. For obtaining samples of the bottom the sounding-lead may have a cup-shaped vessel, with self-closing cover, attached to it, or a deep-sea dredge may be employed. See DEEP-SEA EXPLORATION; DREDGE.

The great bulk of the hydrographic surveying done by commercial nations is performed in the waters contiguous to the coast-lines, since it is here the shoals, reefs, currents, etc., whose location is of concern to the mariners, are chiefly found. Deep-sea surveying is more purely of scientific interest only, the principal direct commercial purpose of such deep-water surveys being the location of submarine telegraph cables.

Turning now to the sources for gathering hydrographic data outside of the surveys conducted directly by the Hydrographic Office, reference has already been made to the surveys performed in locating submarine cable routes. The various cable companies have ships continuously at work making such surveys or repairing and relaying old cables, and the numerous data collected by these vessels are forwarded to the Hydrographic Office for record and compilation. In the United States the Hydrographic Office also has the aid of the work done by the Coast and Geodetic Survey in surveying and mapping the coast-line, by the Engineer Corps United States Army in improving harbors and rivers, and by the United States Lighthouse Board in establishing lighthouses, buoys, beacons, etc. In addition the United States Commission of Fish and Fisheries collects considerable hydrographic information in the course of its work which is of value to the hydrographer. It is also the accepted duty of every master of a vessel to report to the proper authorities every fact of importance to mariners which he may observe in his voyages. Finally, there are the various expeditions which are organized from time to time, sometimes by the Government and sometimes by scientific bodies, to study the physical geography of the ocean. The first, and in some respects the most important, of these expeditions was that of the *Challenger*, sent out by England in 1872, and a reference to the brief description of its work (see CHALLENGER EXPEDITION) will serve to explain the nature and purpose of subsequent similar expeditions.

The hydrographic work so far mentioned has referred exclusively to navigable waters. In recent years constantly increasing attention has been devoted to the conservation and utilization of surface waters for irrigation in arid regions, for water-power and water-supply, and for various other utilitarian purposes. In the United States there is a special department of the Geological Survey devoted to the collection and publication of hydrographic data of this sort. Similar work is done by other governments, particularly that of England in India. As in the case of navigable waters, here also much information is obtained from the work done in developing private enterprises, such as water-power and water-works undertakings.

RECORDING AND PUBLICATION OF HYDROGRAPHIC DATA. The work of placing on record and making public the facts collected by the Hydrographic

Office through its surveys, and from other sources of information, is quite as important as the work of collecting such facts. In this way only is it possible to make the collected facts of value. So far as the mariner is concerned the most important work of the Hydrographic Office is the charts of navigable waters which it issues. These charts are made up by compiling the data collected as previously described from it, constructing maps or charts, showing the configuration of the coast-line and the ocean bottom, the depths of water, the location of channels, rocks, reefs, buoys, lighthouses, etc. As changes occur in these particulars they are recorded, and new charts made showing the changed conditions. Information which is not suitable for representation on charts is published in book form, or in periodicals called *Notices to Mariners*. When it is stated that the Hydrographic Office of each nation publishes not only its own charts, reports, and notices, but reproduces a considerable portion of the similar information published by other nations, it will be seen that the task of recording and making public hydrographic information is one of magnitude. See HYDROGRAPHIC OFFICE.

HY'DROID (from Gk. *ὑδροειδής*, *hydroeidēs*, like water, from *ὕδωρ*, *hydōr*, water + *εἶδος*, *eidos*, form). One of a class of cœlenterate animals, notable for their delicacy and beauty, and receiving their name from their structural resemblance to Hydra (q.v.). The name is now generally restricted to the polyp forms of the Hydromedusæ. (See HYDROZOA.) They exist in compound colonies, one kind having the office of feeding the community, another of protecting it, and another of reproduction. The feeding hydroids are usually fixed, or attached to some object, and proceed from eggs of the reproductive hydroids, or medusæ, the latter in turn growing from buds produced by the former. The medusæ sometimes remain attached to the stem, or become free-swimming. The body of the nutritive hydroid is usually supported by a stem of variable length, but may rest immediately upon the bottom. From one individual buds appear and produce branching colonies of hundreds or thousands, often having a height of fifteen or twenty inches, and the giant hydroid of Japan is more than three feet high. The reproductive hydroids are sometimes developed into perfect medusæ before leaving the parent stem, but they usually break away before attaining their perfect state. Some buds never become much developed, and are called gonophores. These usually remain attached, but attain sexuality and reproductive power. Most hydroids are covered with a chitinous envelope, which is continuous over the branching stem of the entire colony, but some species are naked, and soft. In tubularian hydroids, the chitinous envelope, when present, simply incloses the stem and branches, but is not expanded around the individual polyps (*hydranths*) in the form of a cup. In campanularian hydroids, however, each hydranth is surrounded by a cup, a continuation of the chitinous envelope, into which it can withdraw itself. Hydroids abound in the ocean in various parts of the world, notably the northwest coast of America, the Caribbean Sea, and around Australia. Their colors are usually not brilliant, brown, flesh-color, and white being the most common. A familiar and beautiful example is the Portuguese man-of-war (q.v.). Consult Agassiz, *North American Acalephæ* (Museum of Comparative Zoölogy, Cambridge, 1875). See SIPHONOPHORE, ALTERNATION OF GENERATIONS, and the accompanying illustration.

HY'DROMAN'CY. See DIVINATION.

HYDROM'ETER (Gk. *ὑδρομέτριον*, *hydrometrion*, vessel for hydrostatic measurement, from *ὕδωρ*, *hydōr*, water + *μέτρον*, *metron*, measure), also known as AREOMETER. An instrument used in determining the specific gravity of liquids, and in some instances of solid bodies.

Specific gravity, for determining which the hydrometer is used, is the ratio between the weight of a given quantity of a substance and that of an equal volume of water at its temperature of maximum density, 4° Centigrade, so it follows that the specific gravity of two substances must be directly proportional to their weights when the volumes are the same, or inversely as their volumes when the weights are equal. The hydrometer, which is a hollow instrument of glass or metal designed to float upright in a liquid, makes use of the principle of Archimedes that the weight of the volume of liquid displaced by a body is equal to the weight of the body itself. In its simplest form a hydrometer might consist of a graduated scale floating vertically in a liquid, and on which the level of the surface of the liquid it displaces could be measured. For example, an ordinary ruler if allowed to float upright in water would sink until a certain division on the scale is reached. This reading multiplied by the area of the cross-section of the ruler will give the volume of a mass of water equal to that displaced by the ruler, and equivalent to the weight of the ruler itself. Immersing the ruler in a liquid of different specific gravity, it will sink until the surface touches some other division on the scale, and as before the volume of a mass equivalent to the weight of the ruler will be obtained. A ratio made with these two quantities representing the volumes of the two liquids would give the specific gravity, but as the cross-section of the ruler is a constant quantity, it is only necessary to compare the two readings on the scale. The ordinary hydrometer consists of a glass tube terminating in two bulbs, the lower of which is filled with mercury or shot in order to keep the instrument steady in an upright position when immersed in a liquid. Such a hydrometer is extensively used in scientific and commercial work, as it can be graduated to furnish direct readings of the specific gravity of a liquid. The mark to which the instrument would sink when placed in water is usually marked 1.000, and the weight of water displaced is equal to the total weight of the hydrometer. If the instrument be placed in a liquid that has a less specific gravity than water, alcohol for example, it will sink until the surface of the liquid touches some point higher up on the stem, as in this case it takes a greater volume of the lighter liquid to be equivalent to the weight of the hydrometer. The scale on which the readings are made is on a piece of paper contained inside of the stem, and the method of graduation forms the chief distinction between the different instruments. In the instrument of Gay-Lussac, which is known as a volumeter, the water-point was marked 100, and the division was carried along the stem both

part immersed in water. With an instrument graduated in this manner the specific gravity is obtained by dividing the reading into 100. In practice, it is more convenient to use a hydrometer whose scale is graduated to read specific gravity direct, but in this event the scale is irregular, and great care must be exercised in the construction and testing of the instrument. The accuracy of a hydrometer is greatly increased by making its stem as slender as possible, and consequently increasing the space between the divisions, so it is customary to construct a number of instruments, each having a limited range, and designed for liquids of different densities. The hydrometer when used for a special purpose or substance, frequently undergoes modifications. The alcoholmeter, for example, is so graduated as to give at once the percentage of pure alcohol in a mixture of alcohol and water. The urinometer, lactometer, sacharimeter, and other instruments are all hydrometers used for special purposes. Hydrometers with arbitrary scales also play an important part in scientific work, though the present tendency is toward the exclusive use of specific gravity values. In the Baumé scale, which is encountered frequently in chemical processes, a second fixed point on the hydrometer stem is determined in addition to that given by water. This is obtained by dissolving one part by weight of common salt in nine parts of water, and then the space between these two points is divided into ten equal parts, which are called degrees. The water-point is marked 10 on the scale, and the division is carried beyond for 40 degrees. For liquids heavier than water the second fixed point is determined by immersion in a solution of 15 parts of salt in 85 parts of water, and the space between it and the water-point, which is marked 0, is divided into 15 equal divisions. The scales of Cartier and Beck are also used, though less frequently than that of Baumé.

The following tables from Kohlrausch, *Leitfaden der praktischen Physik* (Leipzig, 1900), afford a comparison of these scales with the true values of specific gravity:

LIQUIDS LIGHTER THAN WATER

SP. GR.	Baumé	Beck	Cartier
.75	58.4°	56.7°	.....
.80	46.3	42.5	43.°
.85	35.6	30.	33.6
.90	26.1	18.9	25.2
.95	17.7	8.9	17.7
1.00	10.	0.	11.

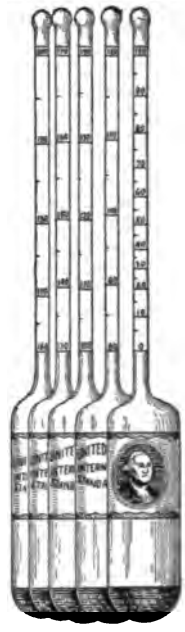
LIQUIDS HEAVIER THAN WATER

SPECIFIC GRAVITY	Baumé	Beck
1.0	0.0°	0.0°
1.1	13.2	15.4
1.2	24.3	28.3
1.3	33.7	39.2
1.4	41.8	48.6
1.5	48.8	56.7
1.6	54.9	63.7
1.7	60.	70.
1.8	65.	76.
1.9	69.	81.
2.0	73.	85.

The specific gravity of liquids changes with the temperature so that it is of the utmost importance to have the liquid at the temperature for

contain within their stems a thermometer tube whose bulb is placed in the lower portion of the instrument.

In the United States Internal Revenue Service the hydrometers furnished to the inspectors are so graduated as to indicate the number of parts by volume of proof spirit equivalent to the volume of the liquor at the standard temperature, which is 60° Fahrenheit. They are constructed so as to read 100 for proof spirit, and 200 for absolute alcohol. Proof spirit in the United States is defined by law to be that mixture of alcohol and water which contains one-half of its volume of alcohol, the alcohol when at a temperature of 60° Fahrenheit being of specific gravity .7939 referred to water at its maximum density. Proof spirit has at 60° Fahrenheit a specific gravity of .93353, 100 parts by volume of the same consisting of 50 parts of absolute alcohol, and 53-71 parts of water.



SET OF UNITED STATES STANDARD HYDROMETERS AS USED BY THE INTERNAL REVENUE OFFICE.

A hydrometer of a different type from those described above is the weight hydrometer, where the submerged volume remains constant, but as the specific gravity of the liquids changes, the weight of the instrument must be varied in order to immerse it to a given point. The Nicholson hydrometer is representative of this class, and consists of a brass tube with conical ends, which floats upright and carries above a thin stem the carrying pan in which may be placed a substance whose specific gravity is to be found. When used to determine the specific gravity of a liquid the weight of the apparatus is first ascertained, and then it is placed in water and weights added until a marked point on the stem is at the surface of the water. If the instrument is placed in a liquid of greater specific gravity, then additional weights must be placed on the pan in order to sink the stem to the mark, while if the liquid is less dense the number of the weights must be diminished. The weight of the instrument increased by the amount of the weights added when the instrument was placed in water, divided by the weight of the instrument and the weights added when the instrument was in the liquid under test, will give the specific gravity. This hydrometer can also be used to determine the specific gravity of a solid, in which case the latter is first placed in the upper pan, while the instrument is in water, and the number of weights which must be removed is noted. The substance is then placed in the lower pan, and the amount of weight which must be removed to restore it to its former position ascertained. The difference in the two amounts

The hydrometer of Fahrenheit is based on a similar principle, but is made of glass instead of metal, and has a bulb filled with mercury at its lower end instead of a weighted cup. It can only be used for liquids. These instruments are not as reliable as the ordinary hydrometers, and are not as widely used. In the most accurate determinations of specific gravity a chemical balance is employed, and equal volumes of the liquid actually weighed, or if the substance is a solid it is weighed both in the air and in distilled water, suitable corrections being applied for temperature, and other disturbing influences.

NICHOLSON HYDROMETER.

The hydrometer is without doubt one of the earliest pieces of physical apparatus, its invention being generally ascribed to Archimedes, to whom is due the principle on which it is based. The instrument is mentioned by Priscian, who died about A.D. 500, and it is also described by Synesius of Ptolemais in a letter to Hypatia of Alexandria, under the name of hydroscopium, as follows: "It is a cylindrical tube the size of a reed or pipe, a line drawn along it lengthwise which is intersected by others, and these point out the weight of water. At the end of the tube is a cone the base of which is joined to that of the tube so that both have but one base. This part of the instrument is called *baryllion*. If it be placed in water it remains in perpendicular direction so that one can readily discover the weight of the fluid." The date of this letter can be approximately fixed by the fact that Hypatia was murdered in A.D. 415. The use of the hydrometer was known to the Saracens of the tenth and eleventh centuries, and one of their writers, Al-Khâzinî, attributes its invention to a Greek philosopher named Poppius, a contemporary of Theodosius the Great. In this connection this same writer refers to the fundamental discovery of Archimedes.

HY'DRONI'TRITES. See HYDRONITROUS ACID.

HY'DRONI'TROUS ACID, HN_2. An acid gaseous compound of hydrogen and nitrogen first obtained by Curtius in 1890. An easy method of preparing this acid was subsequently worked out by Angeli, and consists in adding hydrazine hydrate (see HYDRAZINE) to a concentrated solution of silver nitrate, the result being a precipitate of silver, hydronitrite, AgN_2, from which free hydronitrous acid may be obtained by decomposing with sulphuric acid. The salts of hydronitrous acid, or *hydronitrites*, are violently explosive compounds, and their preparation should not be undertaken by inexperienced persons.

HYDROP'ATHY (from Gk. *ὕδωρ, hydōr*, water + *πάθος, pathos*, disease). A synonym for hydrotherapy, the method of treating diseases by external and internal use of water. See HYDROTHERAPY.

HY'DROPHANE (from Gk. *ὕδωρ, hydōr*, water + *φανός, phanos*, clear, from *φαίνειν*,

HYDROPH'IDÆ.

HY'DROPHIL'ID
from Gk. *ὕδωρ, hydōr*
loving). A family of
which swim in the w
merged parts of plants
elliptical black beetles
næ. Because of the f
of air on the ventral
part has a silvery ap
carnivorous, but the a
decaying vegetation. T
fifty species of this fa
One of the most comm
triangularis. A few
or dung, and subsist
habit such places.

HYDROPH'ILOUS
applied particularly t
linated through the a
also been applied by so
plants, but should be
both because of its pre
and because it is an
senses. The term wat
in the first sense. See

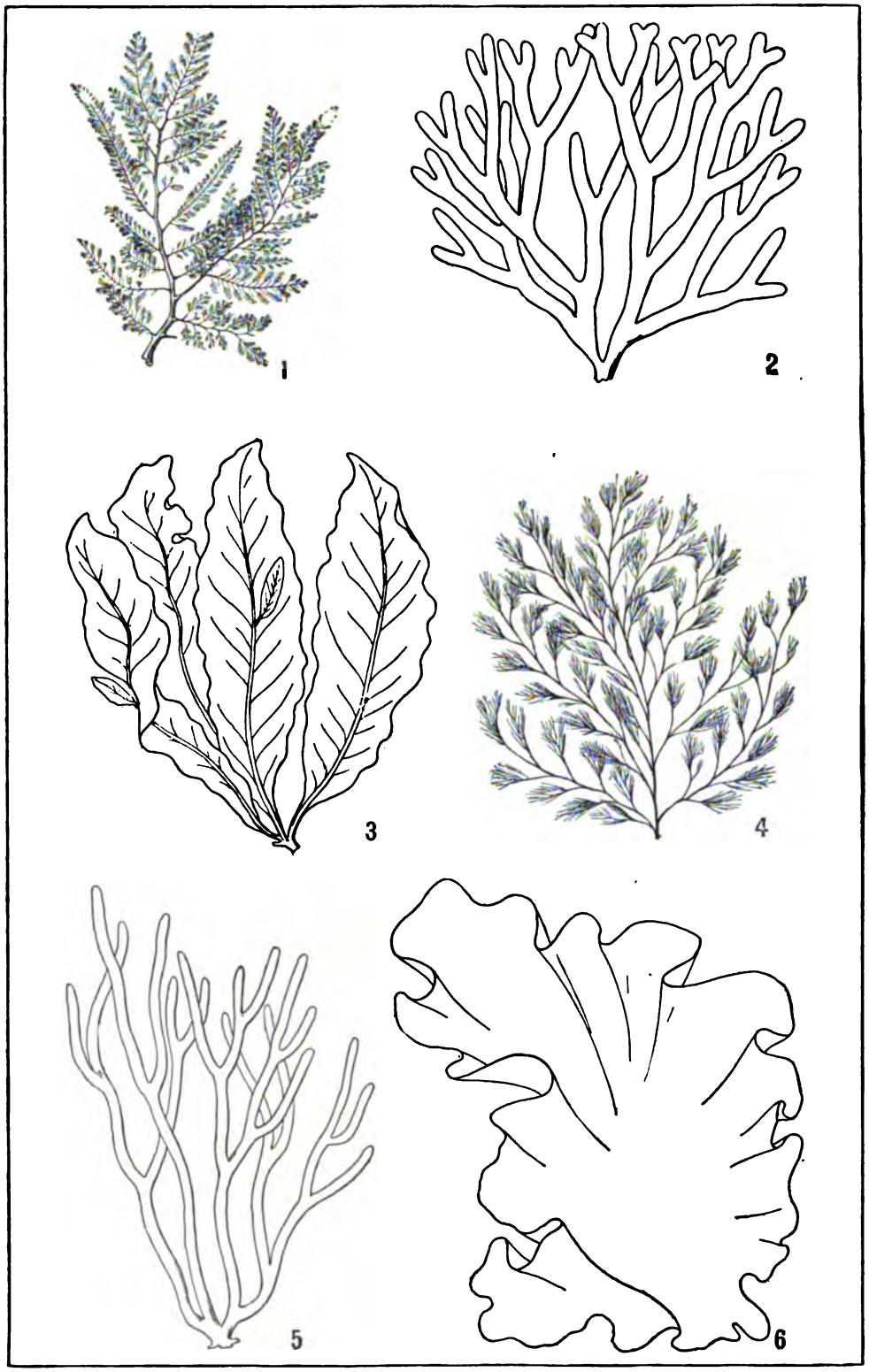
HY'DROPHO'BIA
hydrophobia, from *ὑδρο*
ing water, from *ὕδωρ*,
phobos, fear), or RABIE
acute infectious disease
produced in man by th
cific virus through the
with the disease. This
since the earliest histo
of Abdera gave an acco
tury B.C. Aristotle in
described it. Celsus, B.
symptoms. Xenophon,
tarch, all referred to ra
haave (q.v.) and Van S
ease intelligently. Joh
diè (q.v.), Marochetti,
Dupuy all wrote of it.
brated veterinarian, co
in his books, and relie
with nitrate of silver t
after being bitten seven
is reported to have die
Virchow and Von Ziem
ease by the hypodermic
rabid animal. After m
our knowledge of hydrop
1882, began to treat th
accuracy.

The geographic distri
wide. It has been found
was epidemic in 1860; i
it prevailed in 1839; i
Hamburg, in Saxony, i
parts of the United Stat
disease in Washington,
ing grave apprehension.
very many instances of
recorded. The disease i
in the dog, the wolf, the
skunk, also, seems to
hydrophobia, and the di

been considered distinct and worthy its own name of *rabies mephitica*. A careful consideration of all the known facts, however, leads to the conclusion that the disease is one to which all the lower animals, and man also, are liable; that it is protean in its manifestations, chiefly because of the thousand and one concomitant circumstances and elements; and that the collected statistics are mostly so tainted, from manifold sources of error, that they need to be scanned and sifted with the utmost discretion and care. It is, however, safer to treat every skunk-bite as though certainly by a rabid animal, since in most cases the facts cannot be known. (The curious will find the question most interestingly discussed in a candid manner in Coues's *Fur-Bearing Animals*.) The nature of the infecting virus is as yet unknown. It is probably found in the saliva. In man there is a variable incubation from three weeks to six months, the period depending largely on the site of the infection. Wounds about the neck and face are especially unfavorable in prognosis; next are those of the hands. Punctured wounds, because of the difficulty of cauterizing them, are most dangerous. Three stages are described. In the *premonitory stage* there is pain, numbness, or irritation about the bite. Irritability, nervousness, and depression are common. In the *stage of excitement* there is great hyperæsthesia. Almost any slight stimulus will cause intense reflex excitability and convulsions. The muscles of deglutition are extremely rigid, or even paralyzed, and any attempt at swallowing may cause spasms of the throat and general convulsions; these may even follow the thought of swallowing. The name hydrophobia is erroneous, and based upon false inferences from these facts. The sufferer from rabies does not fear water—he intensely desires it, as he is devoured with thirst, but he cannot swallow it, nor even "go through the motions" of swallowing. There is also a secretion in the throat and mouth of a thick, viscid mucus, with thickened saliva, and the effort to get rid of this with muscles refusing to act, causes the bark-like cough and hawk so often described as 'barking like a dog.' The patient does not bark, and it is doubtful if he bites. The temperature rises, and the patient may become maniacal. This stage may last from one to four days, and then the *paralytic stage* supervenes. In this stage the spasms stop, unconsciousness supervenes for the first time, the action of the heart ceases, and the patient dies.

The pathological changes found after death from hydrophobia are not characteristic. The most constant are found in the nervous system, especially in the region of the medulla oblongata and pons. The changes consist in a varying degree of inflammation, marked by small round cell infiltration of the blood-vessel walls, exudation into the pericellular lymph-spaces, small hemorrhages, and sometimes thrombosis of the small blood-vessels. More recently extensive degenerative changes in the nerve-cells have been described. Lesions have also been noted in the sympathetic, consisting in degeneration of the nerve-cells and increase in the thickness of their endothelial capsules. In addition to the changes in the nervous system, there is usually congestion of the mucous membrane of the gastro-intestinal tract and of the pharynx, larynx, and bronchi. Despite the fact that innumerable attempts to discover the cause of the disease have been made without success, it still seems probable that hydrophobia is due to a micro-organism. This organism is not apparently widely distributed throughout the body, but confined mainly to the saliva and the central nervous system. An emulsion made of the medulla of a rabid animal, injected into dogs, cats, rabbits, guinea-pigs, etc., produces symptoms characteristic of the disease, although in rodents there is little or none of the stage of excitement.

Although we have no knowledge as to the specific germ of the disease, hydrophobia furnishes our most remarkable example of the success of artificial immunization by means of protective inoculation. To the French student Pasteur (q.v.) is due the credit not only of the discovery of the preventive treatment of hydrophobia, but of demonstrating through it a principle in therapeutics which is of constantly widening application. Pasteur found that he could induce the disease in rabbits by inoculations with portions of the spinal cords of rabid animals, and that the spinal cords of these rabbits possessed a high degree of virulence. Drying in air reduced the virulence in direct proportion to the length of the drying. It was found that, while inoculation of man or animals from the fresh rabbit-cords was invariably fatal, if the man or animal was first inoculated from one of the cords the virulence of which had been greatly reduced by the drying, and then from cords of gradually increasing virulence, he could become so accustomed to the virus that injection of the fresh cord would no longer be fatal, and such a series of inoculations made sufficiently soon after the bite of a rabid animal was found to prevent entirely the development of the hydrophobia. Advantage is taken of the long period usually elapsing between the bite and the onset of the disease to practice these preventive inoculations, and the result has been a marked decrease in the mortality from the bites of rabid animals. In view of the uniformly fatal results of hydrophobia and the success of the Pasteur treatment, the importance of determining at the earliest possible moment whether the animal by whom a person has been bitten had rabies can be readily appreciated. The animal should not be killed, for as rabies is invariably fatal to canines, the recovery of a sick animal definitely disproves rabies. On the contrary, the animal should be carefully watched, and if it dies, should be sent to a laboratory where examination can be made and the question of rabies definitely settled by inoculation experiments on animals. The treatment should be cauterization in every case, less than one hour after the bite, by means of the actual cautery, strong acid, or acid nitrate of mercury. Wounds must be opened by the surgeon, and even amputation may be necessary. Washing and syringing wounds with water at 130° F. is desirable. Sucking the wound to draw out the poison has been practiced, and may be safely done if there are no breaks of the membrane of the lips or mouth. Administration of morphine or alcohol does harm. Immunizing by the Pasteur method should be practiced in all cases. By this method the patient is inoculated with attenuated virus by the injection hypodermically of emulsion made from the brain of a rabid animal, repeated in stronger and stronger concentration during twenty-one days. The results of the Pasteur method are now indisputable,



RED ALGÆ

1. Ptilota californica
2. Scinaia furcellata
3. Delesseria sanguinea
4. Polysiphonia Brodiaei
5. Nemalion multifidum
6. Porphyra laciniata

but it is of the utmost importance to begin the treatment as soon as possible after the injury, as the prospect of success grows less and less day by day of delay. Following are the results of the antirabic treatment at the Institut Pasteur, Paris, from 1886 through 1899; 21,631 cases were treated, with 99 deaths; showing a mortality of 0.45+ per cent. In 1900 there were thirty-five Pasteur institutes in the world, at the following places: Eight in France, six in Russia, five in Italy, two in Austria, one in New York City, one in Chicago, one in Baltimore, one in Havana, one in Rio Janeiro, one in Buenos Ayres, one in Saragossa, one in Malta, one in Bucharest, one in Constantinople, one in Aleppo, one in Tiflis, one in Algiers, and one in Athens.

PSEUDORABIES, or LYSSOPHOBIA, is a neurasthenic or hysterical condition, in which the patient, who imagines that he has rabies, in his morbid condition of mind enacts some of the symptoms, and may even be frightened to death. Consult: Youatt, *On Canine Madness* (London, 1830); Suzor, *Hydrophobia: An Account of M. Pasteur's System* (London, 1887); Babes, in *Annales de l'Institut Pasteur*, vol. v. (Paris, 1892); Byron, *Researches in the Loomis Laboratory* (New York, 1890); Pasteur, in *Comptes rendus de l'Académie des Sciences* (Paris, 1881 and 1889), and in *Annales de l'Institut Pasteur* (Paris, 1887-88); Salmon, "Development of Knowledge Concerning Animal Diseases," in *U. S. Department of Agriculture, Bureau of Animal Industry, Sixteenth Annual Report* (Washington, 1899).

HY'DROPHYTES (from Gk. *ὑδωρ, hydōr*, water + *φυτόν, phyton*, plant). Plants which grow naturally either in water or in very wet soil. This term is contrasted with mesophytes and xerophytes (qq.v.). Common illustrations of hydrophytic plant societies are swamps of all kinds, pond societies, and ocean plants. Various classes of hydrophytes are taken up under separate heads, where the main features of the various hydrophytic societies will be discussed. It will be desirable, however, to give a short account of the characteristic hydrophytic structures. The roots of hydrophytic plants are in most cases very greatly reduced, and in some cases altogether lost, as in some of the duckweeds. Root-hairs are also commonly lacking in water plants. The stems and leaves are not as a whole conspicuously reduced in water plants, but they show peculiarities of structure that are quite interesting. The leaves of hydrophytes are frequently finely divided, as in the water-milfoil and mermaid-weed. In many cases where the leaves are not finely divided, they are very thin; for example, in tape grass. An examination of the structure of the leaves shows the entire absence of stomata in the submerged parts, complete or almost complete absence of palisade cells, and a very thin epidermis which contains chlorophyll. The stems suffer a noteworthy reduction in the size and development of the water-conducting vessels and mechanical tissues, and a great increase in air-spaces. The structures just described are found in their highest development in submerged water plants. Hydrophytes whose leaves are aërial show no conspicuous differences from ordinary land plants in most respects. One class of hydrophytes, which may perhaps be called amphibious plants, shows some remarkable variations, especially in structure. Leaves which are developed under the water show the characteristic structures outlined above, including the fine leaf division, whereas leaves of the same plant developed in the air show typical aërial leaves without these divisions and with palisades, stomata, and a thick cuticle. The stimulus or stimuli which cause these wide variations are not certainly known, but they are discussed to some extent in the article LEAF. Common American plants, which show variations to a high degree, are the aquatic buttercups, the mermaid-weed, some of the cresses, and water-hemlocks.

However the hydrophytic structures that have been described in the preceding paragraph may have arisen, certain advantages can be clearly seen, at least in some cases. The thin walls of the epidermis, which are in striking contrast to the thick cutinized walls of many aërial leaves, permit the easy entrance of water and substances dissolved in the water. On this account many submerged plants are practically independent of soil relations; they take in most of their material directly from the water. It is easily possible to grow cultures of many of these plants without having any root connection whatsoever. While certain forms, such as the water-milfoil and the water-weed (Elodea), develop roots in ordinary aquarium cultures, other forms, such as hornwort (Ceratophyllum), never develop roots and yet grow quite as vigorously as in their natural rooted condition. A few forms, such as the bladderwort (Utricularia) and some of the duckweeds, have no roots in nature. Of course, in such cases, the entire absorption of nutriment must take place through the leaf epidermis. The fact that the leaf epidermis contains chlorophyll is also a matter of advantage, since water very soon destroys the efficiency of rays of light. At a comparatively shallow depth there is a cessation of the development of green plants. A reduction in the water-conducting tissues, while not necessarily an advantage, is, nevertheless, not harmful, inasmuch as the absorption is so largely through the leaf, instead of the root, as in land plants. The reduction in root development is not so easy to understand, since it would seem that holdfast organs would ordinarily be of advantage; then again, any absorption which the roots might make would so much the more increase the capacity of the plant. A high development of air-cavities is a distinct advantage, not only to help float the plant, but probably to a much higher degree to act as a sort of air-storage. It can readily be seen that the conditions for obtaining air underneath the water are not of the best, and that any additional means for obtaining or for storing air would increase the plant's efficiency. The reduction in the development of mechanical tissues, of palisade cells, and of stomata is not necessarily an advantage to water plants, but since these tissues are not actually needed, the plant loses nothing by its failure to develop these structures. The peculiar leaf forms that have been noted above are, perhaps, not necessarily of any exceptional advantage. It must not be supposed that everything in a plant can be explained in accordance with the need of the plant. It is much more likely that the explanations should be referred to definite chemical and physical causes. However, in the case of finely divided leaves, it can be seen that a much larger proportion of cells comes in

contact with the material than is true with the more compact air leaves. Thus the absorptive capacity of the leaf is increased. Finely divided leaves are also doubtless more able to escape the dangers coming from currents of water than leaves which are more compact.

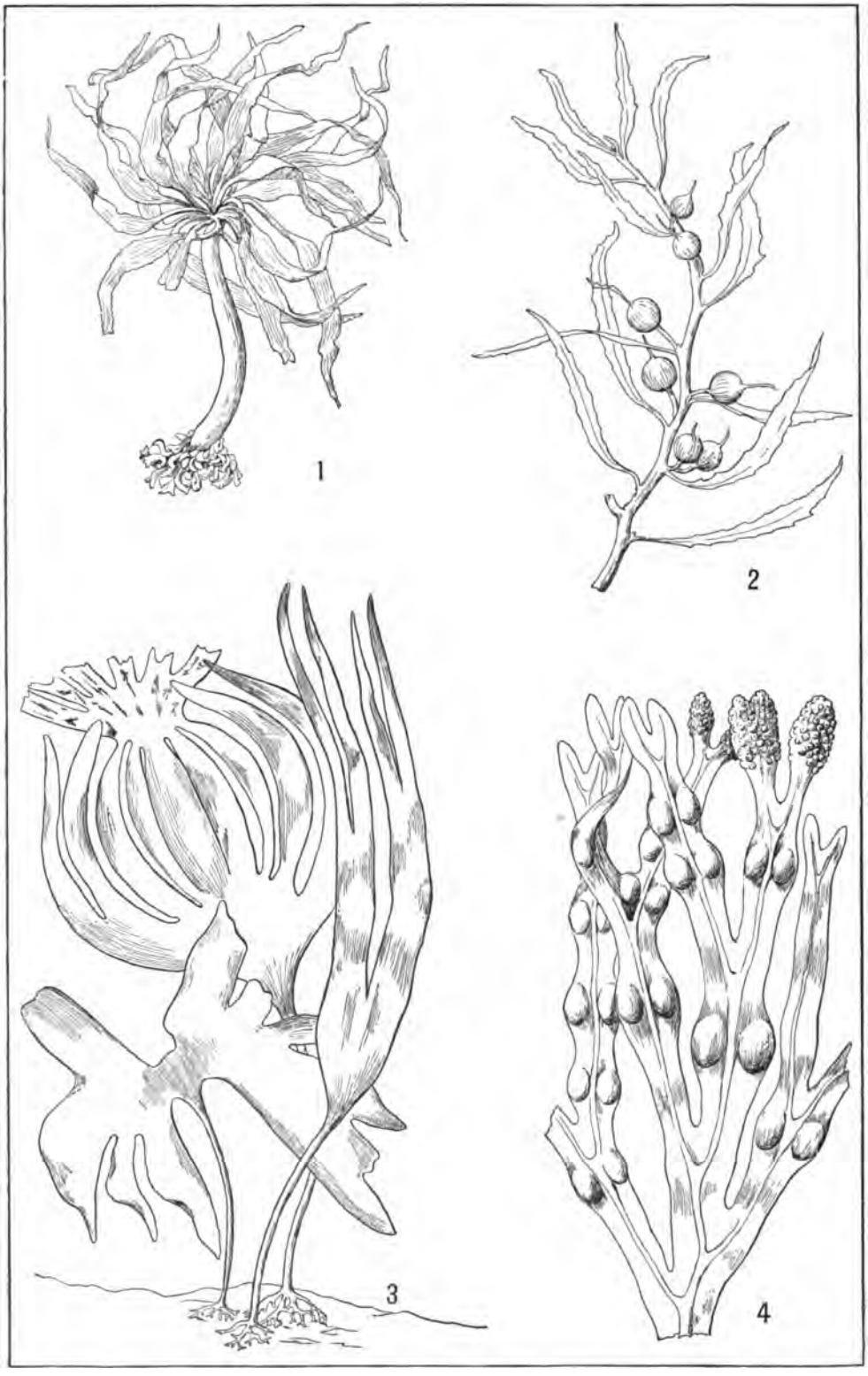
The hydrophytic plant societies are essentially all edaphic, that is, they are conditioned by local causes. In this respect there is a wide contrast as compared with the xerophytic plant societies. Perhaps some of the ocean formations may be conditioned by climatic causes to some extent, but the ordinary hydrophytic societies of swamps and ponds are due to essentially local conditions. Perhaps no plants have such a wide distribution as certain of the hydrophytes. This is particularly true of ocean plants, where it can easily be accounted for by the almost universal distribution of the oceans themselves. It is true, to a striking degree, as well of the pond and swamp plants. Such plants as the pond weeds, cattails, and bulrushes, are found almost throughout the world where the habitats are favorable. Perhaps the chief reason for the wide distribution of hydrophytic species is the great ease of dispersal by means of the water itself, but a reason almost if not quite as important is furnished by the wide degree of uniformity of hydrophytic conditions. Since water is colder in summer and warmer in winter than adjoining portions of the land, it is obvious that water plants can, for reasons of temperature, have a much wider distribution than land plants.

The hydrophytic plant societies may be roughly subdivided into those associated with salt water and those with fresh water. The former are treated under the heads PLANKTON; BENTHOS; MANGROVE SWAMP; and HALOPHYTES; the latter under the head of SWAMPS, where it will be convenient, not only to treat the swamps proper, but also, to some extent, the development of the swamps from ponds and lakes. See DISTRIBUTION OF PLANTS.

HYDROSTATIC PRESS. See HYDRAULIC PRESS.

HYDROSTATICS (from Gk. ὕδωρ, *hydor*, water + στατικός, *statikos*, causing to stand, from ἵστημι, *histanai*, to stand). That branch of mechanics which treats of the properties of liquids in equilibrium, and of solids either totally or in part immersed in liquids. Many of the laws and phenomena of hydrostatics apply equally well to both liquids and gases, i.e. to fluids. A fluid may be defined to be such a form of matter that it yields to any force, however small, which acts to make one layer of the substance move over another; thus the shape of a liquid or gas depends entirely on the forces acting on it, however small, and not on the body itself, as in the case of a solid. A portion of liquid left to itself—as a falling drop—assumes a spherical shape owing to the contraction of the surface layer. (See CAPILLARITY.) Under the action of gravity a liquid contained in an open vessel takes the shape of the vessel so far as all the surface is concerned, except that portion in contact with the air and the portions near the edges of this "free surface." This portion is horizontal, being perpendicular to the vertical force of gravity if the liquid is at rest; because, if it were inclined to this, there would be a component of gravity tending to make the higher portion of the liquid slide down. When a fluid is said to be at rest, it is not implied that there is no motion of the molecules, but simply that there is no flowing, i.e. no currents, no wind. In the case of the open vessel, there is a force pressing down on the free surface due to the weight of the atmosphere, and, since the liquid possesses fluidity, the solid walls, they have a force of reaction against the liquid; thus it is exactly as if the liquid were contained in a vessel and a tightly fitting piston were pressing down on its top surface. If a gas is contained in a balloon or a room, it expands and is *uniformly distributed* throughout the space open to it; it presses against the containing walls, and they have an equal reaction on the gas. If a small quantity of a certain liquid is poured into a tall cylindrical vessel, then another liquid with which the first does not mix is poured carefully on top of this, etc.; the equilibrium—if there is any—will be stable only if the density of any one liquid is less than that of the liquid below it and greater than that of the one above it. For if the density of any layer is greater than that of the one below it, the potential energy of the two will be decreased if the heavier liquid goes to the bottom, and so comes closer to the earth.

FLUID PRESSURE. As a result of the reaction of the containing walls on a liquid or a gas there is always a "pressure" at each point throughout the fluid, i.e. there is a force acting over any surface immersed in the fluid; the numerical value of the pressure over any area is by definition the force per square centimeter, and the "pressure at a point" is the limiting value of the force acting on any surface at that point divided by the area of the surface, as the area is supposed to be taken smaller and smaller until it becomes practically a point. This pressure, due to the reaction of the walls, is the same for all points in the fluid. There is also an additional pressure at each point of a fluid on the surface of the earth owing to the fact that any horizontal plane passing through that point has to support the *weight* of the column of fluid vertically above it. If the area of this plane is A; the vertical height above it to the top of the fluid, h; the average density of the fluid, ρ; the acceleration due to gravity of a falling body, g; the upward force will be ρhgA, and, therefore, the pressure is ρgh. These two pressures are the only ones which affect our senses or produce mechanical effects in general; but there is also, of course, at any point in a liquid what may be called "cohesion," or pressure due to the action of the molecules on each other. Some idea of the magnitude of this may be obtained by separating the molecules, e.g. by boiling the liquid. It is greatly affected by dissolving substances in the liquid. The pressure against any surface immersed in a fluid at rest is always at right angles to it, otherwise there would be produced a flowing owing to the component of the pressure along the surface. Further, the pressure at any point in a fluid at rest is the same in all directions, because, if it were greater in one direction than in another, the fluid would flow. Therefore the pressure at any point in a fluid at rest is the sum of the pressure due to the reaction of the walls, P, and that due to gravity, ρgh. As noted above, the former is the same for all points in the fluid. As a consequence, if a fluid is inclosed in a cylinder into which fit two pistons of



BROWN ALGÆ

1. Postelsia palmæformis
2. Sargassum bacciferum
3. Laminaria digitata
4. Fucus vesiculosus

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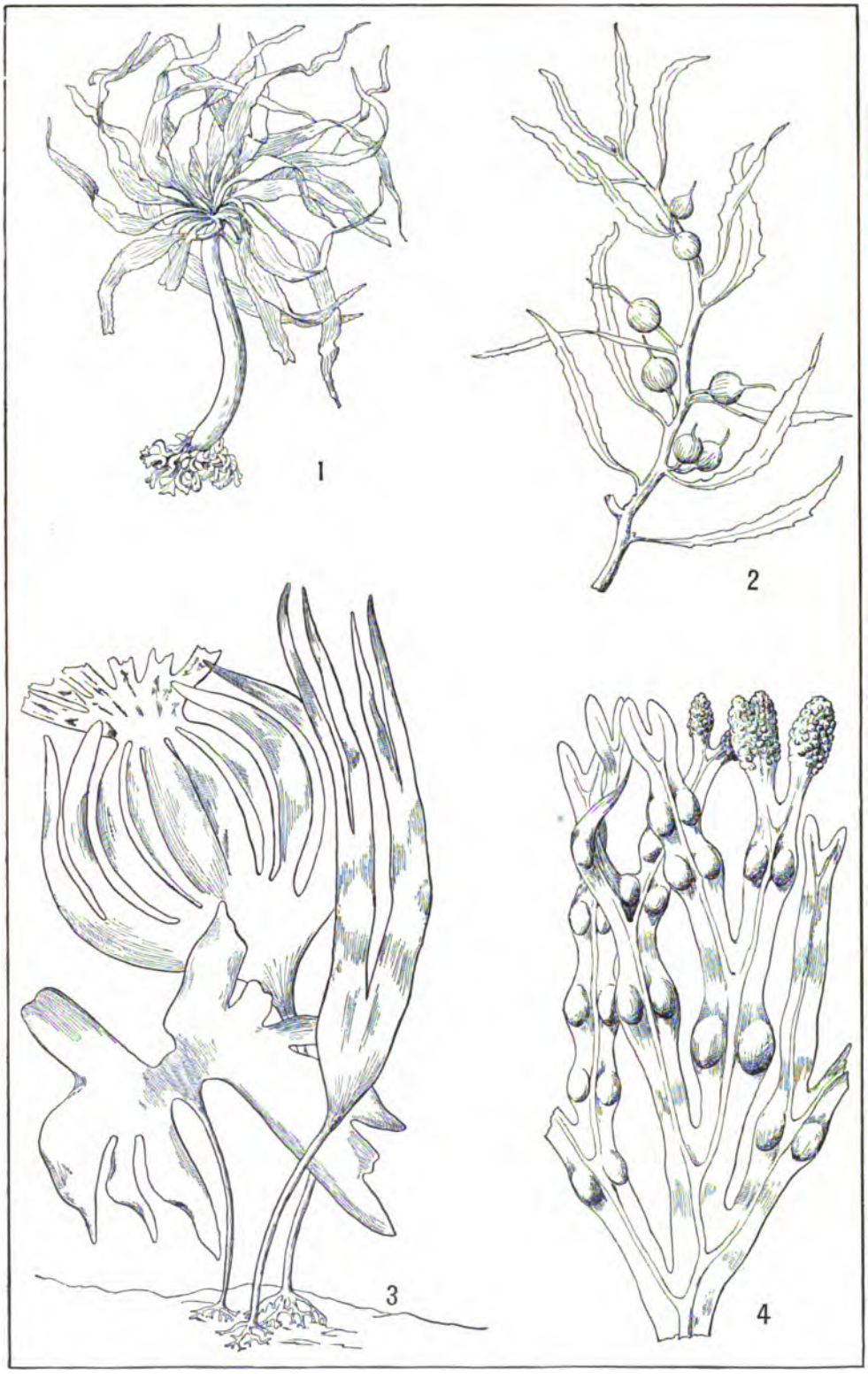

BROWN ALGÆ

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4. Fucus vesiculosus

Therefore, if A_1 is small compared with A_2, the force on the former piston is small compared with the balancing force on the latter; so a small force may produce a large one. In a liquid which is almost incompressible, P may be very great; and so the force produced may be enormous; but in a gas, which is easily compressed, P is never very large; and so the force produced is small. (This principle is that of the hydrostatic press. See HYDRAULIC PRESS.)

The total pressure, i.e. $P + \rho gh$, at all points in the same horizontal level in any one fluid, regardless of the shape or size of the containing vessel, is the same; for imagine a vessel with a horizontal bottom, all points of the fluid along this must have the same pressure, otherwise the fluid would flow; the pressure at any point at a level h centimeters above this bottom plane is less than that at the bottom by an amount ρgh—the same for all points in the plane. If, now, portions of the vessel are imagined removed, so as to leave a vessel of any shape, the pressure at the various points remains unaffected. The pressure on any portion of the containing walls varies with the depth; so the thrust outward on this portion is the resultant of a series of parallel forces, increasing from top to bottom; the point of application of this resultant is called the 'centre of pressure.' If the wall is a vertical rectangle, the centre of the pressure, due to gravity, for a liquid, is at a distance one-third the height from the bottom, etc.

ARCHIMEDES'S PRINCIPLE. If a solid is completely immersed in a fluid, the latter exerts on it pressures from all directions perpendicular to the elementary portions of the surface of the solid. These pressures will produce an upward force on the solid equal to the weight of the fluid displaced by it; because, if the space occupied by the solid were to be filled with the fluid, there would be equilibrium; and, as this substitution has not changed the pressures at the boundary surface of the volume formerly occupied by the solid, the resultant of these surface pressures must just balance the weight downward of the fluid. This buoyant force acting on the solid must then equal the weight of the fluid displaced by the solid and must have a vertical line of action passing through the centre of gravity of the displaced fluid. This is called 'Archimedes's principle.' The apparent loss in weight of a body immersed in water, the suspension of a balloon, etc., are illustrations of it. It evidently gives a method for comparing the density of a solid with that of a liquid; for the weight of a solid in a vacuum is ρgv, if ρ is the density of the solid and v its volume; and its apparent loss in weight when weighed suspended in the liquid is $\rho' gv$, if ρ' is the density of the liquid; both the weight and the loss in weight may be measured, and thus the ratio of ρ and ρ' determined.

FREE SURFACE WAVES. Liquids differ from gases in having definite volumes; consequently, as noted before, if a liquid is poured into an open vessel, it will have a surface in contact with the atmosphere. This is called the 'free surface.' If the liquid is an equilibrium, this surface must be at right angles to the forces acting on it.

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This principle evidently f

the comparison of the densities of two liquids which do not mix.

FLOTATION. If a body less dense than a liquid is immersed in the liquid and allowed to come to equilibrium, it will rise to the surface and 'float' with only part of its volume below the surface. By Archimedes's principle the upward force equals the weight of the liquid displaced; and, since the body does not move in a vertical direction, this force must equal the weight of the body itself. Therefore, a floating body displaces a volume of the liquid of weight equal to its own. The upward force acts through the centre of gravity of the space formerly occupied by the liquid displaced, while the downward force acts through the centre of gravity of the floating body. If the body is in equilibrium these two forces must have the same line of action, or the two centres of gravity must lie in the same vertical line. In most cases this equilibrium is stable, but it may be unstable, e.g. an oblong block set floating with its long direction vertical. The test of stability is to give the floating body a small displacement, i.e. tip it slightly, and to see if the forces acting on it tend to restore it to its previous position or to make it tip still further. See METACENTRE.

CAPILLARITY. Where the free surface of the liquid meets the wall it is not horizontal; and, when a tube of fine bore dips into a liquid, the free surface inside the tube is at a different level from that outside. These variations are said to be due to capillary action, and they may all be shown to be due to the fact that a liquid surface contracts so as to have the smallest area compatible with existing conditions.

The principle of Archimedes, discussed above, is attributed correctly to the philosopher of Syracuse; and many facts in regard to liquids were known to him and other scientists of antiquity. Galileo first stated the law of connecting tubes, and Pascal was the first to recognize the fact that the reaction of the walls produced a pressure which was the same at all points throughout the fluid. The ordinary statements and proofs of hydrostatics are given today exactly as they were by Stevinus (1548-1620). For further information, consult Greenhill, *Hydrostatics* (London, 1894).

HY'DROSULPHU'RIC ACID. See SULPHURETED HYDROGEN.

HY'DROTHER'APY, or **HYDROP'ATHY** (from Gk. ὕδωρ, *hydōr*, water + θεραπεία, *therapeia*, cure, from θεραπεύειν, *therapeucin*, to cure, from θεράπων, *therapōn*, attendant). Water treatment. The efficacy of water in the cure of numerous forms of disease has long been recognized. Water was largely employed by Hippocrates in the treatment of many kinds of disease. Horace speaks of Antonius Musa, the hydropathic physician of the Emperor Augustus (Epist. i. 15). Both Celsus and Galen speak favorably in their writings of the use of water in the cure of disease, regarding it as of high value in the treatment of acute complaints, particularly of fevers. Throughout the Middle Ages, likewise, many physicians, including Aëtius, Paulus Ægineta, and Paracelsus, were advocates of the remedial virtues of water; all of them, however, having faith in its uses in the treatment rather of acute than of chronic disorders. In 1723 Niccolò Lanzani, a Neapolitan physician, published a learned treatise on the subject. In England, about the beginning of the eighteenth century, Sir John Floyer and Dr. Baynard made large use of water. Their conjoint work, denominated *Psychrolousia*, or the "History of Cold Bathing, both Ancient and Modern," is replete with quaint learning and practical shrewdness and sagacity. But the most able and scientific among the older treatises that have appeared in England on the subject of the water treatment is the work of Dr. Currie, published in 1797, entitled *Medical Reports on the Effects of Water, Cold and Warm*, etc. In this work Currie recommends the cold affusion in typhus and other fevers, and gives practical directions in regard to the cases and the times when it may be used with advantage, although he appears to have limited his use of water to acute ailments exclusively.

We have thus seen that up to the beginning of the nineteenth century, by some of those who employed it as a curative agent, water was used in the treatment of acute, and by others of chronic, diseases; by some as an internal agent alone; by others as an external application in the various forms of the bath; but never in all the manners combined. This combination was first effected by the original genius of Vincent Priessnitz, a Silesian farmer, with whom began a new era for the water cure. It was owing, we are told, to his successful treatment of more than one bodily injury which he had sustained in his own person that, about the year 1820, Priessnitz became so convinced of the curative powers of water as to employ it medically in the cure of others. Beginning with the external application of water for trifling diseases among the poor of his neighborhood, he gradually undertook an extended range of cases, and multiplied the modes of administration, introducing the wet compress, the douche bath, partial baths of all kinds, the sweating process, the wet sheet, together with copious drinking of pure water. In addition to water in all these forms, he insisted on the value of exercise, diet, fresh air, and mental repose in the cure of disease, thus practically calling to his aid the entire resources of hygiene, and establishing by a simple, yet thoroughly original combination, nothing less than a new system of medical treatment. As to the success which attended Priessnitz's practice, it is an historical fact that of 7500 patients who had gone to Gräfenberg for advice and treatment up to the year 1841, or within the space of about twenty years, there had been only 39 deaths. It is to be regretted, however, that the founder of the new system was not himself an educated physician, so that he could have understood better the philosophy of his own practice and explained it more correctly. He would not have called his system the 'water cure,' a name scientifically one-sided and incomplete, and therefore misleading.

The undoubted merits of hydropathy at length called to its defense many men of standing in the profession, who, allowing for some of its early extravagances, explained it scientifically, and from their advocacy has sprung up a school of hydropathic physicians. Dr. Winternitz, of Germany, in 1883 laid down the scientific principles of modern hydrotherapy. The fundamental principles of hydrotherapy are very simple. The art of applying these principles requires much teaching, but any one with even moderate sense and intellect can grasp the essential features. Water

may be used either internally or externally. Internally it may be used simply to wash out a cavity—the nose, the mouth, the stomach, the bladder, or the rectum. In addition, it may be taken internally hot or cold and passed into the blood. It may be used hot in the rectum, as a simple enema, or for purposes of stimulation. Externally, water may be used in many conceivable ways, but essentially the use of water means with it the use of two very necessary aids, heat and cold. Hydrotherapy, apart from the use of heat and cold, is of secondary importance. The action of water in the treatment of disease is therefore largely mechanical. The psychical side is not unimportant. It has been used by enlightened physicians ever since the dawn of medicine, and its effects taught in all medical schools. Only the quack and the charlatan will claim that hydrotherapy is a cure-all. Eccentricities, like the Kneipp cure and others, are to be avoided by the sensible. Water acts physically and mechanically. It is capable of readily taking up heat and of giving it up; it thus lends itself most readily to the use of thermal agents. It may be used in gaseous form (steam), liquid form, or solid form (ice). The action of heat and cold are essentially important. Smooth muscle-fibre expands under the action of moderate heat and contracts under the influence of cold. Its contracting power may be destroyed by an excess of either. Cold and heat, therefore, act as irritants to the nervous system, and through their agency we can act upon all of the organs, to stimulate or depress their activities. The heart, lungs, kidneys, liver, spleen, skin, etc., may all be influenced; the body heat and the output of moisture and secretions may be regulated. Thus by the use of heat or cold to certain portions of the skin or internally, almost every organ in the body can be influenced through its blood-vessels, and the skilled physician can, by guiding and directing these effects, bring about changes in vascular states; can remove excess of blood from one part of the body and bring it to another; can impart tone to a flagging organ, as the heart, or to the muscles or to the spinal cord; can increase the secretions from organs, such as the skin or the kidneys, and thus assist in excreting poisonous products from the body.

The applications of water to disease are well systematized by Baruch as *ablution, affusion, sheet bath, drip sheet, compresses, wet pack, tub bath*, and *douche*.

Ablution. Simple application of water by the hand or moist cloth over the body. In fevers the abdomen, the back, the chest, the lower extremities as far as the knees are bathed successively every two or three hours. A temperature of 75° F. should be used at first, and gradually reduced to 60° F. Chilling is to be avoided. Reaction is to be gained, the superficial capillaries becoming suffused and the body assuming a pinkish hue. Rubbing should always be used in ablutions.

Affusion. The patient, with a cold wet cloth about the head, sits or stands in a tub containing about a foot of water at 100° F. A broad stream of water from a bucket or pitcher is poured with force directly over the body. The stimulation will depend upon the temperature of the water and its force of delivery. This is often used in states of profound prostration, in coma, and in stuporous, delirious states.

Sheet Bath. A rubber sheet is laid down over one-half of the bed. This is covered by a blanket. Then a linen sheet is dipped in water at a temperature of from 60 to 70° F., and while still wet is wrapped about the patient while he lies upon the blanket. The face is bathed in ice-water and the head covered with a wet towel. The nurse or attendant rubs the patient energetically over the body. As the body reacts and becomes warm, water at still lower temperatures may be sprayed over the sheet. Afterwards the patient may lie wrapped up in the blanket. This is an excellent method for reducing temperature in fevers, and is applicable in practically all acute diseases accompanied by high temperature.

Drip Sheet. The patient, standing in a tub of water at 100° F., has a wet sheet, wrung out, wrapped about him. He is then firmly rubbed until a reaction occurs. He may be slapped gently instead of being rubbed. This procedure forms an excellent tonic in nervous exhaustion, in the early stages of tuberculosis, and in chlorosis or anæmia.

Compresses. These consist of bands or squares of old linen to which flannel is attached and strings made to fasten the appliance about a part. The linen piece is usually wrung out of hot or cold water and applied to the part and wrapped about by the flannel to prevent evaporation. These compresses are valuable in sore throat, tonsilitis, rheumatism, pneumonia, sprains, etc. They should be renewed hourly in acute processes.

Wet Pack. This is similar to the sheet bath, save that the sheet covering the body is wrung dry and then the patient is rolled up completely in thick blankets. The air should be kept out by fixing the blanket very securely about the feet and neck. The wet pack is more useful in chronic cases. Friction is essential in the acute cases, in order to bring about quicker reaction; hence in these the sheet bath is usually preferred to the wet pack.

Tub Bath. A trained nurse should give this bath. See Typhoid Fever.

Douche. This apparatus throws a jet of water against the body from a hose, and is best given in a special institution devised for this work. Arrangement is made in the apparatus whereby the force of the jet and its temperature can be regulated.

Consult Baruch, *Principles and Practice of Hydrotherapy* (New York, 1900). See Bath; Typhoid Fever.

HY'DROTHO'RAX (Neo-Lat., from Gk. *ὑδωρ, hydōr*, water + *θώραξ, thōrax*, chest). The term applied to dropsical collections in the pleura (q.v.), a closed serous sac enveloping the lung on either side. When it exists to any extent, the pressure which it exerts on the lungs impedes the passage of the blood through them, and occasions difficulty of breathing, lividity of countenance, etc., and more or less dropsy in the face, ankles, etc., soon appears. The physical signs by which the disease can be detected are changes in the condition of the chest, as ascertained by auscultation, percussion, and succussion by the physician.

Hydrothorax may depend upon inflammation of the secreting membrane, or it may be a consequence of organic disease of the heart or lungs, liver, or kidneys. With regard to treatment, when the disease seems to depend upon inflammation

HYDROTROPISM (from Gk. *ὕδωρ*, *hydōr*, water + *τροπή*, *tropē*, a turning, from *τρέπειν*, *trepein*, to turn). The sensitiveness of certain plant organs to the presence of unequal moisture,

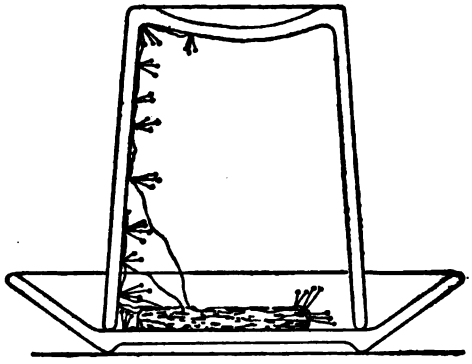


FIG. 1. NEGATIVE HYDROTROPISM.

Culture of the black mold on bread in a moist chamber. The hyphæ carrying the thread-like sporangia grown in such directions as to be as far as possible from the surfaces of bread and glass from which moisture is diffusing. Diagrammatic.

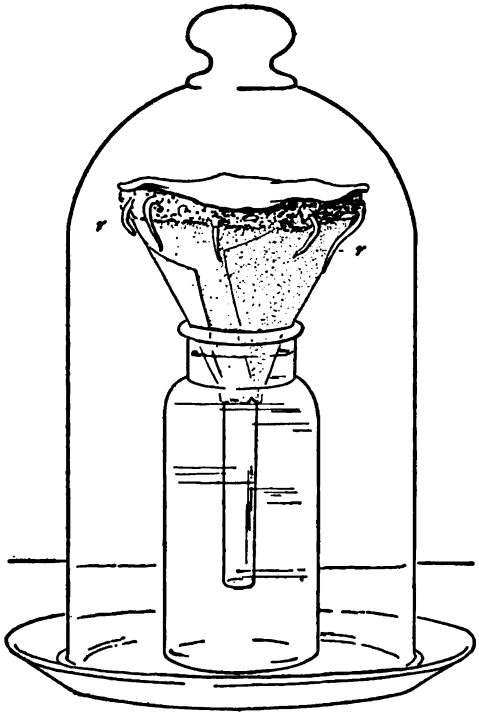


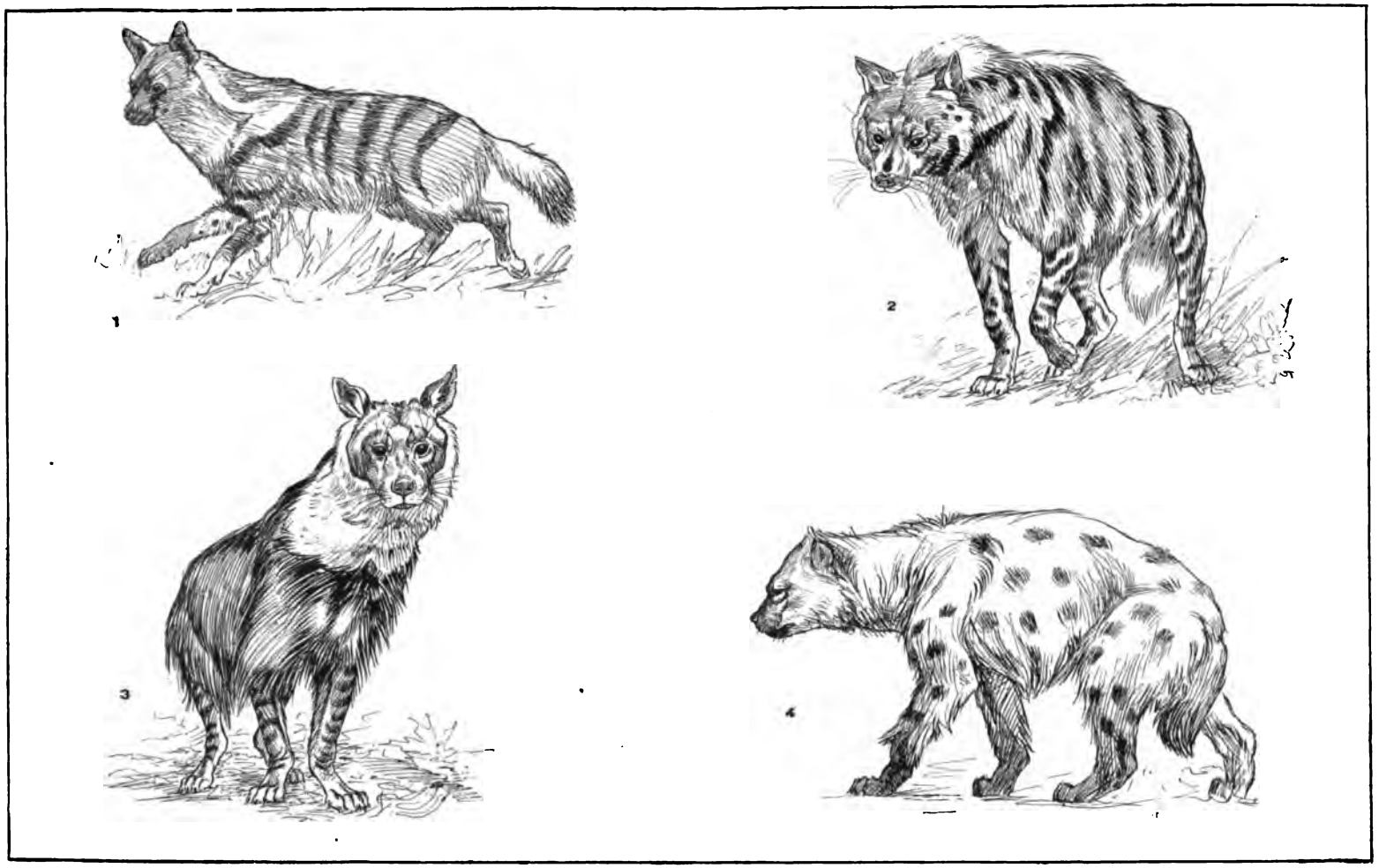
FIG. 2. POSITIVE HYDROTROPISM.

Grains of corn, planted in wet sand in a funnel whose outer surface is covered with wet blotting-paper, have germinated. The roots, *r*, instead of growing straight down, as they would do in saturated air, have applied themselves to the wet paper. Hydrotropism under these conditions overpowers geotropism.

which causes them to curve toward the source of moisture. Among the fungi hydrotropism is rise at right angles to it. If they start from a salient angle on the substratum (e.g. the edge of a slice of bread), they may take the position shown at Fig. 1, growing equidistant from the two moist surfaces. If they arise from a reentrant angle, they place themselves likewise so as to be as far away from each moist surface as possible. The roots of higher plants are also sensitive to moisture, the stimulus of which may exceed that of gravity, as shown in Fig. 2. Here roots of corn planted in the heaped-up sand have come over the edge of the glass funnel, and have started to grow downward in the moist air. As they get farther from the surface of the wet paper covering the outside of the funnel, they find drier and drier air. A stream of water particles, however, is reaching them from one side. At a certain point the stimulus of the diffusing moisture overcomes the geotropism (q.v.) and the root, growing more rapidly on one side, is directed toward the moist surface. When it comes into the neighborhood of the moist paper again the sides are less unequally stimulated, the stimulus of gravity reasserts itself, and the tip again grows downward. The alternating prevalence of hydrotropism and geotropism is shown in the wavy course of the longer roots. It will be observed that the more rapid growth which directs the tip toward the moist surface is not due merely to the absorption of water, for it occurs on the drier side of the root. Hydrotropism is a form of chemotropism (q.v.).

HY'DROZO'A (Neo-Lat. nom. pl., from Gk. *ὕδωρ*, *hydōr*, water + *ζῷον*, *zōon*, animal). A class of Cœlenterata in which the simplest form of the body, as in the polyps, is a sac attached by its posterior end, and with a digestive cavity communicating with the exterior by a mouth only. The mouth is surrounded by hollow tentacles. The body is composed of two cellular layers, the ectoderm and endoderm, separated by a gelatinous, non-cellular 'mesoglœa.' The body is usually differentiated into two sorts of zooids, i.e. 'polyps' or nutritive zoöids, which are usually sexless, and 'medusæ,' or reproductive zoöids. The latter produce medusa buds, which on being set free are called medusæ, and are bisexual. In these medusæ the body is greatly more complicated than in the polyps, being bell or umbrella shaped, with a well-developed nervous system, composed of a thread-ring around the eye of the disk and with ganglia near the 'eyes' or sense organs. The digestive cavity is differentiated into a central and a peripheral portion, the latter forming radial and circular canals. The eggs and sperm are discharged externally, and fertilization of the egg takes place in the sea. Nettling organs (see NEMATOCYST) are usually present; they arise from some of the interstitial cells, and are most abundant in the tentacles. Many Hydrozoa (Hydra and Hydractinia excepted) exhibit the phenomenon of alternation of generations (q.v.). The asexual polyps give rise to buds which develop into medusæ, and the latter lay the eggs from which are hatched the polyps. The medusæ are more or less phosphorescent. They abound in all seas, while Hydra is a minute fresh-water form. Very primitive

HYENAS AND PROTELES



1. AARD WOLF (Proteles Lalandie).
2. STRIPED HYENA (Hyæna striata).
3. BROWN HYENA (Hyæna brunnea).
4. SPOTTED HYENA (Hyæna crocuta).

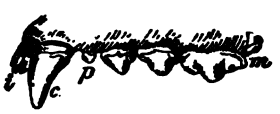
fresh-water forms are Protohydra and Microhydra, which are without tentacles.

The Hydrozoa are grouped in four orders: (1) *Leptolinæ*, having a fixed zoöphyte or polyp stage, and the sense organs exclusively ectodermal (Anthomedusæ and Leptomedusæ); (2) *Trachylinæ*, having no fixed zoöphyte stage, all being locomotive medusæ (Trachymedusæ and Narcomedusæ); (3) *Hydracorallina*, coral-making polyps (Millepora and Stylaster); (4) *Siphonophora*, pelagic hydrozoans in polymorphic colonies; (5) *Graptolithoidea*, an extinct Paleozoic group, related to (6) the *Hydromedusæ*. The Hydromedusæ are a very heterogeneous assemblage of polyp and medusa forms, arranged in several families. In some species we find only hydroids, in others only medusæ; but in many the hydroids and medusæ are alternate generations of a common stock.

Of the orders above mentioned, the Hydrocorallinæ and Graptolithoidea are of importance to the geologist, for they contain fossils of considerable interest. (See STROMATOPORA, and GRAPTOLITE.) Fossil representatives of the Scyphomedusæ are rare, but have been described from Cambrian, Jurassic, and other formations.

Consult: Parker and Haswell, *Text-Book of Zoölogy* (London and New York, 1897); Huxley, *The Oceanic Hydrozoa* (London, 1859); Fowler, "The Hydromedusidæ and the Scyphomedusidæ," in Lankester's *Treatise on Zoölogy*, part ii. (London, 1900). See CORAL; CTENOPHORA; HYDRA; HYDROID; JELLYFISH; MEDUSÆ; POLYP; SIPHONOPHORA; etc.

HYENA, hī-ē'nȧ (Lat. *hyæna*, from Gk. ὕαινα, *hyaina*, hyena, from ὗς, *hys*, hog, Lat. *sus*, AS., OHG. *sū*, Ger. *Sau*, Eng. *sow*, Av. *hu*, pig; connected either with Skt. *sū*, to bear, or with Skt. *sūkara*, swine, *sū*, maker, so called from the grunt). One of a family (Hyænidæ) of carnivorous animals remarkable for their generalized structure, which unites features characteristic of the cats, the civets, and the dogs. Their dentition is calculated for great tearing and crushing power, and includes six incisors and two canine teeth in each jaw, five molars on each side of the upper jaw, and four in the under. This dentition and other features place them between the dogs and the civets, with the latter of which they are connected by Proteles. (See AARD-WOLF.) They seize an object with so firm a hold that among Arabs they are proverbial for obstinacy. The vertebræ of the neck sometimes become anchylosed in old hyenas. In size they equal the largest dogs. The hind quarters are lower and weaker than the fore quarters of the body, so that hyenas move with a shambling gait. The body is covered with long coarse hair, forming a mane along the neck and back. The feet have each four toes. The claws are strong, fit for digging, and not retractile. The tail is short. Beneath the anus is a deep glandular pouch, contributing much to the offensive odor which is one of their many disagreeable characteristics. Hyenas eat carrion as well as newly killed prey, and are of much use, like vultures, as scavengers, clearing away the last remnants of carcasses. They sometimes attack cattle, especially if they flee, but rarely man, though they sometimes seize children. Selous gives surprising instances of their boldness and strength in East Africa. During the day they hide themselves in caves, old rock tombs, and ruined edifices; by night they roam singly or in packs. They prowl about towns and villages, and often dig up corpses that have not been deeply buried. This, together with their aspect and manners, has caused them to be generally regarded with horror, and very exaggerated accounts of their fierceness have been prevalent. Instead of being untamable, as was long the popular belief, they are capable of being completely tamed, and show an attachment to man similar to that of the dog; they have even been used as watch-dogs. Hyenas are found only in Africa and in South-Central Asia.



DENTITION OF HYENA.
i, incisors; *c*, canine; *p*, premolars; *m*, molars.

The most typical and at the same time familiar form is the striped hyena (*Hyæna striata*), which ranges from Abyssinia and the Libyan Desert eastward to India, where it is common throughout all the more open country, roaming widely at night in search of carrion, or living sheep and dogs. It is dirty gray, with narrow tawny or zebra-like stripes, a coarse mane along the back, and a bushy tail. It is cowardly, silent, and both hated and feared by the rural people. Two other species are exclusively African, and differ much from the striped, so that some naturalists put them in another genus (Crocuta). The spotted hyena (*Hyæna crocuta*) is larger than either of the others, and is yellowish, thickly spotted with black, and the nose and feet are also dark. It inhabits nearly all Africa south of the Sahara, hunts in packs, is courageous, and really does most of the ravaging it is accused of. Its unearthly coughing cry is one of the most terrifying of animal utterances. Owing to the peculiar arrangement of the reproductive organs in this species, it is extremely difficult, except by careful examination, to distinguish the sexes by external characters, and from this fact the old myth that hyenas are hermaphrodites has doubtless arisen.

Between these two stands the brown hyena (*Hyæna brunnea*), found on both sides of Southern Africa near the coast, and often on the mountains. It is a less repulsive looking animal than the others; has a dog-like mantle of long brown hair which half conceals its barred legs, and becomes white on the sides of the head and chest, giving a quaint appearance to the front view, since the face itself is black, while the tall ears are gray.

The hyena family, of comparatively recent origin, appears to have evolved from the Viverridæ, through such intermediate genus as Ictitherium of the Lower Pliocene of Southern Europe. That Ictitherium ate bones in the same manner as do the modern hyenas has been proved by the nature of the coprolites found associated with their skeletons. True hyenas are common fossils in the Pliocene and Pleistocene deposits of Europe, during which periods they roamed in abundance as far north as France and England, as is exhibited by their remains in cave floors; and they are known in deposits of similar age in Asia. None have been found in America.

Consult: Blanford, *Fauna of British India: Mammals* (London, 1888-91); *Zoölogy of Abyssinia* (London, 1870); and the writings of sportsmen-travelers in Africa and India. See Plate of HYENAS.

HYENA DOG. See HUNTING DOG.

HYÈRES, ē'ār'. A town in the Department of Var, France, three miles from the Mediterranean and eight miles east of Toulon (Map: France, N 8). It is a fashionable winter resort picturesquely situated on the southern slope of a castle-crowned hill 670 feet high, in a district noted for its mild climate, sheltered location, and luxuriant vegetation. Its chief buildings are the restored twelfth-century cathedral Church of Saint Louis, the hôtel de ville, public library, and museum. There is a considerable export trade in flowers, fruits, cork, and salt, the extensive salt marshes in the vicinity yielding over 20,000 tons annually. The neighborhood has the remains of a Roman town. In mediæval times, as Hiedera, Hyères was a favored port of call for Oriental pilgrims, and as late as the fourteenth century was of greater importance than Toulon. Population, in 1901, 17,659.

HYGEIA, hī-jē'yȧ (Lat., from Gk. *Ὑγίεια, Hygieia, Ὑγεία, Hygeia*, health, from *ὑγιής, hygiēs*, healthful; connected with Skt. *ugra*, mighty). In the ordinary tradition, the goddess of health, daughter of Asclepius, and honored with him at Athens, Epidaurus, Sicyon, Corinth, Titane, and elsewhere. She was joined with the god of healing, Amphiaraus, at Oropus, and on the Acropolis at Athens was an ancient cult of Athena Hygeia, to whom a statue and altar were erected after the great plague, and before the introduction of the worship of Asclepius in Athens. In the art of the fifth and fourth centuries B.C., Hygeia is represented as a maiden, but of the fully developed and vigorous type, while later her form is more youthful and girlish. She is represented in company with her father, or sometimes alone, with the snake by her side or drinking from the patera in her hand. Hygeia seems to be an originally independent divinity, but later came into connection with various deities who had become associated with the cure of disease.

HYGIENE, hī'jī-ēn (from Fr. *hygiène*, from Gk. *ὑγιαίνειν, hygiainein*, to be healthy, from *ὑγιής, hygiēs*, healthy). The branch of medical science which deals with the preservation of health. Within its scope are all measures taken for the acquisition and preservation of health, except those involving purely medical and surgical means. Hygienic measures were a part of religious observance among the Jews, as well as among the people of Assyria and India, and their enforcement lay with the priests. Among the Greeks these duties were transferred to the physicians. Hippocrates's work on *Air, Water, and Places* was largely responsible for this change. (See HIPPOCRATES.) In the twenty-second book of Homer's *Odyssey* there is an account of the sanitary precautions taken by Ulysses after the killing of the wooers. The place of slaughter was cleansed and disinfected by scraping and washing, and by burning sulphur. Little attention appears to have been paid to the infected individual in the olden time, when the panic ensuing upon a plague caused expulsion or expatriation of the sufferers. Laws were framed to protect the public from lepers, for example, by expelling them and burning their houses. In 1423 Venice established its first lazaretto, and in 1485 a permanent health magistracy was created in that city. In 1532 an act of Parliament authorized in England the issue of commissions of sewers for "the overlooking of sea banks and sea walls, and the cleansing of rivers, public streams, and ditches." In 1552 Shakespeare's father was fined for throwing filth into the street, and again in 1558 for not keeping his gutter clean.

Roman law provided no protection for the individual. Greek and Latin writers treated of diet and exercise for the patrons of literature, for princes, and for the wealthy. From the school of Salernum, about the twelfth century, issued the *Code of Health*, which was printed in 1480, and for two centuries thereafter remained the standard work on personal hygiene. Despite the stringent laws seeking to prevent plague which were enacted by James I., and the establishment of lazarettos into which ships discharged their cargoes for detention and airing, serious outbreaks of the dread disease occurred in 1625 and 1629-31. In 1665, according to Macaulay's estimate, the number of deaths from plague during one period of six months reached more than 100,000.

At the close of the eighteenth century little advance had been made in hygienic knowledge beyond the discovery by Woodhall, in 1617, that scurvy was prevented by the use of lemon-juice; the discovery by Morton, in 1697, that foul air produced disease in some way; and the introduction from China into England in 1717 of inoculation with smallpox virus by Lady Mary Wortley Montagu. Differentiation of fevers began early in the nineteenth century. Following the cholera epidemic in London of 1831-32, newly awakened interest resulted in the formation in 1838 of a system of registration of deaths in that city. The establishment of the fact of water-borne diseases was made by the investigations of Dr. John Snow into the cholera outbreak in London, in 1848-49. From this date investigation has been systematically pursued into the causes of death; the causes of disease, its spread, and the agencies that produce it; and into the conditions that promote health. The use of the microscope, the study of bacteriology, of pathology, of the chemistry of food, of climate, and of exercise have all added to the knowledge that has increased the useful application of hygienic principles in our day. Sanitary laws have been enacted which control unhealthful agencies and aim to safeguard and regulate commercial as well as domestic relations.

Hygiene may be variously classified, according to its relations, and the objects in view. There is the hygiene of the individual, of the family, and of the municipality or State; which may be denominated personal, domestic, and public hygiene.

PERSONAL HYGIENE. This includes the study of (1) *Food*, including water and beverages. Food should be adapted to the season of the year, the age, occupation, and the condition of health of the individual. An increase in the quantity of fruit and of water, a greater proportion of vegetables and smaller meals are desirable in hot weather, while an increase in meat and in cereals

is desirable in cold weather. Infants require principally milk, with the proportions of proteids, fats, and sugar graded according to age and digestive capacity. Older children require small quantities of meats, cereals, fruits, and vegetables. In regard to occupation, it may be said in general that active laboring men, like carpenters, wheelwrights, and farmers, may partake of food which takes a considerable time to digest, with more advantage than sedentary men may. Pork and corn-cake or bread is a nutritious and sustaining diet to an active laborer, but should not form the habitual diet of a sedentary person. (See DIET, paragraph *Diet in Disease;* see also FOOD.) The investigation of water-supply, examination for noxious ingredients or medicinal properties in drinking-water, as well as directions for its use, come within the province of hygiene, as does also the use of coffee and tea, which are both stimulating drugs, causing in some persons overaction of the heart, cerebral activity resulting in insomnia, and indigestion; of cocoa, which is slightly stimulating, but contains food; of wine, beer, and distilled liquors, all of which are drugs in the eyes of the physician and the sanitarian, to be used with accurate calculation of their nutrient and stimulant properties. (See ALCOHOL; BEER; WINE.) (2) *Clothing* should be suited to the temperature, the age, and the occupation. Ventilation as well as materials—wool, cotton, linen, and silk—must be considered. (3) *Work and Exercise* are necessary for every one. Regular physical activity is essential to proper development, and to the maintenance of normal action of the vital organs, and the repair of tissue. Even those who are confined to bed by disease need exercise, which is secured by passive motion or massage. (See GYMNASTICS; EXERCISE; MASSAGE.) To work must be joined the consideration of rest and sleep, which should be enjoyed at regular intervals, and in quantities proportioned to individual conditions and occupations. (See SLEEP.) (4) *Personal Cleanliness* includes regular evacuations of the bowels daily; daily bathing, securing constant removal of perspiration; care of the hair and scalp, and care of the nostrils, of the cavity of the mouth and teeth, of the genitals, and of the anal orifice. (5) *Special Habits* which tend to undermine health should be controlled; the use of tobacco, of other narcotics, and of stimulants should receive consideration. Tobacco should never be used before the age of twenty-one or twenty-two years has been reached, and should rarely be used by neurasthenics. In certain diseases, as Bright's disease and syphilis, and certain conditions of the heart, tobacco is pernicious. All other narcotics are distinctly deleterious, and should be forbidden. (6) *Control of Sexual and Other Passions* has much to do with personal health. Indulgence in masturbation by the young delays development, and in a vast majority of cases causes mental enfeeblement. Excessive sexual intercourse has a similar effect, with greater disaster to the male. Perhaps the most undermining of normal mental activities are anger and grief, and these should be avoided or limited. The thoughts should be calm, and mental exercise, as well as physical, should be regularly taken. Mental indolence leads more often to mental disorder than does mental overwork.

DOMESTIC HYGIENE. This includes the study of (1) *The Management of Infancy*, (2) *Preparation of Food*, with regulation of meals, as well as supervision of cooking, and (3) the *Hygiene of the Sick-Room*, including removal of dust-catching furnishings, regulation of heat, light, and ventilation, provision of utensils which may be sterilized, care of bedding and bed-linen, and arrangements for proper bathing and nursing. Besides these subdivisions, others might be made which would duplicate some of the titles more properly assigned to personal or public hygiene; such as *air*, and *hygiene of the school*.

PUBLIC HYGIENE. This comprises care of the surroundings of man, as well as prevention of disease, and disposal of the dead; and therefore includes a consideration of: (1) *Climate*, as one of the agencies active in man's environment, is used as an elastic term to embrace the range of temperature of a locality, the prevailing winds, the rainfall, the vegetation, and the soil. (2) the *Soil under Dwellings*, with reference to possibilities of drainage-proximity to underground water, etc. (3) The *Character of Dwellings*, especially tenements, as to ventilation, and air-space, position, and materials used in construction, and provision for regulating temperature, water-supply and drainage. (4) *Cleansing of Dwellings* and *Disposal of Refuse*. (5) *Cleansing of Streets* in towns. One of the most important questions of public hygiene is the cleaning of streets, and matters connected therewith. Filthy streets are productive of disease not only by the generation of poisonous gases, but also the dust which results from the long-continued trituration of excrementitious and decaying substances is extremely injurious to the mucous membrane of the air-passages, and productive of contamination to blood and tissue. The habit of casting the sweepings of houses and stores upon the sidewalks, especially during the hours in which pedestrians are passing, is a greater evil than many suppose. The dust of these places is often of the most objectionable character, containing the germs of contagion, and there is no doubt that many 'filth diseases' (q.v.) are propagated in this manner. (6) *Regulation of Public Conveyances*. Public conveyances are frequent causes of disease from various sources. The dust which is allowed to collect in street cars, and also ordinary steam railway cars, is of itself a frequent cause of diseases of the air-passages; but compared to the evils which result from overcrowding and bad ventilation, it is of minor importance. Pneumonia, pleurisy, bronchitis, and laryngitis are frequent results of street-car exposure. But one of their greatest evils, and one not yet sufficiently recognized by the public, although well known to the medical profession, is the want of attention paid to the smoothness of the track and the springs of the cars. On street cars undue jarring should not be permitted. When they are properly supplied with springs, and when wheels that are flattened are promptly replaced, all injurious vibrations will be avoided. (7) *Control of Air-spaces in Public Buildings*, such as hospitals, asylums, orphanages, lecture-rooms, theatres, school-houses, etc. The vitiation of air due to impurities added to it by respiration is a subject of great moment. Following are figures showing the difference in the proportion of the constituents of the percentages of expired air and of ordinary air:

Carbon dioxide.....	0.04	4.41

From these figures it is seen that expired air contains over one hundred times more carbon dioxide and nearly 5 per cent. less oxygen than ordinary atmospheric air. Experiments have shown that the average adult emits with each expiration 22 cubic inches of air; or, assuming 18 respirations a minute, 570,240 cubic inches or 330 cubic feet of air in 24 hours. In this total of expired air there is 14.52 cubic feet of carbon dioxide. This amount is increased with increase of physical activity. The figures of De Chaumont, which are generally accepted, show that there is 0.6 part of carbon dioxide per 1000 in the air of a closed and occupied space, or 0.2 part in excess of that in ordinary atmosphere. Burning of coal or illuminating gas adds to the impurity, and hence ventilation is essential. In public buildings, such as those named, there should be three cubic feet of space per person in each room, after deducting from the total room-space the amount occupied by furniture and the bodies of the persons. (8) *Prevention of Disease.* This is a very large topic, and necessarily bears close relation with personal as well as domestic hygiene. It includes notification of diseases to a health officer; most of the activities of municipal departments of health (see HEALTH, BOARDS OF); control of streets and houses, and disposal of refuse (see DISINFECTANTS); control of disease entering our ports (see QUARANTINE); prophylaxis of special kinds against spread of disease (see ANTITOXIN; SERUM THERAPY; VACCINATION); cleansing of public vehicles, to which reference has been made, etc. Overcrowded and dark tenements are the most frequent causes of the spread of disease in a community. They keep alive the diseases of childhood—measles, scarlet fever, diphtheria, etc.—and are the most frequent hiding-places for the germs of tuberculosis. (9) *Disposal of the Dead* is regulated by sanitary laws, which provide, in cities, that undertakers shall obtain permits for removal of dead bodies, and proper disposition shall be made of them by burial or cremation. Public funerals in the case of contagious diseases are often forbidden, and hermetically sealed caskets are enjoined in such cases by many municipalities.

MENTAL AND PHYSICAL HYGIENE. To regard the matter from another view-point, hygiene may be also divided into mental and physical. The former will necessarily include many questions that belong to the latter, for the healthy action of the mind depends to a great extent upon the health of the body. A sufficient amount of sleep ought to be taken to refresh the powers of the mind, as well as those of the body, and that sleep ought not to be much disturbed by dreams. Of course there are those whose occupation demands varied, sometimes excessive exertion, and who must be 'a law unto themselves.' The great time for practically applying the laws of mental hygiene is during the years of childhood and youth. The method of teaching the child should be of the simplest, as well as of the most comprehensive character, and the periods should be frequent during which its mind is completely relieved of all serious study, and allowed to come

studies should not be required, so that hours which should be given to recreation or sleep will not be occupied with laborious efforts of study, which often do little more than produce a disturbed and unrefreshing sleep, and pervert or destroy the appetite for wholesome food. In the matter of school hygiene, great importance is attached to the amount, arrangement, and distribution of light in the class-rooms; the construction of the seats and desks; the type and paper used in making the text-books, etc. Carelessness in these matters is known to be one of the most fruitful sources of imperfect sight, such as myopia, as well as of various deformities, especially spinal curvature.

MILITARY HYGIENE. This term is applied to the sanitary care of the soldier in camp and garrison, and while on the field. Military hygiene embraces a consideration of: (1) *The Selection of the Recruit*, his exercise and training, his general development, and his mental and moral education. (2) *The March in Campaign;* the work done on the march, the equipment, rests, use of fluids, mental occupation, accidents, strain, and the general health of the troops. (See MARCHING.) (3) *Water for Drinking*, its purification and protection. (See ENCAMPMENT.) (4) *The Ration:* its choice, amount, and variety; cooking of meals, disease as related to food, emergency or reserve ration, and travel ration. (See RATION.) (5) *Military Clothing and Equipment* (see UNIFORM, MILITARY); head-covering, underclothing, disposition of the equipment. (6) *Camp Sites, and Camps*, with attention to soil, vegetation, shelter, and area, and their sanitary administration. (See ENCAMPMENT.) (7) *Posts, Barracks, and Hospitals.* (See HOSPITALS, par. *Military.*) (8) *Ventilation, Heating, and Lighting.* (9) *Disposal of Excreta and Waste.* (10) *Personal Cleanliness of the Soldier.* (11) *The Soldier's Diseases and Mortality.* (12) *Disinfection.* (13) *The Habits of the Soldier as Affecting His Efficiency.* (14) *Climate, and Life on a Troop-Ship.* (15) *Disposal of the Dead.*

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HYGIENE OF FOOD. See FOOD.

HYGI'NUS, GAIUS JULIUS. A Latin author. He is generally supposed to have been a native of Spain, though some writers claim that he was born in Alexandria, Egypt, and that he came to Rome with Julius Cæsar when a mere child. He is known to have been a favorite with Augustus, who made him chief librarian in the new Palatine Library. He was a voluminous writer on many subjects, including biography, agriculture, bee-keeping, and military arts, as well as comments on the poems of Vergil and Cinna. These have all been lost. There are also two works still in existence that are assigned to him, one, a textbook on mythology, entitled *Fabularum Liber,*

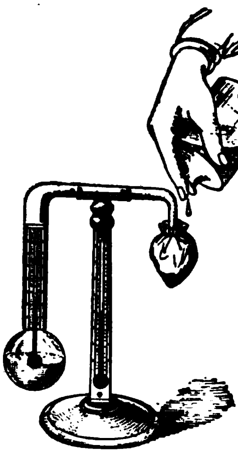
little value now. The *Fabulæ* are edited by Schmidt (Jena, 1872), and the *Astronomica* by Bunte (Leipzig, 1875). Another Hyginus, known as *Gromaticus,* lived probably in the second century, and wrote a work on surveying; edited by Gemoll (Leipzig, 1879).

HYGI'NUS, Saint. Pope, or Bishop of Rome, about the middle of the second century, possibly 137-141. Very little is known about him.

HYGROM'ETER (from Gk. ὑγρός, *hygros,* moist + μέτρον, *metron,* measure). An instrument for measuring the quantity of moisture in the atmosphere. In addition to the gases of which it is composed, the air contains the vapor of water, which is invisible except when it is condensed in the form of fog or cloud. The amount of this aqueous vapor varies greatly, and depends chiefly on the temperature, being at a minimum on cold days, and on warm days forming as much as one-fiftieth part of the air. This vapor has a certain tension or pressure depending upon the temperature, and when the latter is sufficiently reduced condensation takes place and dew is formed. The temperature at which the air contains a maximum of moisture for a given pressure is called the temperature of saturation for that pressure, and if the temperature is reduced below this point condensation takes place. The temperature at which condensation occurs is known as the dew-point (see Dew) temperature. The less moisture the air contains the lower will be the dew-point, and when this is ascertained experimentally, we can use it to determine the pressure of the vapor at that temperature, as the pressure of water-vapor and its relation to temperature has formed the subject of extensive and elaborate experimental researches that are now embodied in carefully prepared tables. It is known that the quantity of water contained in the air varies directly (or nearly) as the vapor pressure, consequently a ratio between the vapor pressures at an observed temperature, and at the temperature of condensation for the atmospheric condition at the time of observation, would give the relative humidity. It is in terms of relative humidity that the amount of moisture in the atmosphere is expressed in the daily weather reports, and the chief function of the hygrometer is to afford such data as will enable us to determine this quantity.

Hygrometers can be divided into several classes. There are those in which use is made of the property of certain substances of altering their dimensions or weight upon absorbing moisture from the air. Of this class the most used are those in which a hair expands and contracts according as the air is more or less moist, and moves a pointer or index over a scale, and indicates relative humidity direct. This form was invented by Saussure, the Swiss physicist, and a somewhat similar instrument was devised by Deluc in which a strip of whalebone was employed. The instruments are known as hygroscopes, and may be used indoors or where only an approximate reading is desired. Another class of hygrometers is based on the principle that certain chemicals will absorb moisture, and the amount thus abstracted from a given volume ture are termed, through which air is forced by means of an aspirator or other device. The substances which may be used for this purpose are strong sulphuric acid in pumice-stone, calcium chloride, phosphoric acid, and potassium or sodium oxide. The amount of moisture is determined by the increase in weight. The class most generally used, however, includes apparatus where the temperature is reduced until condensation takes place, or this temperature can be determined from the temperature of evaporation. Knowing the dew-point for a given condition of the atmosphere, the other data can be readily ascertained.

The Daniell hygrometer, which figures extensively in the earlier works on physics and meteorology, consists of two bulbs connected by a bent tube, as represented in the figure, and inclosing a thermometer together with some ether, and vapor of ether, the air having been expelled before the tube was sealed. One bulb is either blackened or coated with metal, while the other is covered with muslin. The observer's hand is placed for a short time on the muslin-covered bulb to drive the ether into the opposite bulb, leaving the first bulb and the tube filled with the vapor of ether. A little ether is then dropped from the bottle on the muslin-covered bulb; evaporation instantly takes place, and the temperature is reduced, thus condensing the vapor inside; a fresh evaporation from the other bulb fills the vacuum, and the vapor is again condensed by dropping more ether on the muslin covering, the process being repeated until the temperature of the bulb containing the thermometer is so reduced by successive evaporations (see Evaporation) that *dew* begins to be formed on the outside of the bulb. At the instant this occurs, the height of the mercury in the two thermometers is accurately noted, the one giving the dew-point temperature, and the other the temperature of the air. There are other forms of dew-point apparatus, all depending upon this same principle, and the hygrometer of Regnault was devised to remedy some of the defects of the Daniell apparatus. In this instrument a current of air is used to increase the evaporation of the ether, and instead of a glass tube and bulb there is a brightly polished thimble of silver at the base of one of the thermometers, which contains the ether. The air bubbles through the liquid, and the rate of evaporation becomes much more rapid. Knowing the dew-point, a reference to the table will furnish the pressure of aqueous vapor at that temperature, and other tables or the appli-



DANIELL HYGROMETER.

cation of a formula will give the amount of moisture in a given quantity of air.

Instead of the dew-point apparatus, the wet and dry bulb thermometers, or psychrometer, is now generally employed in making ordinary observations, especially by meteorologists. The instrument consists of two ordinary thermometers—one has its bulb bare, and thus shows the temperature of the air, while the other has its bulb covered with muslin which is kept wet with water. The thermometers are often so united that they can be rapidly revolved in order that the wet bulb may be exposed to a constant current of air. In the illustration is shown the sling psychrometer issued by the United States Weather Bureau, where the thermometers are mounted in such a manner that they can be whirled about the hand of the observer. The evaporation from the muslin and the consequent cooling of the bulb being proportional to the dryness of the air, the difference between the readings of the two thermometers is greatest when the air is driest, and zero when it is completely saturated. The readings of the psychrometer and the dew-point apparatus at the same time have been carefully compared, and it has been ascertained that the vapor pressure at the dew-point of air is equal to the vapor pressure corresponding to the temperature of the wet-bulb thermometer minus the number .011, multiplied by the difference in degrees between the dry and wet bulb thermometers. This rule is stated as applying when the psychrometer is whirled, and when the pressure of the barometer is equal to 30 inches. From the difference in readings between the thermometers the vapor pressure can be calculated by formulas which, with certain modifications, are based on those used by Regnault.

U. S. WEATHER BUREAU SLING PSYCHROMETER.

Ferrel's formula, used by the United States Weather Bureau in calculating its tables, is as follows:

Let p = vapor pressure of saturation at dew-point temperature.
p' = vapor pressure of saturation at wet-bulb temperature.
P = barometric pressure, taken as 29.4 in computing the tables.
t = reading of dry thermometer.
t' = reading of wet thermometer.

then for dew points below 32°

$$p = p' - .000360\ P\ (t - t')\ (1 + .00065\ t')$$

and for dew points above 32°

$$p = p' - .000367\ P\ (t - t')\left(1 + \frac{t - t'}{1571}\right)$$

In practice, however, it is usual merely to take the difference between the wet and dry bulb thermometers, and refer at once to the tables, which will give the relative humidity, the amount of moisture in a given quantity of air, and other desired data. These tables and full directions for practical hygrometry are contained in the publications of the United States Weather Bureau, to which the reader is referred for further information, while nearly all the larger treatises on physics contain satisfactory treatment of the subject. Consult also Preston, *Theory of Heat* (New York, 1894). See HUMIDITY.

HY'GROPHYTES (from Gk. *ὑγρός, hygros*, moist + *φυτόν, phyton*, plant). Plants which grow naturally in regions where the atmosphere is moist. Hygrophytes differ from hydrophytes in that they are not necessarily associated with water in the liquid state. Hygrophytic leaves show a number of peculiarities in contrast with xerophytic leaves. For example, hygrophytic leaves do not suffer, but rather thrive, in very moist atmospheric conditions. The leaves themselves are also easily moistened. This type of leaf is very characteristic of the tropical rainy forests. Xerophytic leaves, in contrast with hygrophytic leaves, are not readily moistened, and commonly die if subjected to a moist atmosphere. See HYDROPHYTE.

HY'GROSCOPE. See HYGROMETER.

HYKSOS, hĭk'sŏz. The name of a dynasty of Egyptian Kings, who are known also as the Shepherd Kings. Manetho, of whose annals an excerpt is preserved in Josephus, narrates that foreign conquerors from Asia took possession of Egypt who were called Hykussos. This name seems to mean 'foreign kings' (*hyku-khesou*); the explanation, based on the mutilated form Hyksos and interpreting *sos* as Egyptian *shŏs*, 'shepherd,' although attributed to Manetho, seems to have originated at a later time. Consequently, we have in this no basis for determining the nationality of those foreigners, 'of unknown race,' as Manetho says. Usually, historians, following this later etymology and the insertion in Manetho ("they are said to have been Phœnicians or Arabs"), consider them as nomadic Semites, either Arabs or Canaanites, recently settled in Palestine. Others have supposed them to be Turanians, thinking that they found Mongolian features on statues which were for a long time attributed to the Hyk(us)sos, but are now generally recognized as belonging to an earlier period. Nothing positive can be said as to the origin of this people; it is only known that the conquerors had first founded an empire in Syria (coming from the north from Asia Minor?) before conquering Egypt. This explains why many Semites came thither along with them and, later, under their rule. The date of their conquest is doubtful. From the confused extracts from Manetho, they would seem to have formed Dynasties Fifteen and Sixteen, lasting 259 and 251 years, respectively, and would thus have begun about 2100 B.C. But Dynasty Sixteen seems to be an erroneous repetition, so that only Dynasty Fifteen with six (?) kings remains, and for these 250 years are certainly too much. Taking into consideration the recently discovered Sothiac date for Dynasty Twelve, not much more than a century would remain for them, and therefore the invasion of the foreigners ought to be placed at about 1700 B.C. The reports of the cruelties and devastations, which, according to Egyptian tradition, accompanied the conquest, are untrustworthy. In one point, however, the traditional account has been confirmed; the invaders built a strong fortress on the northeastern frontier of the delta, in the

Sethroite nome, called Avaris (Egyptian, *Hatwaret*), and placed in it a strong garrison to secure the connection between the Syrian and Egyptian provinces. The conquerors soon adapted themselves to Egyptian manners, leaving probably the old administration untouched, and the Kings assumed Egyptian names. Three or four of these royal names have been found on the monuments. The six Kings of this dynasty were: Salatis or Saites; Beon (possibly Kheyân of the monuments); Apophis I. or Apachnan (hieroglyphic *Apopi a-qnan*); Apophis (*Apopi a-user-rê*), who seems to have been misplaced by Manetho and to belong to the end of the series, after Iannas and Archles (or Asses?). Perhaps these last two names are merely corrupt repetitions of the preceding. The second Apophis reigned for at least thirty-three years, as the mathematical papyrus of London written in his reign attests; for the other Kings we have only the corrupt Manethonian dates (nineteen, fourteen, thirty-nine years, etc.). These Kings resided in Memphis, Avaris, and Heliopolis (?), having the Delta under their direct administration, and leaving the country above Memphis to tributary princes of the old nobility. This proved fatal to their dominion, for the vassal Prince of Thebes soon felt strong enough to rebel against his sovereign. A popular tale (Papyrus Sallier I.) gives a fanciful narrative of the beginning of this war, but the mutilated condition of the manuscript renders it difficult to decide whether the foolish arrogance of Apopi or his exaggerated zeal for his god Set is represented as the cause of the struggle. The popular idea that the Hyk(us)sos brought along their own native god of war, Sutekh, and tried to force his exclusive worship upon the Egyptians, is incorrect; this god was merely the Egyptian divinity Set (playfully written Sutekh), the local god of the capital, Avaris, who became, of course, the official patron of the Kings, but did not dispossess any other cults. The revolt against Apopi (II.?) was started by Sqenen-rê, the Prince of Thebes (which of the three princes of that name is doubtful), and lasted for long years, extending through the reigns of two short-lived Theban princes (Kames and Snekhten-rê).

The princes of the nomes north of Thebes were annihilated in the war of independence, as they do not seem to have joined the national cause. When Amasis I. (Ahmose, c.1600 B.C.) ascended the throne, the Pharaohs of the foreign dynasty seem to have been almost completely expelled, but they sustained a long siege in their last stronghold, Avaris. This city fell in the third or fourth year of Amasis Ahmose and the surviving inhabitants were distributed as slaves. The strange statement in Manetho that Misphragmuthosis (i.e. Thutmosis III., c.1500 B.C.) took Avaris and allowed the remainder of the Hyk(us)sos to retire to Syria, is, of course, erroneous. No remarkable buildings of the Hyk(us)sos Kings have survived; only traces of temple restorations in Bubastis and the modern Gebelên. Possibly their constructions were destroyed after the expulsion. A considerable part of Syria seems to have been tributary to them, but the small stone lion bearing the name of Apopi (I.?), found at Bagdad on the Tigris, cannot be considered to prove that these monarchs ruled as far as Babylonia. The whole of this interesting portion of Egyptian history is very obscure. Consult: Koch, *De Regibus Pastoribus* (Marburg, 1844); Chabas, *Les pasteurs en Egypte* (Amsterdam, 1868); W. M. Müller, in *Mitteilungen der vorderasiatischen Gesellschaft* (Berlin, 1898).

HY'LA (Neo-Lat., from Gk. *ὕλη, hylê*, wood). The typical genus of the tree-frog family, Hylidæ; hence the word is often used as a name for tree-frogs in general, especially the common variable one (*Hyla versicolor*) of North America. See TREE-FROG.

HYLÆ'US (Lat., from Gk. *Ὑλαῖος, Hylaios*, woodman). In Greek mythology, an Arcadian centaur who pursued Atalanta and was slain by her. In other legends he falls in the fight against the Lapithæ, or is slain by Hercules.

HYLAS, hī'las (Lat., from Gk. *Ὕλας*). In Greek legend, son of Theodamas or Theiomenes, favorite of Hercules, who took him on the Argonautic expedition. In Mysia, near the mouth of the Cios, while drawing water from a spring he was made captive by the nymph of the place. Hercules returned in sorrow to Greece, taking with him hostages of the Mysians, and requiring that they should continue the search for his beloved. The story was developed by the later Greek writers, and seems to have arisen from a Mysian religious festival, where a priest thrice called the name of Hylas. Consult Mannhardt, *Mythologische Forschungen* (Strassburg, 1884).

HYLLESTED, hyl'le-stĕd, AUGUST (1858—). A Swedish pianist and composer, born of Danish parents, at Stockholm, Sweden. He showed great musical precocity, playing in public when only five years old. He studied under Holger Dahl in Copenhagen, until 1869, and then, after making a concert tour in Scandinavia, entered the Royal Conservatory of Copenhagen. In 1876 he was appointed organist of the cathedral there, and director of the Nykjøbing Falster, a musical society. Three years later he studied with Kullak and Kiel in Berlin, leaving there to become a pupil of Liszt. He made many notable concert tours in Europe and America, and was the recipient of numerous honors. He was assistant director of the Chicago Music College (1886-91), and director of the piano department in the Gottschalk Lyric School (1891-94). In the latter year he went to Europe for an extended concert tour, and upon his return, in 1897, settled in Chicago. His compositions, the most popular of which are his songs and piano pieces, include: the symphonic poem, *Elizabeth*, for full orchestra and double chorus; *Suite romantique; Marche triomphale*, etc.

HYL'LUS (Lat., from Gk. *Ὕλλος*). The son of Hercules and Deianira, married at his father's command to Iole. When Eurystheus was repulsed by the Heraclidæ with the aid of the Athenians, Hyllus slew him as he fled. Adopted by the Dorian Ægimius in Thessaly, he gained the leadership of the Dorians for himself and his descendants. Having invaded the Peloponnesus in obedience to a command of the Delphic oracle to seize the Kingdom of Eurystheus 'after the third fruit,' he was unsuccessful and was killed in combat by King Echemus of Tegea. The oracle was fulfilled in the persons of his great-grandsons Temenus, Cresphontes, and Aristodemus, who after the third generation conquered the Peloponnesus.

A typical and familiar species of the West Indies (*Hylodes Martinicensis*) has some remarkable traits, described under COQUI.

HY'LOPHYTES (from Gk. ὕλη, *hylē*, forest, matter + φυτόν, *phyton*, plant). Plants which grow in the woods; forest plants. The hylophytes are contrasted with the poöphytes, i.e. the plants of grasslands.

HY'LOZO'ISM (from Gk. ὕλη, *hylē*, matter, wood + ζῳον, *zōon*, animal). The assumption that the principle of all change is to be found in material substance, and that all matter is instinct with life. The term is applied to the Ionic School (see GREEK PHILOSOPHY), which sought the explanation of the universe in terms of water, air, fire, etc., and thus assumed, without further investigation, that matter in one form or another had in it 'the promise and potency' of all change, including vital processes.

HYMANS, ē'mäN', LOUIS (1829-84). A Belgian historian, poet, and publicist, born at Rotterdam. He was editor of various papers, and director of the *Echo du Parlement*, a liberal journal. He was elected a member of the Belgian Chamber of Representatives for the city of Brussels (1859), held that post for eleven years, and showed himself an upright and conscientious politician. He was the author of several novels, of *Lettres moscovites* (1857); *Histoire populaire de la Belgique* (18th ed. 1880); *Histoire populaire du règne de Léopold I.* (1864); *Histoire politique et parlementaire de la Belgique* (1869-70); *Notes et souvenirs* (1876); *Types et silhouettes* (1877), reminiscences; and *Bruxelles à travers les âges* (1883-89).—His brother, HENRI SIMON (1836—), an author and critic, was born at Antwerp. He was appointed conservator of the Royal Library of Brussels, and became a constant contributor to art journals. His best-known work is *Histoire de la gravure dans l'école de Rubens* (1879).

HY'MEN, or **HY'MENÆ'US** (Lat., from Gk. Ὑμήν). The Greek god of marriage, whose name survived in the refrain of the marriage song, though the original meaning ('begetter') was forgotten, and many legends devised to explain the occurrence in the hymn. The myths usually represent him as son of Apollo and a Muse, more rarely of Dionysus and Aphrodite. In art he is usually represented as a youth of delicate, almost feminine beauty, with a crown of flowers and a torch; more rarely with wings. Consult: Schmidt, *De Hymenæo et Talasio* (Kiel, 1886); Usener, *Götternamen* (Bonn, 1896).

HY'MENOCEPH'ALUS (Neo-Lat., from Gk. ὑμήν, *hymēn*, membrane + κεφαλή, *kephalē*, head). A genus of small pelagic fishes of the tropics, of the family Macruridæ (see GRENADIER), noted for the papery nature of the bones of the cranium. The only known species (*Hymenocephalus cavernæus*) is gray, with silvery tints on the sides, and was taken from deep water in the Gulf of Mexico. See Plate of CODFISH AND ALLIES.

HYMENOPHYLLITES, hī-mĕn'ō-fĭl-lī'tēz, AND **HY'MENOPHYL'LUM** (Neo-Lat. nom. pl., from Gk. ὑμήν, *hymēn*, membrane + φύλλον, branaceous leaves with cup-shaped spore-cases situated at the ends of the veins, and their creeping rootstocks. The family containing them is one of the most primitive of the modern ferns, and also one of the earliest to appear in the geological records; for fossil leaves, called Hymenophyllites, very similar to those of the modern living genus Hymenophyllum, are found in the Devonian rocks of Europe. It is also known in the coal-measure flora of Carboniferous time, and in the Eocene flora. The fossil fern genus Sphenopteris is very similar in form to Hymenophyllites, and can with difficulty be distinguished from the latter. See FERN.

HY'MENOP'TERA (Lat. nom. pl., from Gk. ὑμενόπτερος, *hymenopteros*, membrane-winged, from ὑμήν, *hymēn*, membrane + πτερόν, *pteron*, wing). An order of insects, containing the ants, bees, wasps, ichneumon-flies, saw-flies, gall-flies, and related insects, elsewhere described under their names. The order includes a very great number of species, estimated at about one-fourth of the whole class, and of which some, as ants and bees, are singularly interesting and important. They have the mouth furnished with mandibles for cutting and tearing, but the other parts of the mouth are adapted for suction, and are generally narrow and elongated, often united into a kind of proboscis, as in bees. (See BEE.) The antennæ are generally slender, but often exhibit differences in the sexes of the same species. The wings are four in number, the first pair larger than the second, the wings of the same side united in flight by little hooks. The wings, when at rest, are laid over one another horizontally over the body. The wings are entirely membranous, not reticulated as in the Neuroptera, but with comparatively few nervures, the arrangement of which is so constant in the whole order that particular names have been given to them and to the space between them, and their diversities have been made use of in classification. The wings are wanting in the imperfectly developed females ('neuters') of some. Besides the ordinary eyes, all the Hymenoptera have three small, simple eyes (ocelli), on the top of the head. The abdomen is generally united to the thorax by a slender pedicel. The abdomen of the females is generally furnished with an organ capable of being protruded, but for different purposes in different sections of the order, it being in some of the groups an ovipositor or borer, and in others a sting.

The Hymenoptera in their perfect state generally feed on honey, but some of them prey on other insects, which are the food of the larvæ of a greater number; while the larvæ of some feed on various vegetable substances. The metamorphoses of the insects of this order are perfect; the larvæ are generally—although not in all the families—destitute of feet; the pupæ take no food. The Hymenoptera are remarkable for the dilatation of the tracheæ or air-tubes into vesicles, and the general perfection of the respiratory system. The instincts and even apparent intelligence displayed by some of them—particularly the social kinds, which live in communities—have excited admiration from the earliest times. See INSECT, paragraph *Social Insects*.

FOSSIL HYMENOPTERA. These appear in the Mesozoic formations in small numbers. Only about a dozen species are known, mainly from the Jurassic limestones of Solenhofen, Bavaria. The oldest hymenopterans are ancestral to the modern ants. In the Tertiary deposits are found representatives of all the important families in fossil forms very close to the modern species. In America the best examples are found at Florissant in Colorado, and in Europe the fresh-water shales of Aix, Œningen, and Radoboj, and best of all, the amber of the Baltic Provinces, are noted localities. Consult Scudder, "Systematic Review of Our Present Knowledge of Insects," in *United States Geological Survey Bulletin*, No. 31 (Washington, 1886).

CLASSIFICATION. The order Hymenoptera is divided into two suborders, each containing several superfamilies, as follows:

Suborder *Heterophaga*.—Superfamilies: Apoidea, true bees; Iphecoidea, solitary wasps; Proctotrypoidea, proctotrypoid parasites; Vespoidea, social wasps; Formicoidea, ants; Ichneumonoidea, ichneumon-flies; Cynipoidea, gall-flies; Chalcidoidea, chalcis-flies.

Suborder *Phytophaga*.—Superfamilies: Siricoidea, horntails; Tenthredinoidea, saw-flies.

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HYMET'TUS (Lat., from Gk. Ὑμηττός). A mountain range in Attica, about 3000 feet high, now called Trelo-Vuni, between four and five miles east of Athens, famous to-day, as well as anciently, for its honey of excellent flavor. There was also quarried at Hymettus a bluish-gray marble, much prized in antiquity.

HYMNOL'OGY (Gk. *ὑμνολογία, hymnologia*, from *ὑμνολόγος, hymnologos*, singing hymns, from *ὕμνος, hymnos*, hymn; connected with Skt. *syūman*, bond, Lat. *suere*, to sew, Gk. *κασ-σύειν, kas-syein*, to make shoes, OChurch Slav. *šiti*, to sew, Goth. *siujan*, OHG. *siuwan*, AS. *seowian*, Eng. *sew* + Gk. *-λογία, -logia*, account, from *λέγειν, legein*, to say). The science of hymns, or the collective body of hymns used at a particular time or place. In the most general sense a hymn is a religious ode or poem; more specifically it is a metrical composition divided into stanzas or verses, intended to be used in worship. In some variety or form the hymn has been thus employed throughout the ages. Lenormant publishes an old Accadian hymn, sung to the moon-god Hurkis, that may have been used at Ur five thousand years ago. The Assyrian tablets furnish many specimens of the so-called penitential hymns. (Consult *Records of the Past*.) The religion of ancient Egypt produced hymns of beauty and power. (Consult Renouf, *Religion of Ancient Egypt*.) In India on anniversary days and in processions there are songs sung to the gods, but these are not of a high character. The Vedic hymns are many of them productions of worth. Buddhist hymns seem to be chiefly for recital or meditation, not for worship. Confucius made a collection of poetry, forty pieces of which are called 'praise songs' or 'songs of the temple and altar.' The Mohammedans have no hymns; they have invocations and addresses. Greece was the land of song, and there was heard a song on every occasion by every class to celebrate every event. The so-called Homeric hymns consist of brief addresses to the gods. Callinus, the father of elegy (c. 700 B.C.), and Archilochus, a contemporary, wrote hymns, but none of them have reached us. Simonides, Tyrtæus, Solon of Athens, Alcæus, and Sappho wrote lyric poetry. Roman worship was silent and reverential, but the priests used songs, and the poets wrote odes and lyrics. Of the hymns of the New World we know but little. Reville gives a sample of the hymns used in the time of the Incas in South America. The hymns, or rather incantations, of the North American Indians are inferior in quality, though not lacking in weirdness.

It is the Hebrew race which produced the highest development of worship poetry before the Christian Era, and it is generally conceded fact that the Hebrew Psalter has never been equaled as a whole. We get glimpses of the kindred arts, music and poetry, very early in the Hebrew Scriptures. Jubal was "the father of all such as handle the harp and organ" (Gen. iv. 21). And in the same connection we hear of the song of Lamech (Gen. iv. 23-24), perhaps the earliest song of Scripture. The song of Miriam (Ex. xv. 21) is the only one preserved of many possible improvisations that she may have produced. The Ninetieth Psalm has been attributed to Moses, and has been aptly described as the 'swan song of Moses.' In the Book of Numbers (xxi. 14) we find the mention of the "Book of the Wars of the Lord," which some suppose to be a collection of songs and ballads composed by the camp-fire. In the same chapter (xxi. 17-18) is given the song "Spring Up, O Well." One of the great songs of the Old Testament is that of Deborah and Barak (Judges v.). It is cast in a distinctly metrical form. The song of Hannah (I. Sam. ii.) reminds of the song of Mary (Luke i. 46-55) and it might be called the Magnificat of the Old Testament. The schools of the prophets knew of the soothing influence of music and used it in prophecy, and with it they may have used song also. With the founding of the Temple was founded the temple of Hebrew song. Scholars are not agreed as to the number of psalms composed by David. The estimate runs from ninety-five down to none. Solomon is said to have written 1005 songs, but only two Psalms (lxxii. and cxiii.) have his name prefixed to them. His other poetical productions are rather didactic than lyrical. The Psalms contain many of the poetical productions of exilic and post-exilic times. Jonah ii., Isaiah xii., and Habakkuk iii. are also poetical productions. Robert Lowth was the discoverer of the metrical arrangement of Hebrew poetry, first publishing his discovery in 1753. Michaelis, Herder, Rosenmüller, De Wette, Gesenius, Rau, Hollmann, Gustav Bickel, and others have contributed something to the understanding of the subject.

In the New Testament the hymn note is changed. The centre is a person, not a race. The *Magnificat* of Mary (Luke i. 46-55) is a witness to her talent as a daughter of David, and her piety as a true Israelite. Her song has been much used by the Church, rarely, however, in metrical form. The best metrical version is that of W. J. Irons. The song of Elizabeth

(Luke i. 42-45), sometimes called the *lesser Benedictus*, and the song of Zacharias (Luke i. 68-79), the *Benedictus*, were in use in the Church as early as the time of Saint Augustine. The *Nunc Dimittis* of Simeon (Luke ii. 29-32) was used in Christian worship as early as the sixth century. The *Gloria in Excelsis* of the angels (Luke ii. 14) in its present form appears in the *Codex Alexandrinus* of the fourth century, thus proving its early use. The Epistles of Paul contain hymns. In Colossians iii. 16 we have a reference to the use of Psalms in public worship. Other hymns are found in Ephesians v. 14; I. Timothy iii. 16; vi. 15-16; II. Timothy ii. 11-13; the parallelism of this last passage is very marked. In the Apocalypse the language is naturally poetic, and there are several passages which might have been hymns; i. 4-8; v. 9-10, 12-14; xi. 15, 17, 18; xv. 3, 4; xxi. 10-14; xxii. 17.

One of the earliest references to be found in regard to the worship of the early Church is in the famous letter of Pliny to Trajan (A.D. 103) in these words: "They [the Christians] had been accustomed to come together on a fixed day before daylight, and to sing responsively a song to Christ as God." What this song was we do not know. Unfortunately, the first hymn-book of the Church is lost. This book was compiled and largely written by Justin Martyr. It was entitled *Psaltes*, and is mentioned by Eusebius, Jerome, and Gennadius. The Anti-Nicene Fathers bear testimony that hymns were used by the Church. We have one hymn entire appended to *The Instructor* of Clement of Alexandria (c.200 A.D.). It is the earliest Christian hymn extant, and may be Clement's, though by some supposed to be earlier than his time. It is entitled *A Hymn to Christ the Saviour*. The best translation is by Dean Plumptre, but the most common one is by Henry M. Dexter, beginning "Shepherd of tender youth." The next hymn is that mentioned by Saint Basil (c.330-379) in his treatise *On the Spirit*, and sometimes called the *Candle-light Hymn*, because sung in church at the lighting of the lamps. It begins "Joyful light of the holy glory." It has been translated many times. The best known translations are those of John Keble and Henry W. Longfellow. The chief Eastern liturgies contain the well-known *Cherubic Hymn*, beginning "Let us who mystically represent the Cherubim," dating from the time of Justinian (527-565). Methodius, who suffered martyrdom in the year 312, composed a hymn which is found in the *Banquet of the Ten Virgins* (*Discourse* xi. ch. 2), beginning "Up, maidens, the sound of the cry that raiseth the dead." The Gnostics composed many hymns to further the spread of their doctrines. Valentinus (d. 160) wrote many of the most profound. Bardesanes (d. 224) is said to have composed one hundred and fifty hymns. His son, Harmonius, was also a writer of hymns. They are sometimes called the fathers of Syrian hymnology. But that honor really belongs to Ephraem Syrus (d. 378), a poet of no mean order, who wrote to counteract the work of the Gnostics, as a little later Chrysostom (d. 407) did to counteract the work of Arius. With Ambrose (d. 397) begins a great uplift of the art of hymn-writing. To him is attributed the hymn *Te deum laudamus*, though probably written in part at least at a much later date. There are ninety-two of the hymns of the Ambrosian school yet in existence. Ambrose also reformed the music of the Church, and his form of chant was used until the introduction by Gregory the Great (d. 604) of the Gregorian chant.

Both Greek and Latin hymnologists were active during the Middle Ages. In the Greek Church Saint Andrew of Crete (660-732), Saint John of Damascus (d. 787), and his foster-brother Cosmas (d. 760), were followed by the poets of the Studium, Saint Theodore (d. 826), Saint Theophanes (c.800-850), and Saint Joseph (c. 840), the most prolific of them all. The Church is greatly indebted to John Mason Neale (1818-66) for his translations from Greek sources, which however, were by no means close; indeed, he greatly improved upon his originals. In the Latin Church Aurelius Clemens Prudentius (d. c.413) was a prolific writer of hymns. Cœlius Sedulius (fl. 450) was the next writer of note. Ennodius (c.473-521) composed a few hymns. Venantius Fortunatus (d. 609) was a writer of much power. He is best known to us by his passiontide hymn *Vexilla regis prodeunt*, which in the translation of John Chandler, begins "The royal banner is unfurled." We are under obligation to Robert II., King of France (d. 1031), for *Veni, Sancte Spiritus* ("Come, Holy Spirit"), and three other hymns. The great hymn *Veni, Creator Spiritus* ("Come, Creator Spirit") is sometimes attributed to Charlemagne, to Ambrose, Gregory the Great, or Rabanus Maurus. The last named writer did compose hymns of merit, but this is not to be included. Saint Bernard of Clairvaux (d. 1153) is a name that belongs to the whole Church. He contributed a long poem on the "Name of Jesus." This contains several passages that have been used for hymns. Saint Bernard of Cluny (d. 1140) is not so well known personally, yet we can never sing of heaven in the highest strain without using John Mason Neale's translation of a part of his *De contemptu mundi*, which he called *Bernard's Rhythm on the Celestial Country*, especially the verses beginning "Jerusalem the golden." Thomas of Celano (fl. 1220), the friend of Saint Francis of Assisi, has given us the marvelous judgment hymn *Dies Iræ* ("Day of Wrath"). Saint Thomas Aquinas the Schoolman (q. 1274) wrote *Pange, lingua, gloriosi corporis mysterium* ("Sing, tongne, the mystery of the glorious body"). To Jacopone, the Italian Franciscan monk, we owe the *Stabat Mater* ("The Mother [i.e. the Virgin Mary] stood"). These hymns were the principal great hymns before the time of the Reformation.

One of the great results of the Reformation was the use of the vernacular in Church worship. Luther was the first hymn-writer of the German Church, enriching its worship with no less than thirty-seven hymns. The best-known is *Ein' feste Burg ist unser Gott* ("A Mighty Fortress is our God"). The first evangelical hymn-book of 1524 contained eight hymns. Subsequent editions contained more and more until that of 1553 contains one hundred and thirty-one. Co-workers with Luther added much to the hymnology of the Church. Justus Jonas (1493-1555); Paul Eber (1511-1569); Erasmus Alber (d. 1553); Lazarus Spengler (1479-1534); Hans Sachs, the shoemaker poet of Nuremberg (1494-1576); Paul Speratus (1484-1551); and others among the early Reformers published hymns of value. The Bohemian Brethren, notably Michael Weisse (d. 1534), furnished a number of hymns in this period. Their hymns breathed a deep spiritual atmosphere. The French Reformation produced the

poetical translation of the Psalms by Clément Marot (d. 1544) and Theodore Beza (d. 1605); the German Reformed hymn-book of 1540 published at Zürich; and the Genevan Psalter of Calvin of 1562. In England the Reformers issued Miles Coverdale's *Goostly Psalmes and Spiritualle Songes* (London, 1539); Robert Crowley's versification of the Psalter and Litany (1549); and, last and most famous of all, the rendering of the Psalms by Thomas Sternhold and John Hopkins (1560).

The time of the Thirty Years' War was marked by the production of many fine German hymns of a more or less martial character. The principal composers were Martin Opitz (1597-1639); Johann Heermann (1585-1647); Johann Michael Altenburg (1584-1640), who composed part of the battle hymn of Gustavus Adolphus, "Fear not, O little flock, the foe;" Paul Fleming (1609-40), author of the *Pilgrim Hymn*, beginning "In all my deeds;" and Martin Rinkart (1586-1649), who composed the German Te Deum *Nun danket alle Gott* ("Now thank we all our God").

Germany continued to produce great hymns and hymn-writers after this period. Paul Gerhardt (1607-76) wrote one hundred and twenty-three hymns. Many have been translated into English, and some are in common use. Probably the most familiar is "O sacred head once wounded," translated by John Wesley. Johann Franck (1618-77), burgomaster of Guben, anticipated the Pietists in his mysticism as shown in his hymns. Johann Rist (1607-77) produced 610 hymns, a few having merit. Johann Scheffler, known as 'Angelus Silesius' (1624-77), was a writer of force, and some of his hymns are yet used. All the hymns of the period are somewhat mystical in their teachings.

Pietism was a reaction against Protestant Scholasticism, and swung to the other extreme of Mysticism. The leaders of the movement, Philipp Jacob Spener (1635-1705), and August Hermann Francke (1663-1727), wrote a few hymns. Christian Friedrich Richter (1676-1711) wrote thirty-three hymns. Johann Anastasius Freylinghausen (1670-1739) wrote a few hymns, and published the first hymn-book of the movement at Halle in 1704. Gottfried Arnold (1666-1714), the Church historian, wrote several hymns of value. Joachim Lange (1670-1744), a friend of Francke, wrote the morning hymn, *O Jesu, süsses Licht* ("O Jesus, sweet light"). Johann Friedrich Starck (1680-1756) of Frankfort wrote 939 hymns. Karl Heinrich Bogatzsky (1690-1774) wrote hymns, as well as devotional works. Philipp Friedrich Hiller (1699-1769) of Württemberg wrote many hymns. The Moravian Church has produced many fine hymns, some of which have been translated by John Wesley, Miss Catherine Winkworth, and others. Count Nicolaus Ludwig Zinzendorf (1700-60) produced 2000 hymns. "Jesus, Thy blood and righteousness," and "I thirst, thou wounded lamb of God," have been favorite translations from his hymns. Bishop August Gottlieb Spangenberg (1704-92) wrote ten hymns. That on Christian simplicity, beginning "Holy simplicity, miracle of grace," written as a birthday hymn for his sister, is considered his best. Christian Gregor (1723-1801) compiled the Moravian hymn-book of 1778, published at Barby, still in use. To this he contributed several hymns. The inspiration of the hymnology of the Evangelical Revival in England can be traced directly to the Moravian Brethren. To this period belong a few other hymn-writers of note, such as Joachim Neander (1650-80), sometimes called the 'Psalmist of the New Covenant,' and Friedrich Adolph Lampe (1683-1729), the author of thirty hymns. Gerhardt Tersteegen (1697-1769), a ribbon-weaver, produced one hundred and eleven hymns, some of which are worthy to be placed in the first rank. From the writers of this school we have the first introspective hymns of value.

The hymns of the Evangelical Revival are not by any means the first great hymns produced in England. The Elizabethan period produced the hymn by F. B. P. (the initials may stand for Francis Baker, pater, i.e. priest), "Jerusalem, my happy home," translated from the Latin; also the first English hymn-book. This was by George Wither, and was published in London in 1623. The Puritans produced as hymn-writers, Robert Herrick (1591-1674); John Milton (1608-74); Henry Vaughan (1622-95); and Jeremy Taylor (1613-67). In the Restoration period Samuel Crossman published *The Young Man's Meditation* (1664), which contains several hymns, a good specimen of which can be seen in Lord Selborne's (Sir Roundell Palmer) *Book of Praise* (1863). Henry More in his *Divine Dialogues* (1668) published seven long hymns on the festivals of the Church. But the greatest lyric poet of the period was Thomas Ken (1637-1711), the good Bishop of Bath and Wells. His evening, morning, and midnight hymns stand at the head of all worship poetry of the English language. The first two have never been surpassed, and hardly approached. Joseph Addison, his contemporary, furnished a few hymns of an exalted character. In 1683 John Mason published *Songs of Praise*, a hymn-book which went through many editions. Benjamin Keach published *Spiritual Melody* (1691), the first Baptist hymn-book. Among Independents the first hymn-book used was *A Collection of Divine Hymns* (1690). The metrical version of the Psalms by Sternhold and Hopkins was followed by that of Francis Rouse (1646), and that in turn by Nahum Tate and Nicholas Brady (1696), which exerted a great influence. The tendency, however, came to be less and less to base hymns on the Hebrew Psalter for a whole hymn-book. A preparation for the work of Isaac Watts (1674-1748), sometimes called the 'father of English hymnody,' was thus made. His hymns have been more widely sung than those of any other English writer, with the possible exception of Charles Wesley. His first work, *Horæ Lyricæ*, appeared in 1706; *Hymns and Spiritual Songs* in 1707. Besides these he published *Divine and Moral Songs for Children* (1720), long extremely popular. To the school of Watts belongs Philip Doddridge (1702-51). His hymns were almost all written to follow sermons, reënforcing the truth which had been preached. The Wesley family, and the men who gathered about them, both in and out of the Church of England, were prolific writers, and produced some of the best hymns in the history of the Church. Samuel Wesley (1662-1735) was no mean poet. His son, John (1703-91), translated several hymns, and mended many more. Samuel, Jr. (1691-1739), wrote some hymns. To Charles (1707-88), however, we must turn as the leader of the lyrical forces of the Evangelical Revival. He wrote over 6000 hymns. Out

four hundred of his hymns are in common use. They include a wider range of subjects than those of any other writer of hymns. They chronicle the events of the time as well as the devotional experiences of the writer. Some were impromptu. Many have bits of personal history as a background. Around some hymns have grown beautiful stories, the historical data for which is exceedingly slight. The original hymn-books of the Wesleys were issued in thirteen volumes under the direction of George Osborn (London, 1868-72). Thomas Olivers (1725-99), John Cennick (1718-55), Edward Perronet (1721-92), and John Bakewell (born 1721), were of the Wesleyan party; while John Gambold, the Moravian (1711-71), Joseph Hart (c.1712-68)*, Miss Anne Steele (1717-78), John Newton (1725-1807), William Cowper (1731-1800), Robert Robinson (1735-90), John Fawcett (1740-1817), Augustus Montagu Toplady (1740-78), Joseph Swain (1761-96), William Williams (1717-91), and still others were more or less affected by the movement. The hymns of the movement are characterized by greater breadth of view than any previously issued. They include hymns of all kinds, but very few didactic hymns.

Hymns of modern days seem to have been produced by small groups of men representing some movement or belief. (a) The missionary movement produced James Montgomery (1771-1854) as its first hymn-writer and Reginald Heber (1783-1826) as its ablest. Both produced many hymns other than missionary. (b) The Oxford movement was characterized by its hymnological productions, as well as its works of devotion and argument. John Keble (1792-1866), with his *Christian Year*, Frederick William Faber (1814-1863), Edward Caswall (1814-78), John Henry Newman (1801-90), author of "Lead, kindly light," and Isaac Williams (1802-65) were the singers of this group. Their work evinced not only a deep piety, but an unsurpassed scholarly finish. (c) The Sunday-school movement has produced a great many hymns. Among the first publications was William Batchelder Bradbury's *Golden Chain* (New York, 1861). (d) The evangelistic movement of Messrs. Moody and Sankey brought into the Church a class of hymns entirely different from those produced by any other movement. Many were not of high order, in fact were a disgrace to the Church, but they were so widely used that this article would be incomplete without a notice of them. Beginning with *Select Hymns*, *The Gospel Hymns* in six numbers (1875-95) were followed by hymn-books whose name is legion and whose copies are millions. The most voluminous writer of this movement has been 'Fanny Crosby' (Mrs. Frances Jane [Crosby] Van Alstine). (e) The Salvation Army has not added much to the hymnology of the Church; it has, however, changed the class of music used, and not for the better.

In an article of this kind there must of necessity be many omissions. Only a few of the greatest hymn-writers can be mentioned. Four women have written hymns any one of which is worth a lifetime to produce. Mrs. Sarah Flower Adams (1805-48), "Nearer, My God, to Thee;" Miss Charlotte Elliot (1789-1871), "Just as I am

markable hymn-writers, such as John Pierpont (1785-1866), Henry Ware, Jr. (1794-1843), William Bourne Oliver Peabody (1744-1847), William Cullen Bryant (1794-1874), the Longfellows (Henry Wadsworth, 1807-82, and Samuel, 1819-92), Edmund Hamilton Sears (1810-76), Theodore Parker (1810-60), Stephen Greenleaf Bulfinch (1809-70), James Thomas Fields (1817-81), and Thomas Wentworth Higginson (1823—). The Protestant Episcopal Church has to offer the names of Bishop George Washington Doane (1799-1859), Bishop Phillips Brooks (1835-93), Bishop George Burgess (1819-66), and the Rev. Dr. William Augustus Muhlenberg (1796-1879). The Presbyterian Church has the names of Samuel Occam (1723-92), Samuel Davies (1723-61), Thomas Hastings (1784-1872), the Alexanders (James Waddell, 1804-59, Joseph Addison, 1809-60), Thomas Mackellar (1812—), Mrs. Elizabeth Prentiss (1818-78), and Charles Seymour Robinson (1829-99), the compiler of *Songs for the Sanctuary* and *Laudes Domini*. The Congregationalists have enrolled the names of Timothy Dwight (1752-1817), Joel Barlow (1755-1812), Nehemiah Adams (1806-78), Ray Palmer (1808-87), author of the immortal "My faith looks up to Thee," Henry Martin Dexter (1821-90), Jeremiah Eames Rankin (1828—), and Horatio Richmond Palmer (1834—). The Baptists furnish a long list with the names of Oliver Holden (1765-1844), Adoniram Judson (1788-1850), Mrs. Lydia Sigourney (1791-1865), Robert Lowrie (1826—), William Howard Doane (1831—), and Samuel Francis Smith (1808-95), author of "My country, 'tis of thee." The Methodists produced the first hymnologist of the American Church, David Creamer (born 1812). His *Methodist Hymnology* appeared in New York in 1848. Other Methodist hymn-writers are Miss Hannah Flagg Gould (1789-1865), Thomas Hewlings Stockton (1808-68), William Hunter (1811-1877), Thomas Osmond Summers (1812-82), Robert Arthur West (1809-66), President William Fairfield Warren (1833—), and Professor Caleb Thomas Winchester (1847—). Other American hymn-writers are John Greenleaf Whittier (1807-92), Hosea Ballou (1771-1852), Edwin Hubbell Chapin (1814-80), Charles Dexter Cleveland (1802-69), Miss Lucy Larcom (1826-93), Mrs. Emily Miller (1833—). The later writers of the Church of England include the names of Christopher Wordsworth (1807-85), Henry Alford (1810-71), John Samuel Bewley Monsell (1811-75), William Josiah Irons (1812-83), Arthur Penrhyn Stanley (1815-81), John Mason Neale (1818-66), Sir Henry Williams Baker (1821-77), Edward Hayes Plumptre (1821-91), John Ellerton (1826-93), William Walsham How (1823-97), and Samuel John Stone (1839—), and these are only a few of many. Other English writers of note are Horatius Bonar (1808-90), Frances Ridley Havergal (1836-79), James Drummond Burns (1823-64), Thomas Toke Lynch (1818-71), Norman Macleod (1812-72), Andrew Young (1807-89), John Burton (1803-77), Henry Francis Lyte (1793-1847), Sir Edward Denny (1796-1889), Josiah Conder (1789-1855), Henry Kirke White (1785-1806), Sir Robert Grant (1785-1838), Bernard Barton

(1784-1849), and Mrs. Felicia Dorothea Hemans (1793-1835).

Hymns, Ancient and Modern, originally compiled by a committee of which Sir H. W. Baker was secretary, and published in London in 1861, with supplemental hymns published in 1889; and *The Congregational Psalmist* (1858), edited by Henry Allon, and *Church Hymns* (1871), edited by Canon John Ellerton, are the greatest hymn-books of England. *Laudes Domini* (New York, 1884), edited by Charles Seymour Robinson; *The Plymouth Collection* (1855), by Henry Ward Beecher; *The Evangelical Hymnal* (1880), of Charles Cuthbert Hall and Sigismund Lasar; the Protestant Episcopal *Hymnal* (1871); the Baptist *Praise Book* (1871); and the *Methodist Hymnal* (1878) are noteworthy American hymnals.

BIBLIOGRAPHY. It has been estimated that there are at least 400,000 hymns in all languages, of which the greatest number are in German, and the next greatest number are in English. The literature on the subject is consequently becoming quite large. The great thesaurus of information is J. Julian's *Dictionary of Hymnology* (London and New York, 1892), the labor of many years and of many hymnologists. It covers the entire field and contains separate articles upon the hymnology of the different periods and lands. A. F. W. Fischer's *Kirchenlieder-Lexicon* (Gotha, 1878-79) is also very good. For the study of early Greek and Latin hymns the standard work is H. A. Daniel's *Thesaurus Hymnologicus* (Leipzig, 1855), which gives the text of many hymns; for the Latin mediæval hymns, a work of similar rank is F. J. Mone's *Lateinische Hymnen des Mittelalters* (Freiburg, 1853). For German Protestant hymnology to the seventeenth century the great work is P. Wackernagel, *Das deutsche Kirchenlied von der ältesten Zeit bis zu Anfang des xvii. Jahrhunderts* (Leipzig, 1864-77). J. M. Neale, by his *Mediæval Hymns and Sequences* (London, 1851), *Hymns of the Eastern Church* (London, 1862), and other similar works, contributed much to a knowledge of the hymnology of the Eastern and Western Churches of the Middle Ages. A fairly creditable book on Latin hymns is S. W. Duffield's *Latin Hymn-writers and Their Hymns* (New York, 1889).

The following books are recommended, but the list makes no pretension to completeness, only the greater books being named. On the general subject: Josiah Miller, *Singers and Songs of the Church* (New York, 1869); J. E. Prescott, *Christian Hymns and Hymn-writers* (London, 1883); W. G. Horder, *The Hymn Lover* (London, 1889); Duncan Morrison, *The Great Hymns of the Church: Their Origin and Authorship* (London, 1890); A. E. C., *Hymns and Their Stories* (New York, 1894); R. E. Welsh and F. G. Edwards, *Romances of Psalter and Hymnal* (New York, 1896); W. T. Stead, *Hymns that Have Helped* (New York, 1897); Duncan Campbell, *Hymns and Hymn-makers* (London, 1898). For the biography of a hymnologist, consult H. Housman, *John Ellerton: A Collection of His Writings on Hymnology; With a Sketch of His Life* (London, 1896). On German hymnology, consult: Winkworth, *Lyra Germanica* (London, 1855); and id., *Christian Singers of Germany* (ib., 1869); and for the hymns of Luther especially, Bacon, *Hymns of Martin Luther* (New York, 1883). There are several commentaries on hymns that are very well done. Hyde, *Hymnal Sermon Pictures* (New York, 1899), does what is done nowhere else, and is most complete in the analysis of the hymns he discusses. Commentaries on denominational collections are: Biggs, *Hymns, Ancient and Modern* (London, 1867), giving annotations on the hymns of the Church of England; Nutter, *Hymn Studies* (New York, 1884, 3d ed. 1902), based on the American *Methodist Hymnal;* Burrage, *Baptist Hymn Writers and Their Hymns* (Portland, Maine, 1888); Tillet, *Our Hymns and Their Authors* (Nashville, Tenn., 1889); the annotated edition of the *Hymnal* of the Methodist Episcopal Church, South; Robinson, *Annotations upon Popular Hymns* (New York, 1893), based on his *Laudes Domini;* Stevenson, *The* [British] *Methodist Hymn-Book*, illustrated (London, 1883), from which S. W. Duffield drew many of the facts and anecdotes given in his *English Hymns* (New York, 1886), intended as a commentary on Robinson's *Laudes Domini*. The best anthologies of religious lyric poetry are: *The Book of Praise* (London, 1862; many subsequent editions), by Sir Roundell Palmer (Lord Selborne); and *The Treasury of Sacred Song* (London, 1889), by Francis Turner Palgrave.

HYMNS, NATIONAL. See NATIONAL HYMNS.

HYMN TUNES. The authentic history of hymn tunes begins with Hilary of Poitiers, who died in 368. His music was simpler than that of the ordinary jubilations, each syllable of the text being given but one, or, at the most, two musical tones. Saint Ambrose (died 397) and, later, Pope Gregory the Great (died 604), introduced radical reforms in the style and singing of hymns (see AMBROSIAN CHANT; GREGORIAN CHANT), and the impetus given by them to the plain-chant (q.v.) carried that form along for centuries. It is noteworthy that, even so early, in many cases the author of the words also wrote the accompanying melodies. With the growth of polyphonic music these old chants were used as *canti fermi* upon which the more elaborate forms of masses and motets were constructed. Under Palestrina (q.v., died 1594) the polyphonic hymn reached its highest development. Around the historic plain-chants he embroidered a wealth of contrapuntal devices, yet preserving throughout their original smoothness and beauty. The difficulty of the music is the one objection against their more general use.

Meanwhile a reaction had arisen against the heavy, sombre music which had heretofore been the sole style of hymn tunes. Between the acts of Mystery Plays, and especially at those given at Christmas time, it was customary to sing songs whose general trend was religious, but whose music was light and popular. The Reformation was imminent and Luther appreciated and seized the opportunity for an innovation in Church music. He adapted some of these popular tunes to German translations of Latin hymns, wrote some original words, and the whole was set for four, five, or six voices by Johannes Walther. Most important in this connection is the fact that for the first time in the history of hymn tunes the music was rhythmic. This was the beginning of the chorale (q.v.), which became immediately and widely popular. The next great period in Germany begins with Johann Sebastian Bach (1685-1750), who, while emphasizing the rhythmic element, at the same time de-

veloped the structural side of the music. After him the decline was rapid.

In France Clément Marot (died 1544) and Theodore Beza (died 1605) wrote metrical psalms which were set to popular music. Goudimel (1505-72), the earliest national composer, wrote many hymn tunes, but their difficulty rendered negative their excellence, and they were supplanted by the simpler arrangements of Claudin le Jeune (died 1600). Of the later French hymn-writers the most important was César Malan, of Geneva (1787-1864), who composed melodies to his own words. In England the history of hymn tunes follows much the same line as on the Continent. There were no hymns proper until the eighteenth century; before that time Tallis (died 1585), Byrd (died 1623), Parsons (died 1570), etc., set psalms to revised forms of old Continental tunes, and in 1621 "the Whole Booke of Psalmes" was published. The music of this edition was arranged largely by Thomas Ravenscroft, the tunes having been set by Bennet, Morley, Tallis, etc. With Orlando Gibbons (1583-1625) the polyphonic school in England came to an end, and the later compositions of Carey (died 1743), Wainwright (1792-1854), and their successors were poor in comparison. The reforms of the Commonwealth did nothing for Church music, and it was not until Purcell (1658-95), the greatest native English composer, that a lighter, more varied note was introduced into hymn tunes. The hymns of Watts (1674-1748) marked the beginning of the popular epoch, and those of Charles Wesley (1757-1834) its high-water mark. In recent years choral music and hymn tunes have drawn more closely together, to the immeasurable advantage of the latter. In England especially, Dykes (1823-76), Barnby (1838-96), Stainer (1840—), and others have all written excellent music. At the same time, however, many hymns have been written in England and the United States whose music depends wholly for its success on its catchy character. Most representative of this class are the hymns of Moody and Sankey. For a more detailed account of hymn tunes, consult: Dickinson, *Music in the History of the Western Church* (New York, 1902), which contains an exhaustive bibliography of the subject; Mees, *Choirs and Choral Music* (New York, 1901); also Butterworth, *Story of the Tunes* (New York, 1890); Love, *Scottish Church Music* (London, 1891); Curwen, *Studies in Worship Music* (London, 1894); Cowan and Love, *Music of the Church, Hymnary and Psalter in Metre, Its Sources and Composers* (London, 1901).

HYND'MAN, Henry Mayers (1842—). An English journalist and socialist leader, born in London. He graduated at Trinity College, Cambridge, and began to study law in 1863, but three years later, as correspondent for the *Pall Mall Gazette*, went to the war in progress between France and Italy, where he became the friend of Mazzini, Garibaldi, and other patriots. Between 1869 and 1871 he traveled in Australia, New Zealand, and Polynesia, and while in Melbourne wrote articles for the *Argus* in the cause of free education. He founded the Social Democratic Federation in 1881, and from that time was a conspicuous reform agitator. He was chairman at the International Socialist Congress held in London in 1896, and assisted at the formation of the new 'International' at Paris in 1900. He was an Irish land-leaguer and a pro-Boer during the second Boer War. From 1874 he used his pen diligently in the socialistic cause. His books include: *A Commune for London* (1888); *Commercial Crisis of the Nineteenth Century* (1892); and *Economics of Socialism* (1896).

HY'OID BONE (from Gk. *ὑοειδής, hyoeidēs*, shaped like the Greek letter upsilon, from *ὑ, y*, upsilon + *εἶδος, eidos*, shape). The tongue-bone, or V-shaped bone. It is sometimes spoken of as unimportant in man, compared with the so-called hyoid bone in many of the lower animals, in which, on account of its being a support for bronchial apparatus, it is often developed to a great size. But its importance is no less in man, because of its connection with many muscles; the perfection of its form and its exact location at the base of the tongue being a considerable element in the apparatus for the formation of articulate and musical sounds.

HYOLITHES, hī-ō-lī'thēz (Neo-Lat. nom. pl., from Gk. *ὑ, y*, upsilon + *λίθος, lithos*, stone). An important and common fossil of the Cambrian rocks, and found also, though less commonly, in the higher rocks up to and including those of the Permian system. The shells of this mollusk are slender, conical tubes, often curved, and with triangular or flattened cross-sections. Some are provided with a lid to close the aperture. The old genus Hyolithes has been elevated to a family rank, and the numerous species have been distributed among several new genera. The hyolithids are very common in many of the lower Cambrian rocks, and they are indeed among the very oldest fossils known. They have been classed as pteropods, and more recently as worm-tubes, with the probabilities in favor of the latter relation. Some authors have also considered the hyolithids to represent quite nearly the most primitive form of gastropod. Consult: Novak, "Revision der Palæozoischen Hyolithiden Böhmens," in *Abhandlungen der Böhmischen Gesellschaft der Wissenschaften*, series 7, vol. iv. (Prague, 1891); Holm, "Sveriges Kambrisk-Siluriska Hyolithidæ och Conulariidæ," in *Afhandligar Sveriges Geologiska Undersökning*, series C, No. 112 (Stockholm, 1893); Walcott, "Fauna of the Lower Cambrian or Olenellus Zone," in *Annual Report of the United States Geological Survey*, vol. x. (Washington, 1893); Matthew, "Illustrations of the Fauna of the Saint John Group," in *Transactions of the Royal Society of Canada*, vols. i. to v. (Montreal, 1883-91).

HY'OSCY'AMUS. See Henbane; Belladonna.

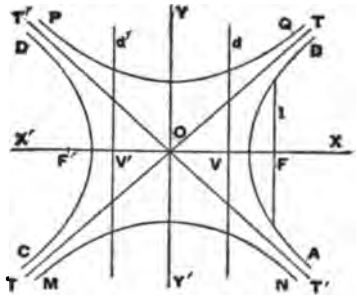
HYPATIA, hī-pā'shī-ȧ (Lat. from Gk. *Ὑπατία*). Daughter of Theon, an astronomer and mathematician of Alexandria and head of the Neo-Platonic school in that city, early in the fifth century. She is famed alike for her beauty, her purity, her wisdom, and her tragic fate. Her father gave her the best training the philosophy of the time could furnish, and she succeeded him as lecturer at Alexandria; her fame drew students from all parts of the East, where the influence of Greek thought and knowledge was felt. The citizens of Alexandria were proud of her, and such reliance was placed upon her judgment and sagacity that the magistrates used to consult her on important cases. Among those who were most intimate with her was Orestes, prefect of

the Christians," says Socrates, the Church historian, "that it was by her influence he [Orestes] was prevented from being reconciled with Cyril. Some of them, therefore, whose ringleader was a reader named Peter, hurried away by a fierce and bigoted zeal, entered into a conspiracy against her; and observing her as she returned home in a carriage, they dragged her from it and carried her to a church called Cæsareum, where they completely stripped her and then murdered her with shells. After tearing her body to pieces, they took her mangled limbs to a place called Cinaron. and there burned them." This occurred in March, 415. As at the time Synesius (q.v.) met her (about 395) she had been for twenty years a famous lecturer, and as she lived twenty years after that, she must have been at least sixty years old when murdered, but in legend and fiction she is represented as of unfaded physical charm. She is the heroine of Charles Kingsley's *Hypatia, or New Foes with an Old Face* (1853). Synesius has preserved a few of her letters. Consult Meyer, *Hypatia von Alexandria, ein Beitrag zur Geschichte des Neuplatonismus* (Heidelberg, 1886).

HY'PERÆSTHE'SIA (Neo-Lat., from Gk. *ὑπέρ, hyper*, over + *αἴσθησις, æsthēsis*, sensibility, from *αἰσθάνεσθαι, aisthanesthai*, to perceive through the senses) and HYPERALGESIA. Hyperæsthesia is a term commonly though less correctly used to designate increased sensibility to pain, the proper term being hyperalgesia. It is believed that there is no increase of sensibility to touch or to heat and cold over the normal, though tactile and thermal sensibility may be diminished under various conditions. Unpleasant sensation or actual pain may be caused by a light touch on the surface, and is due to irritation of over-sensitive end-organs of common sensibility (that is, pain), and not to increased perception of touch. Hyperalgesia is due to peripheral, spinal, or cerebral irritation of sensory nerve-fibres. Increased cutaneous sensibility occurs in meningitis, cerebral or spinal; tetanus, hysteria, traumatic neuroses, hydrophobia, etc., as well as neuritis and multiple neuritis, and in some fevers. Local hyperalgesia occurs in inflamed areas, as around carbuncles, burns, gout, etc. See ANÆSTHESIA.

HYPER'BOLA (Gr. *ὑπερβολή, hyperbolē*, hyperbola, excess, from *ὑπερβάλλειν, hyperballein*, to exceed, from *ὑπέρ, hyper*, over + *βάλλειν, ballein*, to throw). One of the conic sections (q.v.). Analytically, the hyperbola is the locus of a point which moves so that its distance from a fixed point, called the focus, bears a constant ratio greater than unity to its distance from a fixed straight line, called the directrix. In the figure, F is the focus and *d* the directrix for the branch on the right; F′ is the focus and *d*′ the directrix for the branch on the left; XX′ is the transverse axis; YY′ the conjugate axis; and *l* is the latus rectum. The equation of the hyperbola referred to the rectangular axes XX′, YY′ is $\frac{x^2}{a^2}+\frac{y^2}{a^2(1-e^2)}=1$, in which a =OV, and e is the given ratio. Since $e>1$, $a^2(1-e^2)$ is negative. Putting $-b^2$ for

is the *conjugate hyperbola* with reference to the hyperbola AB, CD. (See CONJUGATE.) The



HYPERBOLA.

hyperbola is the only conic section having real asymptotes. These are the lines TT, T′T′ in the figure. The equation of the hyperbola referred to its asymptotes is $xy=ab$. An hyperbola whose asymptotes are perpendicular to each other is called a *rectangular* or *equilateral hyperbola*. These asymptotes have the following remarkable property: If, starting from O, the asymptotes be divided in continued proportion, and from the points of section lines be drawn parallel to the other asymptote, the areas contained by two adjacent parallels and the corresponding parts of the asymptote and curve are equal.

HYPERBOLE, hī-pĕr'bō-lē. The name given to a figure of rhetoric, by which expressions are employed that, taken literally, signify more than is really meant. The use of the figure is to arrest the attention. Hyperbole is the basis of many metaphors. Thus, we call Nero a 'monster'; Tamerlane, a 'tiger'; and so on. See RHETORIC, FIGURES OF.

HY'PERBOL'IC GEOMETRY. See GEOMETRY.

HYPERBOLIC LOG'ARITHMS. See LOGARITHM.

HY'PERBO'REANS (Gk. *Ὑπερβόρεοι, Hyperboreoi*, beyond the north wind, from *ὑπέρ, hyper*, beyond + *βορέας, boreas*, north wind). A name given by the ancients to a mythical people dwelling in the distant north, beyond the Rhipæan Mountains, where it was everlasting day and perpetual spring, and where sorrow and old age were never found. The name was often applied to any people who lived in the far north. The Hyperboreans may have been originally those who brought to Apollo gifts and sacrifice. Consult Crusius, "Hyperboreer," in Roscher, *Lexikon* (Leipzig, 1884-97).

HY'PERCAL'VINISM. That form of Calvinism which carries the system to its extreme logical conclusions, holding, for example, to a double predestination (to evil as well as good), and atonement only for the elect. The more moderate Calvinists seek to soften some of the results of their principles.

HY'PERI'DES (Lat., from Gk. *Ὑπερείδης, Hypereidēs*). An Athenian orator of the fourth century B.C., one of the ten comprised in the Alexandrian canon. After studying philosophy

under Plato, and oratory under Isocrates, he began his public career as an advocate in the Athenian courts of justice, and joined the patriotic party, at that time led by Demosthenes and Lycurgus. He fitted out two triremes at his own expense for the Eubœan expedition of B.C. 358. In B.C. 338, when the disastrous fight of Chæronea laid Greece at the mercy of Philip, Hyperides proposed that the citizens should send their wives and children to places of security, and fight it out to the last. Though this desperate advice was not taken, its genuine patriotism was appreciated and rewarded by his countrymen. When the death of Philip revived the hopes of the anti-Macedonian faction, Hyperides promoted the alliance with Thebes, and after the destruction of that city by Alexander was one of the orators demanded of the Athenians by the Macedonian king. Alexander, however, did not press his demand, and Hyperides continued to oppose the Macedonian influence as strongly as ever. The arrival in Athens of Harpalus, the runaway treasurer of Alexander, then absent on his Eastern conquests, disturbed the friendly relation that had hitherto subsisted between Hyperides and Demosthenes, for in this celebrated case Hyperides, as one of the few anti-Macedonians who were above suspicion, was chosen to prosecute his friend. (See DEMOSTHENES.) In the Lamian War, which followed the death of Alexander, Hyperides took a leading part, and he spoke the funeral oration over his countrymen who had perished in battle. The year B.C. 322 saw the hopes of Athens finally crushed at the battle of Crannon. The chiefs of the patriotic party sought safety in flight. Hyperides was overtaken at Ægina and put to death. Tradition says that his tongue was torn out by his captors, or that he bit it out to avoid betraying his friends. As an orator Hyperides was ranked high by the ancients; it is said that some critics preferred him to Demosthenes. The 'grace' of his speeches was especially praised. The writer of the *Lives of the Ten Orators* enumerates 75 speeches, of which 52 were considered genuine. Until recently these were known only in scanty fragments, but late in the last century a number of papyri were discovered in Egypt which contain six speeches in a fairly complete state, including the famous funeral oration. This fully justifies the praise of the ancient critics, and may be ranked as one of the finest products of Greek oratory. A complete edition of the speeches and fragments has been published by Blass (Leipzig, 1894). The orations *Against Athenogenes* and *Against Philippides* have been edited, with an English translation, by Kenyon (London, 1893). Consult: Blass, *Attische Beredsamkeit*, iii (Leipzig, 1898); Jebb, *Attic Orators*, ii. (London, 1880).

HYPE'RION. See TITANS.

HYPERION. (1) A poetic fragment by John Keats. It deals with the overthrow of the old order of Saturn by the new one of Jupiter in Greek mythology, was begun in 1818, recast but by no means for the better in 1819, and finally published in 1820. (2) A romance by Longfellow, published in 1839. Its sale during the first twenty years approximated 15,000 copies. It narrates the wandering through Germany of Paul Flemming, the partly autobiographical hero, and contains much of German romance, introduced by translations of legends and poems.

HYPE'RIUS, ANDREAS GERHARD (1511-64). A Protestant theologian and reformer, born at Ypres, whence his learned name Hyperius, Gerhard being his family name. He was educated at the University of Paris, and traveled in the Netherlands and in Germany. Driven from England (where he lived four years with William Mountjoy, Erasmus's friend) by the persecutions of 1540, he went to Germany, was converted to Protestantism, and became professor of theology at Marburg. A deep scholar and a liberal theologian, he was accused of Zwinglian views on the Lord's Supper. He wrote: *Methodi Theologiæ Libri III.* (1566); *De Formandis Concionibus Sacris* (1553); and *De Recte Formando Theologiæ Studio* (1556), the first scientific dictionary of theology.

HY'PERMET'AMOR'PHOSIS. See METAMORPHOSIS.

HY'PERMETRO'PIA. See SIGHT, DEFECTS OF.

HY'PERMNES'TRA (Lat., from Gk. Ὑπερμνήστρα). One of the Danaids. She alone of the daughters of Danaüs disobeyed his command to slay her husband, Lynceus, but was eventually pardoned by her father.

HY'PERO'PIA (from Gk. *ὑπέρ*, *hyper*, above + *ὤψ*, *ōps*, sight). A congenital or acquired error of refraction of the eye. Owing to too little convexity of the refracting surfaces, parallel rays of light do not converge to a focus on the retina, like in the normal eye, but to a point somewhere behind the same. It is usually called Hypermetropia, long-sightedness, and is the opposite of myopia.

HY'PERSPACE. See GEOMETRY.

HY'PERSTHENE (from Gk. *ὑπέρ*, *hyper*, over + *σθένος*, *sthenos*, strength). An iron-magnesium silicate. It crystallizes in the orthorhombic form, but is also found in granular masses. Associated with labradorite and other basic feldspars, it is an important constituent of certain eruptive rocks, such as gabbro and norite, and is widely distributed, especially in Sweden, Norway, Greenland, the Adirondacks, and Canada. When cherry-red in color it may be cut and polished, and used as an ornamental stone.

HYPERSTHENE GAB'BRO. See GABBRO.

HYPER'TROPHY (from Gk. *ὑπέρ*, *hyper*, over + *τροφή*, trophē, nourishment, from *τρέφειν*, *trephein*, to nourish). The term applied in medicine to the abnormal and disproportionate enlargement of any part of the body. Examples of this change are seen in the muscular system, where it may occur altogether independently of disease. The huge bosses of flesh that stand prominently forward in the arm of a blacksmith or of a pugilist, and in the leg of a balletdancer, are illustrations of hypertrophy from increased use, where the general health may be perfect. In double organs, such as the kidneys and lungs, if the organ on one side degenerates through disease, the organ on the opposite side is often found to enlarge, and carry on double work. In these cases hypertrophy is an effect of disease, but is at the same time a preservative of life.

There are, however, cases in which the hypertrophy has a hurtful instead of a conservative effect, as, for example, hypertrophy of the thyroid gland, constituting the disease known as

of blood to a part, whether due to increased exercise, or irritation by mechanical or chemical agents, etc. (3) It may be due to old age—the so-called senile hypertrophy, the commonest example of which is the enlargement of the prostate gland in old men, which is said to occur in about forty per cent. of all men after the age of fifty years. (4) Syphilis and chronic inflammations are also very common causes of hypertrophy. See HEART, DISEASES OF THE.

HY'PHA (Neo-Lat. nom. pl., from Gk. ὑφη, *hyphē*, web). An individual filament of the body of a fungus. A mass of organically related hyphæ constitutes a mycelium. See FUNGI.

HYP'NAL (from Gk. ὑπναλέος, *hypnaleos*, causing sleep, from ὕπνος, *hypnos*, sleep; connected with Lat. *somnus*, *sopor*, AS. *swefen*, Skt. *svapna*, sleep, from *svap*, to sleep). A hypnotic of unquestionable value, combining as it does the effects of chloral hydrate and antipyrine, of which it is composed. Although it is recommended by some for insomnia accompanied by coughing, its chief use is found in cases of sleeplessness due to pain. Its only rivals in the latter field are opium, chloral hydrate, and Cannabis Indica. (See HASHISH.) The objections to using opium as a hypnotic in cases of persistent sleeplessness are well known; and the combination of the analgesic antipyrine with chloral hydrate gives great relief from pain, permitting the hypnotic action of the latter drug.

HYP'NOS (Lat., from Gk. Ὕπνος). The Greek god of sleep, the son of Erebus and Night, and twin brother of Death. He is represented as a youth with wings on his temples, bearing a poppy branch and the horn of slumber.

HYP'NOSCOPE (from Gk. ὕπνος, *hypnos*, sleep + σκοπεῖν, *skopein*, to view). A magnet devised to measure hypnotic sensitiveness. The magnet is a slit tube 3.4 cm. in diameter by 5.5 in length, and weighs 169 grams. It is very powerful, lifting 25 times its own weight. The instrument is applied by removing the armature and inserting the forefinger of the person to be tested into the magnet so as to touch both poles at once. After two minutes sensitive or objective effects will be noticed in 30 per cent. of persons tested. It is not an instrument of any value whatever. Hypnotic influences cannot be measured by any known mode at the present time.

HYPNOTICS (from Lat. *hypnoticus*, Gk. ὑπνοτικός, *hypnotikos*, relating to sleep, from ὕπνος, *hypnos*, sleep). Agents which are used to induce sleep. During the state of slumber, especially if deep, the functional activity of the cerebral centres is largely suspended. Medullary centres remain active, but are less alert. The brain and spinal cord are anæmic, reflex action is diminished, and the senses are dulled. The ordinary precautions of one about to sleep—the recumbent position, the darkened and quiet room, the absence of previous excitement—are simply evidences of physiological necessity. Hypnotics act ordinarily by diminishing the functional activity of the brain, or by causing an anæmia of it, occasionally by both methods. They may the hundreds or thousands, the counting imaginary sheep as they jump an imaginary wall, and many similar expedients. These are only of value in light grades of insomnia. (B) *Dietetic.* This class causes a congestion of the abdominal viscera by increasing their functional activity, and thus leads indirectly to cerebral anæmia. A light supper of crackers and cheese, or oysters, or soup, or beef tea, is often of great value for inducing sleep. Frequently the addition of a little alcohol as a weak toddy, or a bottle of beer, will help. (C) *Mechanical*, including: (1) *Hot water-bag* or *brick* to the feet, of value when the extremities are cold. It acts by indirectly causing cerebral anæmia. (2) *Moist warmth* to abdomen by a poultice or hot compress covered with oil-silk. This is frequently of value. It acts by dilating the abdominal vessels, and this causes cerebral anæmia. (3) *Hot bath.* This acts by dilating the cutaneous vessels, and thus causing cerebral anæmia. Certain precautions should be observed: The bed should be well warmed, and the room moderately cool. The bath should be hot, and the individual should stay in it for several minutes. He should be dried as quickly as possible, and in passing from the bath to the bed he should be well wrapped up and wear warm slippers. This method is often of great value when properly applied. It should be used with caution in cases of heart disease. (4) *Chapman's method.* This consists in the application of cold to the spine. It indirectly causes dilatation of the abdominal vessels, and thus cerebral anæmia. (5) *Massage.* This should be general and thorough, especially to the abdomen. It acts by dilating the vessels of the body, and also by lessening the irritability of the sensory cutaneous nerves. If the ordinary precautions of quiet and darkness are observed after the massage, this method frequently acts very well. All the preceding measures are of little value in case any acute disease is present. In such cases, and many others, we have to resort to drugs. These should not be used for ordinary insomnia until a thorough trial has been given to the dietetic and mechanical hypnotics. None should be given except under the advice of a physician who has examined the patient. They are, of course, grouped under the class (D) *Medicinal.* (1) *Opium* and its derivatives. As simple hypnotics these are all objectionable, for they produce other marked effects than sleep. The danger of a habit forming must also be considered. In acute diseases, especially when accompanied by pain or delirium, they are of great value. Codein is the least objectionable, but it is also the most expensive and the least efficacious. Heroin, dionin, and peronin, three new derivatives of morphine, can be utilized, but the danger of forming a habit is always present. (2) *Hyoscyamus* and its derivatives. These are not of as much value as are ordinary hypnotics, for they cause other marked effects. In cases of mania they are of great value. Hyoscine hydrobromate has the most decided hypnotic action. (3) *Cannabis Indica.* Feeble in hypnotic power. The sleep produced by it is apt to be preceded by delusions often unpleasant. (4) *Chloral hydrate.* This is a very valuable hypnotic. It has some

hydrate is a powerful cardiac depressant, and in cases of heart disease or heart weakness from any cause, it should be used with great caution, if at all. A small dose has caused death, although fifty and sixty grains have been given in other cases without harm. (5) *Bromides.* These are not very powerful hypnotics, but are often used as adjuvants to others. Potassium bromide is the most useful, but sodium bromide, though less active, is not as depressing to the circulation. (6) *Monobrated camphor.* A feeble hypnotic. (7) *Paraldehyde,* a polymeric modification of acetic aldehyde. This is an efficient hypnotic, producing sleep, as a rule, in half an hour. As regards its nervous effects, it is almost a pure hypnotic, and it causes but slight depression of the heart and respiration. It leaves no after effects except the odor of the breath, which is often very marked. It may cause nausea or vomiting if the stomach is very irritable. Like all hypnotics, it sometimes fails. (8) *Sulfonal.* This is an efficient but slow-acting hypnotic. The dose is given one or two hours before the expected sleeping-time. (9) (10) *Trional* and *Tetronal* are similar drugs, with more rapid and powerful action. The three last named may produce poisoning if used for any length of time or in too large doses. (11) Urethane, ethyl, $C_2H_5CO_2NH_2$, has a bitter, disagreeable taste. This is an efficient hypnotic, leaving no disagreeable after effects. In large doses it may cause vomiting, but is otherwise a pure hypnotic. It has no depressing action on the heart or respiration. (12) *Amylene hydrate.* A colorless fluid with a sharp taste and smell. This is an efficient hypnotic, causing sleep in fifteen to forty-five minutes. The sleep is natural, and there are no bad after effects. It has no depressing effects on the heart or respiration. It has caused in a few cases a delirium resembling that of alcoholic intoxication, but followed by refreshing sleep. (13) *Amylene chloral,* or dormiol, is similar in action. Most of the drugs named are considered in special articles under their names.

HYPNOTISM, or **HYPNO'SIS** (from Gk. ὕπνος, *hypnos*, sleep). The general names for a group of abnormal phenomena, physical and psychical, which show a close outward resemblance to the phenomena of normal sleep and of sleep-walking. The symptoms of the hypnotic state differ considerably among different subjects, and the marking off of distinct stages within this state is rather a matter of theory than of actual observation. The artificial sleep is continuous and progressive, beginning with a languor and drowsiness not unlike those of a man suddenly waked from sound sleep, or arousing from a too protracted morning's nap after a disturbed night. As the state advances, the subject becomes partially anæsthetic, insensitive to pin-pricks, pinching of the skin, etc.; his sense-organs are closed to most of the impressions from his surroundings that would normally excite them; if awakened before the sleep has grown more profound, he remembers hazily what has occurred during hypnosis. He is extremely suggestible at the hands of those who, as he thinks, have induced the sleep, and will execute movements that the experimenter prescribes to him. The voluntary muscular system evinces a curious the stage in question. As the sleep is continued the subject becomes still more anæsthetic, until consciousness seems to lapse altogether; on waking, he has no memory whatsoever of the hypnotic period. The name of 'somnambulism' is given to a stage of profound hypnosis in which illusions are produced at the experimenter's suggestion: the subject takes ink for wine, a pillow for a baby, steps carefully over an imaginary book, etc., etc.

These phenomena of sleep or trance, mixed with much that is simply charlatanry, have been discussed and exploited from time immemorial. The medicine-men of primitive and savage tribes, the magicians of Egypt and Chaldæa, the Hindu ascetics, the monks of Mount Athos, the quack physicians of all ages, have made use of hypnotism to enhance their personal prestige, to cure the sick, or to induce states of religious ecstasy. The modern history of hypnotism begins with F. A. Mesmer (1733-1815), a German physician who practiced hypnotic therapeutics at Paris from 1778, causing so great a stir in scientific circles that his pretensions were made a matter of inquiry by a royal commission (1785). The report of the commission was unfavorable; but 'mesmerism' still flourished. In England valuable works were published in the early forties by J. Braid, a Manchester surgeon (c. 1795-1860); but their sanity and importance have but recently been fully recognized. Braid coined the word 'neurohypnotism,' or nerve sleep, from which comes the modern word hypnotism. During the last third of the nineteenth century the facts of hypnosis were thoroughly investigated by physiologists and psychologists. Heidenhain and Preyer in Germany, Richet, Charcot, Liébault, and Bernheim in France, Delbœuf in Belgium, confirmed and extended Braid's results. The French investigators split into two distinct 'schools': that of Charcot and his followers at the Paris Hospital of the Salpêtrière, and that of Bernheim and his followers at Nancy. The Salpêtrière school maintains that hypnotism is a pathological phenomenon, akin to hysteria, and characterized by three well-marked stages; the school of Nancy asserts that it can be set up in the normal individual, that it is a unitary and progressive stage, and that the key to its understanding is given with the facts of suggestion. The latter views have found general acceptance; but the controversy undoubtedly hindered the advance of knowledge and threw discredit upon the whole subject. It need hardly be said that the doctrines known as animal magnetism, electro-biology, odism or odylism, mesmeric clairvoyance, etc., are one and all—save in so far as they cover the facts of hypnotism proper—fanciful and ungrounded hypotheses.

In considering the psychology of the hypnotic state, we have first to notice that its sole and essential condition is an exaggerated state of passive attention to some object or person. (See ATTENTION.) In popular phraseology there is a 'total surrender of the will' of the subject, either to a sense-impression or to the experimenter's personality. The condition of hypnosis thus lies—and this fact is of extreme importance—in the mind of the subject himself; the experimenter or 'operator' has no power, except as

of Psychology, vol. ii. (New York, 1890); Lehmann, *Die Hypnose* (Leipzig, 1890); Wundt, *Hypnotismus und Suggestion* (Leipzig, 1893); Dessoir, *Bibliographie* (Berlin, 1891); Jastrow, *Fact and Fable in Psychology* (Boston, 1900).

HYPOBOLE, hī-pŏb'ō-lē (Gk. *ὑποβολή*, a throwing under, from *ὑπό*, *hypo*, under + *βάλλειν*, *ballein*, to throw). A figure of rhetoric, whereby each of several arguments that appear to favor the side of one's opponent is introduced only to be refuted in order. See RHETORIC, FIGURES OF.

HYP'OCAUST (Lat. *hypocaustum*, *hypocaustos*, from Gk. *ὑπόκαυστον*, vaulted room with furnace below, from *ὑπό*, *hypo*, under + *καυστός*, *kaustos*, burned, from *καίειν*, *kaiein*, to burn). The name for the subterranean hot-air chamber under the *calidarium* in Roman bathing establishments. The hot air was generated by a circular furnace which heated the water and gave out streams of hot air into the hypocaust, which consisted of a hollow double floor of concrete and tiles, between which were the pillar-like *suspensuræ* of tiles. The hot air was distributed throughout the building from the hypocaust by series of wall and floor flues, giving an even temperature. The system was invented shortly before Augustus, and was soon adopted not only in public baths, but in private houses. It is now coming again into use for heating the so-called 'Turkish baths.' It can be studied in all the details of its arrangement in the ruins of Roman houses and baths. See BATHS.

HY'POCHLO'RITES. See HYPOCHLOROUS ACID.

HY'POCHLO'ROUS ACID, HClO. An acid that may be assumed to be formed when chlorine monoxide (Cl_2O) is dissolved in water. Chlorine monoxide, which decomposes into chlorine and oxygen with explosive violence, may be obtained by the action of dry red oxide of mercury upon chlorine. In aqueous solution, chlorine monoxide is not explosive. The salts of hypochlorous acid are termed *hypochlorites*, and some of them are valuable bleaching agents. Ordinary bleaching-powder is supposed to contain the hypochlorite of calcium; Javelle water contains the hypochlorite of potassium; Labarraque's solution contains the hypochlorite of sodium. Bleaching-powder is made by the action of chlorine on lime; similarly, the hypochlorite of potassium may be obtained by the action of chlorine upon a cold solution of caustic potash. If solutions of hypochlorites are heated, the corresponding *chlorides* and *chlorates* are formed. See BLEACHING-POWDER.

HYPOCHŒRIS, hī'pō-kē'rĭs (Neo-Lat., from Gk. *ὑποχοιρίς*, succory-plant). A genus of plants of the natural order Compositæ, of which one species, *Hypochœris radicata*, or long-rooted cat's-ear, is extremely common in meadows and pastures in Great Britain and other parts of Europe. Its leaves, which are all radical, and spread on the ground, resemble in form those of the dandelion, but are rough; the stem is branched, the flowers somewhat similar to those of the dandelion, but smaller. Cattle eat this plant readily,

HYPOCHONDRIA, hī'pō-kŏn'drĭ-ȧ. See HYPOCHONDERS; HYPOCHONDRIASIS.

HYP'OCHONDRI'ASIS (Neo-Lat., from Lat. *hypochondrium*, Gk. *ὑποχόνδριον*, hypochondriac region; so called because of the supposed connection of the disease with this part of the body). A disease characterized by extreme increase of sensibility, palpitations, morbid feelings that simulate the greater part of diseases, exaggerated uneasiness, and anxiety, chiefly in what concerns the health, etc. In extreme cases it becomes a species of insanity. The disease is very frequently associated with disorder of the digestive functions. See INDIGESTION.

When sombreness of disposition and anxiety concerning personal comfort become exaggerated, and attention is directed chiefly to the state of the health, it amounts to common hypochondriasis. When it passes beyond the control of the will, when the whole mind is directed to the state of the system, or to particular organs, and exalts and misinterprets sensations, the condition is designated hypochondriacal insanity. The disease may be described as the engrossment of the attention by false impressions conveyed, or conceived to be conveyed, from internal organs. These sensations may, in many instances, be real, and proceed from actual alterations in the structure or functions of the parts supposed to be affected; but they may likewise consist of ordinary sensations, excited and intensified by the act of attention which makes them known to the patient. Neither the experience nor the sufferings of the victims are imaginary, however absurd their errors, and however groundless their apprehensions may be; the disease is real, and consists in the exaltation of sensibility and attention, and in the delusions which originate in that morbid state. A man lives in constant fear of death; he is firmly convinced that he labors under cancer, consumption, disease of the heart, etc. Hypochondriasis is often a precursor of melancholia, or other kinds of alienation; but it must likewise be regarded as a distinct and independent affection, traceable, generally, to disorder of the digestive and assimilative apparatus, to sexual excess or other debilitating influences. Such patients always should be watched, for many of them commit suicide while temporarily under the influence of an hallucination or a delusion. Diversion, camp life, hunting, fishing, and other occupations should engross the patient's attention during an outdoor life, or travel should be his resource, always in the society of a lively, healthy companion. Drugs alone produce little benefit. Consult: Falret, *De l'hypochondrie et du suicide* (Paris, 1822); Bucknill and Tuke, *Psychological Medicine* (London, 1879); Mercier, *Psychology, Normal and Morbid* (London, 1902).

HY'POCOTYL (abbreviation of *hypocotyledonous*, from Gk. *ὑπό*, *hypo*, under + *κοτυληδών*, *kotylēdōn*, cotyledon, from *κοτύλη*, *kotylē*, socket). In seed-plants, the axis of the embryo below the cotyledons. This axis has been variously called 'radicle' and 'caulicle,' but since it has peculiar powers which do not belong to ordinary root and stem structures, it has received a distinctive name. See EMBRYO.

HYPOCRITE, THE. A play by Isaac Bickerstaffe, produced in 1768, and founded on Cibber's *Non-Juror*, which, in turn, was taken from the *Tartuffe* of Molière.

HY'POCY'CLOID. See CYCLOID.

HY'PODER'MIC MEDICATION (from Gk. *ὑπό*, *hypo*, under + *δέρμα derma*, skin). Introduction of medicines beneath the skin, with a hypodermic syringe. This method is often preferable to that of giving them by the mouth. The stomach is sometimes in a condition which will not bear the presence of drugs, particularly narcotics, and these are the agents which are most frequently administered hypodermically. A small graduated glass syringe attached to a slender hollow needle, cut off obliquely so that its sharpened extremity may easily be made to pierce the skin, is used. The medicine may be thrown in just beneath the skin, or the point of the syringe is thrust into the body of a muscle. The wounding of blood-vessels or nerves should be carefully avoided, and therefore the operation should not be undertaken except by a physician or a trained nurse. Local pains may generally be more successfully treated in this manner than by the common method. In some cases an anæsthetic may, however, be preferable. It is usual to make a special preparation of the drug which is to be introduced. The syringe must be completely filled when used, as the introduction of an air-bubble into a vein might be attended with danger. All instruments and drugs used should be thoroughly sterilized. The hypodermic syringe should be used with great caution, and never by the patient.

HY'PODER'MIS (Neo-Lat., from Gk. *ὑποδερμίς*, under-skin, from *ὑπό*, *hypo*, under + *δέρμα*, *derma*, skin). In plants, a layer of cells beneath the epidermis. An archesporial cell is said to be hypodermal in origin when it arises immediately beneath the epidermis. Tissues bordering directly upon the epidermis are called *hypodermal*.

HYPOGYNY, hī-pŏj'ĭ-nĭ (from Gk. *ὑπό*, *hypo*, under + *γυνή*, *gynē*, woman). The condition in a flower in which the sepals, petals, and stamens arise from beneath the ovary. As a consequence, the ovary is seen inside of the flower, and is often spoken of as 'superior.' The contrasting term is 'epigyny' (q.v.). Hypogynous flowers are considered to be more primitive in character than epigynous flowers. See FLOWER.

HY'PONASTY (from Gk. *ὑπό*, *hypo*, under + *ναστός*, *nastos*, close-pressed, from *νάσσειν*, *nassein*, to pack closely). A term applied by DeVries to the occurrence of greater growth upon the under side of a dorsiventral organ, which produces therefore an upward curvature. This may be due to internal or external causes. It is the common condition of young leaves and flower parts when they are in the bud. The correlative term is epinasty. See GROWTH.

HY'PONI'TRITES. See HYPONITROUS ACID.

HY'PONI'TROUS ACID, $H_2N_2O_2$. An acid which may be obtained in dilute aqueous solution, or in the form of its salts, but which has not been isolated in a concentrated state. Its salts are termed *hyponitrites*. It may be obtained by allowing sodium amalgam to act upon barium nitrite, neutralizing the resulting solution with acetic acid, precipitating with silver nitrate, and decomposing with hydrochloric acid the silver hyponitrite thus obtained. Silver hyponitrite, $Ag_2N_2O_2$, explodes if heated to a moderately high temperature. The solution of free hyponitrous acid decomposes, on heating, into nitrous oxide ('laughing gas') and water.

HY'POPHOS'PHITES. See HYPOPHOSPHOROUS ACID.

HY'POPHOS'PHOROUS ACID, H_3PO_2. A crystalline compound that melts at about 17.5°C. and is readily transformed into ordinary phosphoric acid. It may be obtained by boiling caustic potash with phosphorus, subsequently adding sulphuric acid, concentrating the solution by evaporation and allowing it to crystallize in the cold. The salts of hypophosphorous acid are termed hypophosphites, those of iron, calcium, sodium, and potassium being extensively used in medicine, and often forming ingredients of patent medicines which are claimed to be valuable remedies for tuberculosis. Most such preparations are worthless, being mixtures of the hypophosphites of two or more metals, the several ingredients of which may counteract one another; and some such mixtures are positively harmful. On the other hand, if prescribed separately, in moderate doses, by a competent physician, the hypophosphites often constitute valuable therapeutic agents, inasmuch as they have the effect of improving nutrition and relieving some of the symptoms of phthisis. The hypophosphite of potassium may be used as an expectorant in chronic bronchitis. The officinal syrup of hypophosphites contains several hypophosphites, a considerable amount of free hypophosphorous acid, and often some iron.

HYPOS'TASIS (Neo-Lat., from Gk. *ὑπόστασις*, *hypostasis*, subsistence, from *ὑπόστατος*, *hypostatos*, substantial, from *ὑφιστάναι*, *hyphistanai*, to stand under, from *ὑπό*, *hypo*, under + *ἱστάναι histanai*, to stand). A term of Greek theology, variously employed before the fourth century, but at last technically used to denote personal distinctions in the Godhead. The Council of Nicæa (325) did not clearly distinguish between *hypostasis* and *ousia* (substance and essence), and a controversy followed. (See HOMOOUSION.) The same uncertainty appears in the West as late as Augustine, who confesses that he does not understand the difference between the two Greek words (*De Trinitate*, v. 8, 10). But gradually the two words were differentiated, and *hypostasis* came to be used exclusively for the personality of Father, Son, or Holy Spirit. It was thus interpreted as being equivalent to *prosopon*, which the Latin rendered by *persona*, whence our word 'person.' The fully developed trinitarian dogma asserts one essence, or substance (*ousia*), and three persons (*hypostasis*) in the Godhead. This has remained the orthodox faith of the Church. Consult: the *Histories of Doctrine*, by Harnack, vol. iv. (London, 1898);

Loofs (Halle, 1893); and Fisher (New York, 1896). See TRINITY.

HY'POSTAT'IC UNION. A term used to describe the union of Christ's human nature to the hypostasis or person of God the Word, in virtue whereof, while each nature is complete, even after union, yet there is but one undivided person of the God-man, to which all the actions, whether divine or human, are ascribed. This form of expression was devised for the purpose of excluding the doctrine of a mere moral union held by Nestorius. See MONOPHYSITES; NESTORIANS; TRINITY.

HY'POSUL'PHITES. See THIOSULPHURIC ACID.

HYPOT'ENUSE (Fr. *hypoténuse*, from Gk. *ὑποτείνουσα, hypoteinousa*, subtending, from *ὑποτείνειν, hypoteinein*, to subtend, from *ὑπό, hypo*, under + *τείνειν, teinein*, to stretch). That side of a right-angled triangle opposite to the right angle. The hypotenuse is the longest side of the triangle, and its mid-point is the centre of the circumscribed circle. According to the famous 47th proposition of the first book of Euclid's *Elements:* The square of the hypotenuse of a right-angled triangle equals the sum of the squares on the other two sides; the proof of this proposition is attributed to Pythagoras.

HYPOTH'ECA'TION (ML. *hypothecatio*, from *hypothecare*, to hypothecate, from Lat. *hypotheca*, from Gk. *ὑποθήκη, hypothēkē*, pledge, from *ὑποτιθέναι, hypotithenai*, to place under, from *ὑπό, hypo*, under + *τιθέναι, tithenai*, to place). At Roman law hypothec was the right to take and sell property belonging to another to satisfy a claim. Any balance (*hyperocha superfluum*) remaining after a creditor's claim was satisfied was restored to the former owner of the property. Hypothec might be established by the act of the owner (English mortgage), or it might be created by law (English lien). In either case the hypothecation might be of real property or of personal property, or of both. Many of the legal liens extended over the debtor's entire estate, real and personal. Hypothec was distinguished from pignus or pledge, in that it was established without delivery of possession. In modern civil law the term hypothec is commonly restricted to the mortgage or lien upon real property. At French law a lien upon movables or upon an entire estate is termed a 'privilege.' In Spanish law the term is restricted to the contractual mortgage of real property; all legal liens, whether upon realty or personalty, are 'preferences.' In Scotland, however, a legal lien upon personal property is called a hypothec. Consult the authorities referred to under CIVIL LAW.

HYPOTH'ESIS (Gk. *ὑπόθεσις*, supposition, from *ὑποτιθέναι, hypotithenai*, to place under, from *ὑπό, hypo*, under + *τιθέναι, tithenai*, to place). In scientific procedure, a conjecture as to the explanation of any phenomenon, made provisionally and used as a starting-point for further investigation and theory. Thus in studying the motion of the moon Newton made the hypothesis that its divergence from the straight line was due to the same cause that brings an apple to the ground when released from the stem. He then proceeded to find whether the rate of fall in the two cases was expressible by some single formula. After years it was discovered that this was the case. It is now quite generally admitted that an hypothesis, to have any value, should be based on some known law, and should be the conjectural extension of that law to a new sphere under investigation. Thus Newton worked from the known law of gravitation on the surface of the earth. The hypothesis of a luminiferous ether is based on the known laws of the motion of fluids, etc. Such a known law is called a *vera causa*. Some logical purists insist not only that the point of departure must be a known law, but that the extension of this law to another sphere may not be legitimately made unless its extension is at least conceivably verifiable by sense-perception. Thus they claim that the existence of the luminiferous ether is not a rigidly logical hypothesis, because the ether is thought of as having no properties perceivable by our senses without the use of instruments that no one even supposes capable of construction. Such an interpretation of the *vera causa* is, however, not in accordance with actual scientific practice, nor is it theoretically justifiable. It would rule out the hypothesis of the prevalence of gravitation even within the solar system, as no one ever did or presumably ever will perceive with any of his senses the action of gravitation except as a *movement*, and this movement is the thing to be explained by the law of gravitation, and not its further perceptual justification. An hypothesis is a provisional attempt to *think* things together as instances of the prevalence of the same law; and all that is necessary to make an hypothesis valuable is that it should furnish some conception which shall at least provisionally unify experience by reducing it to law. A distinction is often made between theory and hypothesis. A theory is said to be a verified hypothesis. This distinction is one of degree, not of kind. Even an hypothesis which has been 'verified' may be overthrown by new facts; so that it is rather the fashion nowadays to speak of all the conceptions of natural science as '*working* hypotheses,' and to say that they are accepted only tentatively as the basis for further investigations and for further theorizing on results. As to whether there is any unconditional element in scientific conceptions, see KNOWLEDGE, THEORY OF. For bibliography of the subject, see the works cited in the article LOGIC.

HYPOTHETICAL QUESTION. A legal term for the proper form of question to be asked an expert witness. See EXPERT EVIDENCE.

HYPOXANTHIN, hī'pŏ-zăn'thĭn (from Gk. *ὑποξανθος, hypoxanthos*, yellowish-brown, from *ὑπό, hypo*, under + *ξανθός xanthos*, yellow), or SARKIN, $C_5H_4N_4O$. An organic substance chemically allied to xanthin, which it usually accompanies. If given to birds, hypoxanthin is excreted largely in the form of uric acid; it is not known by what organ this transformation is effected—probably not by the liver. See XANTHIN.

HYPSIPYLE, hĭp-sĭp'ĭ-lē (Lat., from Gk. *Ὑψιπύλη*). The daughter of Thoas of Lemnos, whom she saved when the women of the island killed all the other men in revenge for their neglect. When the Argonauts came to Lemnos, Hypsipyle became by Jason the mother of two sons, Euneus and Nebrophonus or Thoas. Having been driven out because she had spared her father. Hypsipyle became the nurse of Opheltes, son of the Arcadian King Lycurgus. When

Adrastus and the other heroes were on their way to the siege of Thebes, they met Hypsipyle in the Nemean forest and begged her to show them a spring, and during her absence the boy was killed by a serpent. For this neglect she was imprisoned, but was rescued by her sons. The funeral games instituted by the heroes for the dead Opheltes were the origin of the Nemean Games.

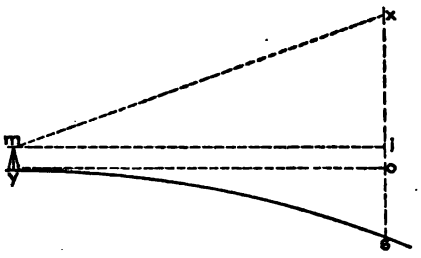
HYP'SISTA'RIANS (from Gk. Ὑψιστάριοι *Hypsistarioi*, Hypsistarians, from ὕψιστος, *hypsistos*, most high, from ὕψι, *hypsi*, on high). A small sect which existed in the fourth century in Asia Minor. It seems to have been monotheistic and Jewish in some of its features, and in others Christian, debased by Sabean elements. Thus it taught the unity of the Deity, and His universal dominion; that sacrifices and other phenomena of external worship were to be given up; at the same time it enjoined Sabbath observance and the dietary laws of the Jews.

HYPSOM'ETER (from Gk. ὕψι, *hypsi*, on high + μέτρον, *metron*, measure), or THERMO-BAROMETER. An instrument to determine the atmospheric pressure and altitude at a given point by ascertaining accurately with a thermometer the temperature at which water boils. The boiling-point of water diminishes with a decrease in the pressure of the atmosphere, and this always comes with an increase in elevation above the sea-level. With the barometer (q.v.) it is possible to measure heights with considerable exactness; consequently, by knowing the atmospheric pressure corresponding to the temperature at which water boils, we are able to find the altitude. The apparatus to determine the boiling-point was first used by Wollaston in 1816, and consisted of a metal vessel containing a delicate and carefully tested thermometer with graduations extending from 80° to 100° C., which could be read to .01 of a degree. There is a spirit lamp to boil the water, and the instrument is far more portable than a mercurial barometer. The relation between the boiling-point of water, the height of the barometer, and the altitude is shown in the following table, which is calculated for a mean temperature:

Boiling-point (Centigrade).	100°	99°	98°	97°	96°	95°	94°	93°	92°	91°	90°
Height of barometer (mm.).	760	732.2	707.1	681.9	657.4	633.7	610.6	588.3	566.7	545.8	525
Elevation (in meters).....	0	305	610	920	1225	1540	1850	2165	2485	2800	3120

From this table it will be seen that a variation of .1° in the boiling-point at sea-level corresponds to a decrease in the height of the barometer of 2.7 mm., at an elevation of 1000 meters 2.5 mm., at 2000 meters 2.2 mm., and at 3000 meters 2 mm. An approximate rule to determine the elevation of a place by this method, expressed in feet and Fahrenheit degrees, is to multiply the difference between the observed boiling-point and 212° by 550, if the height is less than half a mile, and by 560 if it is in excess of that amount, these factors representing the average amount of altitude corresponding to 1° at 70° Fahrenheit.

HYPSOM'ETRY. The art of measuring heights on the earth's surface. Such measurements are performed by means of trigonometrical observations and calculations; by running a line of precise levels starting from mean sea-level and terminating at the point whose height is to be measured, and by barometric observations and calculations. The second of these methods of measurement gives exact heights, but the other two methods give approximate heights only. To illustrate the application of the three methods of measurement a supposititious case will be assumed and each method applied to its solution. Let *x* represent the top of a mountain whose heights above the base *s* it is desired to measure by trigonometrical observation, and whose distance *mi*



from the point of observation is known. The instrument is set up at *y* and by it the vertical angle *imx* is measured. This gives the observer a triangle *mix*, of which the side *mi*, the angle *imx*, and the angle *mx* (90°) are known, and from these data he can readily calculate the length of the side *ix*. To this dimension in order to get the height of the mountain he must add the dimension *io*, which is the height of the instrument above the ground, and the dimension *os*, which is due to the curvature of the earth. The dimension *io* is easy to determine, but *os* has to be calculated. Now the curvature of the earth is 0.667 foot, or nearly 8 inches in one mile, and increases as the square of the distances, being thus 32 inches in two miles and 72 inches in three miles. If then the distance *mi* is one mile the dimension *os* is 0.667 foot. Owing to the refraction of the atmosphere, however, the point *x* always appears to the observer to be higher than it really is, and at an average this deceptive elevation amounts to one-seventh of the curvature of the earth, and, like the latter, varies with the square of the distance. For a distance *mi* equal to one mile, then, the dimension *os* is 0.667 foot, due to curvature minus one-seventh of 0.667 foot due to refraction, which makes it 0.5714 foot. In careful geodetic work the calculations for refractions and curvature are made with much more precision than is done above and the instrument observations are made with exceeding care, but the general method is the same. At best such measurements are only approximate, since the determination of the refractions, which depends upon the atmospheric conditions, can be approximate only. To measure the height *xs* by leveling, the observer starts from mean sea-level and runs a line of precise levels inland, which terminates at the point *x*, and establishes accurately its height above mean sea-level. The same result may be accomplished by starting the line of levels to *x* from a point on a line of levels previously run from mean sea-level. The method of running precise levels differs from ordinary spirit level-

ing (see LEVEL, LEVELING) only in the greater accuracy of the methods and instruments used.

For measuring heights by barometric observations the form of barometer known as the aneroid barometer is usually used. Mercury barometers may of course be used, but usually they are not, owing to the greater difficulty in transporting them and of keeping them in proper working order. The adaptability of the barometer as an instrument for measuring heights depends upon the facts that the mercury column falls as the atmospheric pressure decreases, and that the atmospheric pressure decreases gradually as we ascend above the sea-level. As a rough average it may be assumed that the barometer falls 1-10 inches for about 106 feet rise. To measure the height sx, therefore, barometer readings are taken simultaneously at s and at x, and from them the difference in height of s and x may be found by the formula,

$$d = 6000\ (\log. H - \log. h)\left(1 + \frac{T + t - 60}{900}\right)$$

in which d equals the difference in height; H and h are the two readings, and T and t are the temperature of the two stations in degrees Fahrenheit. In the most accurate barometric work various refinements of observation and calculation are introduced, but the general principle of the operation is the same as has been described. Barometrical measurements of heights are only approximate, since the moisture and dryness of the air, the wind, and various other atmospheric phenomena cause variations in the readings recorded, and no formula can possibly be devised that will embrace all these sources of error. Simultaneous observations, with barometers adjusted to the same standard, give the most reliable results. For a full discussion of the methods of measuring heights by trigonometrical leveling, precise leveling, and barometric observations, the reader may consult Johnson, *Theory and Practice of Surveying* (New York, 1900). See SURVEYING.

HYRA'CEUM (Neo-Lat., from Gk. ὕραξ, *hyrax*, mouse; connected with Lat. *sorex*, shrew-mouse). A peculiar substance found in the crevices of the rocks of Table Mountain, Cape of Good Hope. It is one or more of the excrements of the Cape hyrax (*Hyrax capensis*). Hyraceum is a blackish-brown viscid material, not unlike soft pitch, having a strong and offensive taste, not unlike castoreum, for which it has been used as a substitute in medicine, though now obsolete. At one time so large a quantity was found as to suggest the idea of its being used as a manure, but the supply was soon exhausted.

HYRACO'DON (Neo-Lat., from Gk. ὕραξ, *hyrax*, mouse + ὀδούς, *odous*, tooth). A primitive fossil rhinoceros found in the Miocene rocks of Western America and Europe. See RHINOCEROS.

HY'RACOTHE'RIUM (Neo-Lat., from Gk. ὕραξ, *hyrax*, mouse + θηρίον, *thērion*, diminutive of θήρ, *thēr*, wild beast). An extinct four-toed ungulate mammal of the size of a fox, generally considered as an ancestral horse, remains of which are found in the Lower Eocene deposits of Europe and Western North America. See HORSE, FOSSIL.

HY'RAX (Neo-Lat., from Gk. ὕραξ, mouse). A general name for a suborder (Hyracoidea) of small peculiar ungulate mammals comprised in a single genus and family (Procavia, Procaviidæ), whose species are locally called 'conies,' 'damans,' and 'rock-rabbits.' Some fourteen species are known in Southwestern Asia, and in Eastern and Southern Africa. Although having the size and superficial appearance of rodents, and long so considered, Cuvier pointed out their essential agreement, in dentition and anatomical characters, with the ungulates. The molars are quite similar to those of the rhinoceros, but the upper jaw has two incisors curving downward, and during youth two very small canines, the lower jaw four incisors without canines. The skull, also, and other bones resemble those of the rhinoceros. The muzzle is short and pointed; the ears short and round. The ribs are more numerous than even in the rhinoceros—21 pairs, a number exceeded in no quadrupeds except the sloths, whereas no rodent has more than 15 pairs. The toes are united by the skin, as in the elephant and rhinoceros, and are round and soft, merely protected in front by a broad nail, which does not reach the ground. The legs are short. The tail is a mere tubercle. Their bodies are clothed with thick, uniformly dark-brown hair, except that it is discolored around a curious gland near the middle of the back, which is naked in several species.

The habits of all the conies (except the tree-hyraces) are much alike. The typical Abyssinian species live in rocky or stony places, in communities, like rabbits, and make their homes in holes under rocks or in a rocky watercourse. They seem to be mainly nocturnal and feed at night or in the early morning on leaves and young shoots of trees and bushes. In daytime they lie on rocks in the shade until toward noon, when they are likely to retire to their holes. They are very timid, and disappear when they are in the least danger. The only sound they seem to make is a shrill squeak when suddenly alarmed. This description will remind the reader of the closely similar behavior of the pikas (q.v.) of the Rocky Mountains, often called 'conies.' Mosely speaks of 'a short, hissing noise,' as the alarm cry of the Cape hyrax. All climb about smooth rocks with wonderful agility, which is explained by soft, almost suction-giving pads on the soles of their feet. (Consult Schweinfurth, *Heart of Africa*), vol. i., Leipzig, 1878.) The species longest known is the only Asiatic one (*Procavia Syrica*), which inhabits Arabia, Syria, and Palestine, and is the animal called 'cony' in the ordinary version of the Bible, for which the Syrian name is 'daman.' It was among those animals prohibited to the Israelites under the mistaken belief that they chewed the cud; but they are now eaten by the Arabs, though not regarded as very palatable by Europeans. Several species inhabit Abyssinia and East Africa, down to Mozambique; and Cape Colony and Natal are the home of a kind (*Procavia Capensis*) having very fine soft brown fur, with the spot on the back black, which is familiar to the English colonists under the names 'rock-badger' and 'rock-rabbit,' and to the Dutch as 'dasse.' They are often tamed as pets.

Three species of the genus Dendrohyrax, which live in East and West Equatorial Africa, differ decidedly from other conies by the habit of spending their lives and making their breeding nests in holes in trees. These three species agree in that the females have but a single pair of teats (other hyraces have three pairs), and the West Coast one

is remarkably large and furry, so that its skin is of much value as material for cloaks.

Consult for systematic revision of the order, Thomas, "On the Species of the Hyracoidea," in *Proceedings of the Zoölogical Society of London* (London, 1892).

HYRCA'NIA (Lat., from Gk. Ὑρκανία, *Hyrkania*). An ancient district of Asia, south of the Caspian Sea (anciently called *Hyrcanum Mare*), bounded on the southeast by the Sariphi Mountains (now Elburz), which separated it from Parthia, and on the west by Media. It corresponded to the modern Mazanderan and Astrabad. The district is called *Vehrkâna* in the *Avesta*, a name which recalls the ancient name for wolf (*vahrka*). The region was wild and heavily wooded, and not generally fertile with the exception of the valleys among the hills, which produced corn, oil, and wine.

HYRCA'NUS (Lat., from Gk. Ὑρκανός, *Hyrkanos*). The name of two Jewish high priests and princes of the Asmonean family. (1) JOHN (Heb., Johanan) HYRCANUS, son of Simon Maccabæus, was, during the lifetime of his father, governor of the seacoast, with his seat in Gazara, and defeated Cendebæus, the Syrian general. When Ptolemy succeeded in murdering Simon, an attempt was made also on Hyrcanus, but he escaped and obtained control of Judea (B.C. 135). At the beginning of his reign Antiochus Sidetes invaded the country, and Hyrcanus was compelled to sue for peace after having been shut up in Jerusalem. Antiochus showed himself inclined to be sparing and Jerusalem escaped destruction. Shortly afterwards Judea assisted Antiochus in a campaign against his brother, Demetrius Nicator, in which, however, Antiochus lost his life. Demetrius's short reign marked a period of internal dissensions in Syria, which enabled Hyrcanus to establish the independence of Judea. In this his alliance with Rome (a policy inaugurated by his uncle Judas and followed by his father Simon) was of material help. After the fall of Demetrius and his rival Alexander Zabina, Hyrcanus began (B.C. 123) the conquest of troublesome neighbors. First attacking Medaba in the Jordan district, he marched toward Schechem and succeeded in destroying the Samaritan temple on Mount Gerizim (c. 120 B.C.), though the Samaritans were not brought to submission till c. 109 B.C. Next the Idumæans were conquered and compelled to accept the Jewish faith. Even the trans-Jordanic peoples felt the power of Hyrcanus, and under his strong rule Judea reached the highest point of its power and equaled the Judea of Solomon's day. Coins were minted with the inscription, "Johanan High Priest and Chief of the Commonwealth of the Judeans." Like the Maccabees before him, Hyrcanus was a Pharisee, but because of an aspersion cast upon his mother, who had been a prisoner of war, he became a Sadducee, and the latter part of his reign was involved in this factional difficulty. He died in B.C. 105 and left five sons—Aristobulus, Antigonus, Alexander, Absalom, and another whose name is not known—two of whom, Aristobulus I. and Alexander Jannæus, governed with the title of king. (2) HYRCANUS II., son of Alexander, and grandson of the preceding. On the death of his father, B.C. 79 (or 78), he was appointed high priest by his mother, Salome Alexandra, who ruled Judea herself for several years. After her death (B.C. 69), he became temporal ruler also; but his younger brother, Aristobulus, an abler and more energetic man, seized the government, and forced Hyrcanus to make an agreement by which Aristobulus was to rule and Hyrcanus be only high priest. Induced by the Idumean Antipater, he broke this agreement, and, aided by Aretas, King of Arabia Petræa, he endeavored to win back his dominions. Scaurus, the legate of Pompey, was bribed by Aristobulus, and Aretas had to abandon the siege of Jerusalem. By counter bribery on the part of Antipater, Hyrcanus obtained the control. Pompey took away the kingship from Hyrcanus, leaving him high priest, and proclaimed Antipater governor of the country. Aristobulus and his two sons, who had been carried away captives, tried at different times to wrest the power from Antipater, but failed. Finally, in B.C. 47, Cæsar made Hyrcanus tetrarch and high priest and Antipater was made procurator. Those around Hyrcanus and Hyrcanus himself began to suspect Antipater, and, while banqueting with Hyrcanus, Antipater was poisoned (B.C. 43), though Hyrcanus was not involved in this act. In B.C. 40 Antigonus, son of Aristobulus II., with the help of the Parthians, invaded the land, captured Hyrcanus by treachery, cut off his ears, and thus disqualified him for the office of high priest, and carried him off to Seleucia, on the Tigris. Some years later Herod, son of Antipater, obtained supreme power in Judea, and invited the aged Hyrcanus home to Jerusalem. For some time he lived in ease and comfort, but, falling under suspicion of intriguings against Herod, was put to death (B.C. 30). Consult Grätz, *Geschichte der Juden* (Berlin, 1854-75), vol. ii., chaps. i.-iii.

HYRIEUS, hī-rī'ē-ŭs *or* hĭr'ĭ-ŭs (Lat., from Gk. Ὑριεύς, *Hyrieus*, Οὐριεύς, *Ourieus*). Son of Poseidon and King of Hyria in Bœotia, for whom Agamedes and Trophonius built a treasure-house. In this, one stone was so arranged that it could be removed from the outside, thus enabling them to plunder the treasury at will. When Agamedes was finally caught in a trap set by the King, Trophonius cut off his brother's head to prevent discovery, and fled to Lebadea, where he was swallowed up by the earth. (See TROPHONIUS.) The story is that of Rhampsinitus in Herodotus, and is found as a folk-tale in many lands, and in many variations.

HYRTL, hēr't'l, JOSEPH (1810-94). An Austrian anatomist, born in Eisenstadt in Hungary. He was educated at the University of Vienna. He became professor of anatomy at Prague in 1837, and filled a similar position at Vienna from 1845 to 1874. His last years were spent in retirement and almost total blindness. Hyrtl endowed several charities in Vienna. His high rank in the scientific world was recognized before his death by the erection of a colossal marble statue in the arcade of the University of Vienna (1889). His researches dealt with comparative anatomy, especially that of fishes, the construction of the ear and of the testicles, and above all, with the subject of angiology, in which his great discoveries were made. Besides monographs on such subjects, including *Untersuchungen über das Gehororgan des Menschen und der Saugetiere* (1845), *Vergleichende Angiologie* (1850), and *Die Blutgefässe der menschlichen Nacheburt* (1870), he wrote on general anatomy, *Lehrbuch der Anatomie des Menschen* (1846; 20th ed. 1889), and a valuable and original *Handbuch der*

topographischen Anatomie (1847; 7th ed. 1882); and on the history of anatomical nomenclature, *Das Arabische und Hebräische in der Anatomie* (1879), *Onomatologia anatomica* (1880), and *Die alten deutschen Kunstworte der Anatomie* (1884). But his most important work was as a technical anatomist. He had great practical skill, devised special preparations for the dissection of various organs and a microscopical preparation to show capillary vascular network of the lesser organs, and wrote a *Handbuch der praktischen Zergliederungskunst* (1860).

HYSLOP, hīs'lop, JAMES (1798-1827). A Scottish poet, born and brought up on a farm in Kirkconnel Parish, Dumfriesshire. He was entirely self-taught, but while in the employ of a sheep-farmer in Muirkirk (1812-16), he became imbued with the Covenant associations of Airdsmoss, which inspired his best poem, "The Cameronian's Dream" (*Edinburgh Magazine*, 1821). Besides other poems, he published in the same periodical his accounts of a three years' voyage to South America, whither he was taken as tutor on a war-ship, having had previous experience of teaching in Greenock. After spending three years ashore, in teaching and journalism, Hyslop embarked again as tutor on H.M.S. *Tweed*, but within a month died of fever near the Cape Verde Islands, and was buried in the Atlantic. His poems, eighty-two in all, were published in Glasgow (1887), and two years afterwards his masterpiece was set to music by Hamish McCunn (q.v.).

HYSSOP (AS. *ysope*, from Lat. *hysopum, hyssopum, hyssopus*, from Gk. *ὕσσωπος, hyssōpos, ὕσσωπον, hyssōpon*, hyssop, from Heb. *ēzōb*, sort of aromatic plant), *Hyssopus*. A genus of one species of the natural order Labiatæ. The common hyssop (*Hyssopus officinalis*), a native of Southern Europe and the East, and naturalized in the United States, is a half-shrubby evergreen plant, about 1½ feet high, with beautiful blue flowers arranged in one-sided whorled racemes. It has long been cultivated for its aromatic leaves, young shoots, and seeds, which are sometimes used to season salads and soups, but more generally in a dried state as a stomachic and carminative. The virtues of hyssop depend on a volatile oil. A syrup made from the leaves is sometimes used for colds, but the plant is less in favor than formerly. It has been supposed that the hyssop of the Bible is some species of Phytolacca, as Phytolacca acinosa, a native of the Himalayas; but the common caper has also been so considered. Hedge-hyssop is Gratiola officinalis.

HYSSOP.

HYSTASPES, hīs-tās'pēz (Lat., from Gk. Ὑστάσπης). A name found several times in Persian history. (1) It was the name of the father of King Darius I., and according to the Old Persian inscriptions he was Governor of Parthia, and his father's name is given as Arshāma, which agrees also with Herodotus. The name Hystaspes, or Vishtaspa, of the inscriptions, is identical in form with Vishtaspa, the name of Zoroaster's patron, in the *Avesta;* but there is no historical ground for identifying the two personages, as has been erroneously done by some. The allusion to Hystaspes in Lactantius in the Church Fathers seems to have reference to Zoroaster's patron. Consult Jackson, *Zoroaster, the Prophet of Ancient Iran* (New York, 1898). (2) HYSTASPES, the son of Darius I. and Atossa, was a brother of Xerxes, and commanded a force of Bactrians and Sacæ in the latter's army.

HYSTASPES. An ancient author, according to the testimony of several of the Church Fathers. He is supposed to have been a *magus* who wrote a book called *Vaticinia*. Of his life or date we are entirely ignorant. Two passages regarding his writings occur in Justin Martyr, one saying that he foretold the destruction of the world by fire, as the Sibyl did, and the other mentioning the book in connection with the Sibylline works and the prophetic books of the Old Testament as loathed by the evil demons. There is in the writing of Clement of Alexandria a reference of doubtful meaning, but usually construed to say that the work was in existence in the second century, and that it referred to the coming of the Messiah and to His kingdom; and another in Lactantius, where Hystaspes, like the Sibyl, is said to predict the destruction of Rome, and is quoted as describing the wickedness of the last time, its misery, and the final destruction of the unjust. The name points to Persian origin; but the possibility that it was merely the name of the work, as seems evident from the passage in Clement, when the choice would be due to the fame of the Magians, makes the origin of the work uncertain. Even its existence cannot be considered proved, much less that of an author called Hystaspes. Consult Kuhn, "Eine zoroastrische Prophezeiung in christlichem Gewande," in *Festgruss an Roth* (Stuttgart, 1893).

HYSTERE'SIS (Neo-Lat., from Gk. *ὑστέρησις*, deficiency, from *ὑστερεῖν, hysterein*, to be behind, from *ὕστερος, hysteros*, latter; connected with Skt. *ud*, AS. *ūt*, OHG. *ūz*, Ger. *aus*, Eng. *out*). The name given a phenomenon in the magnetization of magnetic substances, which was first observed by Warburg, in 1881, and later, in 1885, independently by Ewing, to whom the name is due. It is found that if a rod of iron—or any magnetic substance—is placed in a magnetizing helix, and the electric current through this gradually increased to a certain value, and then slowly decreased, the magnetic properties of the rod do not follow the same course when the magnetizing current is decreasing as they did when it was increasing. All the properties due to the magnetization—the induction, the change in length, the change in elasticity, etc.—lag behind the magnetizing force. That is, if these properties have certain values for a given magnetizing force when the current is increasing, they will not return to the same values, when, as the current is decreasing, the same magnetizing force is reached; but this force must be still further decreased, or even reversed, before these same values are again obtained. The amount of hysteresis varies greatly with different qualities of iron and steel, and with different substances. Its value is most important from a commercial

standpoint, because each time the magnetization of a piece of iron is reversed—as happens at each alternation of an alternating electric current—there is a definite amount of energy lost in heating the iron, and this amount depends on the hysteresis. There is another kind of hysteresis which is quite different. If a given magnetizing current is applied suddenly to a rod of iron, it may not attain its full magnetism instantly; and the fact that time is required to reach this is said to be due to 'viscous' hysteresis or 'magnetic lag.' For a full discussion of the importance of hysteresis, and of the molecular theory, which explains it, consult Ewing, *Magnetic Induction* (London, 1891). See MAGNETISM.

HYSTE'RIA (Lat., from Gk. ὑστέρα, *hystera*, womb; connected with Lat. *uterus*, womb, Skt. *udara*, belly). A diseased state of the nervous system characterized by a great variety of symptoms denoting disordered nervous functions. It was formerly considered to be disease of the womb, and hence came its name; and it was at one time thought to be trifling and under the control of the will of the patient. Both these ideas are erroneous; for hysteria is frequently found among males, and is a disease of very serious nature, involving not only the brain and spinal cord, but also the peripheral nerves and the sympathetic system. While comparatively rare among Anglo-Saxons, it is said to be widespread among Latin nations and Scandinavians, being especially frequent among the French. Hysteria arises from predisposing causes of an hereditary nature, such as parental alcoholism, epilepsy, insanity, or hysteria, as well as injudicious training or education in youth, with depressing influences, as of surroundings. Exciting causes are overwork, worry, excessive responsibility, sexual excesses, profound or prolonged grief, and emotional or other mental shock, and lastly severe trauma, such as a railway accident, fall, or blow may produce. Hysteria is found among the working classes as well as among the idle, wealthy, and self-indulgent, who have never learned self-control or practiced self-denial. Two forms of hysteria are described, for reasons of convenience rather than for scientific reasons, as follows: (1) The form of the disease in which the patient is excitable, emotional, and perverse without cause and without intention, and has disturbances of sensation, motion, circulation, secretion, and excretion; usually falling into this condition after strain or stress, a disappointment, or great fatigue. (2) The form of the disease in which the patient has convulsive attacks, known by some as *hysteria major*, in contradistinction to the former variety, which is sometimes called *hysteria minor*. The patient may suddenly sink to the floor, become partly unconscious and rigid, and, either turning pale or remaining rosy, may breathe violently for a few minutes, and then recover perfect consciousness. Or the patient may sink to the floor after experiencing a sharp pain or an aura of some sort, uttering a little cry or calling for help, with pale or ashen face, and dilated pupils. Convulsions follow rigidity, resembling epileptic convulsions; there may be frothing at the mouth; after a short relaxation, during which the patient gasps, a repetition of the convulsions occurs, with absolute unconsciousness. Then the patient rolls, tossing the arms and legs about, and assuming various rigid positions, occasionally bending the head forward, doubling up the body, clenching the fists, and folding the arms across the chest or the abdomen, or bending the head and feet backward in the pose called opisthotonos. After several repetitions of such actions, the patient remaining unconscious, relaxation occurs with a short period of repose, followed at once by attitudes of petition, depression, gayety, etc., the patient being delirious and talking of past events or imaginary encounters, not recognizing, though speaking with, those around her, and controlled by hallucinations of sight and hearing. In a varying time the delirium ceases and the patient becomes conscious, exhausted, and complaining of tenderness in some part of the body, passes a large quantity of pale, limpid urine, and generally resumes her occupation or goes about her house as if nothing had happened. The whole attack may last from 15 to 50 minutes. If these attacks are frequently repeated, the patient's strength is rapidly undermined, and she may be confined to her bed. The form of hysteria with convulsive seizures is often called *hystero-epilepsy* (q.v.)—an unfortunate and misleading term, which should not be used. It really means a combination of hysteria and epilepsy in the same person, which is possible, but rare.

Hyperalgesia confined to certain spots, circumscribed areas of anæsthesia, or anæsthesia of a half of the body, hysterical deafness, hysterical blindness, twitching of muscles, or contractures of groups of muscles, the *'globus hystericus,'* or feeling of a lump in the throat, spasmodic closure of the glottis with pseudo-asthma, retention of urine, paralysis (either hemiplegia or paraplegia), palpitations of the heart, flushing of face, neck, and scalp, with sweating, coldness of extremities or of the entire body, œdema of the extremities, menstrual irregularities, and vomiting of fluid, are among the symptoms of the disease. Mental changes are certain to occur, amounting only to lack of balance and of will power, or impairment of memory in some, in others also recurring melancholy, rapid emotional play, lack of power of application, impaired judgment, diminished regard for truth, and craving for sympathy. The last two symptoms are the basis for the peculiar actions of 'fasting girls;' self-mutilating martyrs; alleged sufferers who feign paralysis, pain, tumor, stone in the bladder, etc., and who eagerly submit to surgical operations.

Hysteria is not dangerous to life. Recovery is rare in prolonged cases, though proper treatment may be followed by cure in cases in which symptoms have reappeared upon provocation many times in the course of a year or two. Harshness used on the erroneous supposition that willfulness or perversity is at the foundation of hysteria always does harm, and is unjustifiably brutal. Relief of strain and of worry, change of environment, removal of the patient from home and from accustomed companions in the family, and treatment for indigestion, restoration of function, and nerve-building, form the principal features of remedial agencies. Will power must be systematically cultivated, and moral support be given to the patient. Massage, electricity, diet, baths, and sometimes a rest cure, are efficacious. See INSANITY; HYPNOTISM; TEMPERAMENT. Consult: Janet, *Etat mental*

des hystériques: les accidents mentaux (Paris, 1894); Richer, *Paralysies et contractures hystériques* (Paris, 1892).

HYSTERICS. See HYSTERIA.

HYS'TERO-EP'ILEP'SY. An improper, though frequently employed, term for a variety of hysteria, in which convulsive attacks occur, of an epileptoid nature. It is not a form of epilepsy, though not differentiated from that disease till Charcot, of Paris, gave an accurate and intelligent description of hysteria. See HYSTERIA. Consult: Feré, "Notes pour servir à l'histoire de l'hystéro-épilepsie," in *Archives de Neurologie* (Paris, 1882).

HYS'TEROT'OMY. See CÆSAREAN OPERATION.

HYTHE, hĭth (AS., haven). A market-town in Kent, England, 14 miles south of Canterbury. Hythe is a favorite seaside summer resort, and the seat of the national school of musketry (Map: England, H 5). It has an interesting church, partly Norman and partly Early English. Under the chancel is an extraordinary collection of human skulls and bones—many of the skulls having deep cuts in them; their age and origin are uncertain, but they are reputed to be the remains of Danes slain in a battle fought about 1000. Hythe owns its water-works. It is one of the Cinque Ports, but through the silting of its harbor has become removed half a mile from the coast. Population, in 1891, 4347; in 1901, 5600.

HYTU, ē-tōō'. See ITU.

I

I The ninth letter in the alphabets of Western Europe. Its form in the Phœnician and early Greek alphabets, from which it is derived, somewhat resembled a narrow upright Z. (See ALPHABET.) After various modifications this was straightened into its present shape. The Greek designation, *iota*, of the letter is an adaptation of its Phœnician name *yod*, 'a hand.' The dot over our small *i* did not come into use until the fourteenth century.

PHONETIC CHARACTER. The 'short i' in English is described as a high-front or palatal vowel, made by the blade of the tongue approximating the forward part of the palate or roof of the mouth—the sound heard in *it*. When approximated so far as to make a partial contact or closure, this passes over into a semi-vocalic or consonantal *y*, as in *you* (*iu*), although in English the *y* is often not written, e.g. *minion, million;* other variations may be noticed in *charity, bird*. The corresponding 'long i,' common in European languages, is found in *machine, police, pique*. This is sometimes known as the 'long e' sound in *receive, believe, seat*. The sound commonly called 'long i' in English, *wide, ice*, and the name of the letter itself (*i* pronounced *eye*), is really a diphthong, like *aisle*, made by premature opening of the lengthened vowel under stress-accent. This phonetic change from the older character of the sound was going on during the Middle Period of transition into the Modern English, so that it is now a phonetic rule that Anglo-Saxon or Old English *ī* regularly calls for a diphthongal long i in modern English, e.g. OE. *wīd, mīl* = Mod. Eng. *wide, mile*. Historically the linguistic character of *i* is fairly stable, Indo-Germ. **uidhevā*, Skt. *vidhávā*, 'widow,' Lat. *vidua*, OChurch Slav. *vidora*, AS. *widewe*, Eng. *widow;* or Gk. *οἶνος* (for *ϝοῖνος*), 'wine,' Lat. *vinum*, A.S. *wīn*, Eng. *wine*. For the connection of I and J, see J.

As a Symbol.—I in the Roman notation stands for 1; in chemistry I = iodine; in logic I is the symbol of the partial affirmative proposition.

I'ABA'DU IN'SULA (Lat., translation of Gk. *Ἰαβαδίου νήσος, Iabadiou nēsos*). According to Ptolemy (vii. 2), a large island in the Indian Ocean, southeast of the Golden Chersonese and southwest of the Isles of Satyrs; said to be very fertile and to contain much gold. The island meant was probably the modern Java, though Humboldt and others regard it as Sumatra.

The name, according to Ptolemy, signified *Island of Barley*. The capital was named Argyre (*Ἀργυρῖ*).

IACCHUS, ī-ăk'kŭs (Lat., from Gk. *Ἴακχος, Iakchos*). A title used of Bacchus in the Eleusinian Mysteries, in which he was regarded as the son or husband of Demeter, or the son of Persephone. He was thus distinguished from Dionysus, the son of Zeus and Semele, but was sometimes called his son, and at times identified with him.

IACHIMO, ī-ăk'ĭ-mō. In Shakespeare's *Cymbeline*, a Roman libertine who on a wager conceals himself in Imogen's room and carries away apparent evidence of her unchastity.

IAGO, ē-ä'gō. A Spanish and Portuguese form of the name James, now occurring only in the combination Santiago (Saint James).

IAGO. In Shakespeare's *Othello*, a calculating and malignant character, the ancient of Othello, whom he secretly hates while retaining his confidence. In revenge for imagined wrongs he skillfully concocts evidence which convinces Othello of the unfaithfulness of his wife, Desdemona. Othello in jealousy murders Desdemona, and stabs Iago when the plot comes to light.

IAL'YSUS (Lat., from Gk. *Ἰάλυσος*). An ancient city on the island of Rhodes, possibly a Phœnician settlement, certainly an important place in the Mycenæan period. It was later colonized by Dorians from Argos, and formed with Lindus and Camirus the Rhodian tripolis. Even in the Homeric poems it is famed for its wealth. In B.C. 408 it united in the foundation of the city of Rhodes (q.v.). Some remains are still traceable near the modern village Ialiso. A necropolis at Ialysus has yielded many Mycenæan vases and other ornaments.

IAM'BIC VERSE (Lat. *iambicus*, Gk. *ἰαμβικός, iambikos*, from *ἴαμβος, iambos*, iambus, from *ἰάπτειν, iaptein*, to assail with words). A term applied in classic prosody to verses consisting of the foot or metre called *iambus*, made up of two syllables, of which the first is short, and the second long (⏑—). Archilochus (q.v.) is the reputed inventor of iambic verse. The term is also applied by analogy to English verse wherein stressed and unstressed syllables correspond to a long syllable followed by a short syllable in Latin or Greek verse. The English language runs more easily and naturally in this metre than in any other.

The stág | at éve | had drúnk | his fill.

See METRE; VERSE.

IAMBLICHUS, ī-ăm'blĭ-kŭs (Lat., from Gk. Ἰάμβλιχος). (1) A Greek writer of the second century A.D., a Syrian by birth, and the author of the earliest Greek romance of which considerable remains have survived. It was entitled *Babyloniaca*, and described in thirty-five books the remarkable adventures of two lovers, Rhodanes and Sinonis. The original romance has perished, but large extracts are preserved by Photius (chap. xciv.). (See PHOTIUS.) There is no great merit in the style, and the plot is full of magic.

(2) A Neo-Platonic philosopher, born at Chalcis, in Cœle-Syria, about A.D. 283. He lived mostly at Alexandria. He studied under the Neo-Platonists Anatolius and Porphyrius, and became deeply imbued with the teachings of Plotinus, which he expounded for many years to a large circle of hearers at Alexandria—but with a considerable admixture of his own peculiar views. He died at Alexandria, about A.D. 330. His doctrines were a mixture of Pythagorean and Platonic ideas, with much superstition and magic, and the supposed manifestation of God by ecstasies, and a communication with the spiritual world by means of ceremonies. He was a voluminous writer, but most of his writings are lost. Perhaps they were destroyed by the Emperor Constantine, who ordered the burning of the works of Porphyrius. Of his work, Περὶ Πυθαγόρου Ἀιρέσεως, in ten books, we possess four complete sections, viz.: *On the Life of Pythagoras* (Περὶ βίου Πυθαγορικοῦ), edited by Nauck (Saint Petersburg, 1884); *Exhortation to Philosophy* (Προτρεπτικὸς Λόγος εἰς Φιλοσοφίαν), ed. by Pistelli (Leipzig, 1888); *On Mathematics* (Περὶ Μαθηματικῆς Ἐπιστήμης), ed. by Festa (Leipzig, 1891); and an introduction to the *Arithmetic* of Nichomachus, ed. by Pistelli (Leipzig, 1894). There is also in existence a work on *Mysteries* (Περὶ Μυστηρίων Λόγος), which is attributed to Iamblichus; but the attribution has been questioned, perhaps, without reason. On Iamblichus and his philosophy, consult: Chaignet, *Histoire de la psychologie des Grecs*, vol. v. (Paris, 1893); and Zeller, *History of Greek Philosophy* (New York, 1889).

IANTHE, ī-ăn'thē. (1) In Roman mythology, a girl to whom Iphis was betrothed (Ovid, *Met.*, ix. 12). (2) A character in Sir William Davenant's *The Siege of Rhodes*. (3) Lady Charlotte Harley, to whom, under the name of Ianthe, Byron dedicated his *Childe Harold*. (4) A character in Shelley's *Queen Mab*.

IAPETUS (Lat., from Gk. Ἰαπετός). One of the Titans, son of Uranus and Gæa, father in Hesiod of Atlas, Menœtius, Prometheus, and Epimetheus. Through Prometheus he is ancestor of Deucalion (q.v.), and so of the human race. Many scholars suppose his name to be identical with the biblical Japhet; others, like Maximilian Meyer, *Giganten und Titanen* (Berlin, 1887), deny any such connection.

IAPYGIA, ī'ā-pĭj'ĭ-ā (Lat., from Gk. Ἰαπυγία). A name given to the southeastern district of Italy, forming the heel of the Peninsula; also called Messapia. The name Iapygia was familiar to the Greeks, but was not known to the Romans.

IBA, ē'bä. The capital of the Province of Zambales, in Luzon, Philippines (Map: Luzon, D 4). It is situated 122 miles northwest of Manila, and has a post-office and telegraph station and a population (1898) of 3500.

IBADAN, ē-bä'dän. The chief commercial city of Yoruba, in the interior of the English colony of Lagos, in Nigeria, Africa. It is a walled town, situated on a small river, the Odo-Ona, 30 miles south of Ojo, and about 85 miles northeast of Lagos, with which latter town it is connected by rail. Its population is estimated at 200,000, including the people outside the walls.

IBAGUE, ē'bä-gā'. Capital of the Department of Tolima, Colombia, situated 60 miles west of Bogotá, on a fertile plain, at an altitude of over 4000 feet (Map: Colombia, B 3). It has a temperate and healthful climate, and is a prosperous and important town, with a number of sulphur and silver mines in its vicinity. Its population is estimated at 12,000. Ibague was founded in 1550, and was in 1854 the temporary capital of the Republic.

IBAJAY, ē'bä-hī'. A town of Panay, in the Province of Capiz, Philippines, situated about 62 miles northwest of Capiz and near the Point of Potol, where the town formerly stood, and where much amber is collected (Map: Philippine Islands, G 8). Population, in 1898, 11,350.

IBALONE, ē'bä-lō'nā. The ancient name of the Vicol tribe in the Philippine Islands (q.v.), especially on Albay Island.

IBANAG, ē'bä-näg'. The speech of the Cagayane people in Luzon. See PHILIPPINE ISLANDS.

IBÁÑEZ DE IBÁÑEZ DE IBERO, ē-bän'yäth dā ē-bän'yäth dā ē-bā'rō, CARLOS, Marquis of Mulhacén (1825-91). A Spanish military engineer and geodetist, born in Barcelona. As a result of his work in geodesy and geography, he was given the title of Marquis of Mulhacén, and was elected to many scientific societies. His publications include: *Base central de la triangulación geodésica de España* (1865); *Descripción geodésica de las islas Baleares* (3 vols., 1871); and *Tableau géographique et statistique de l'Espagne* (1888).

IBARRA, ē-bär'rä. The capital of the Department of Imbabura, Ecuador, situated at an altitude of over 7000 feet, 60 miles northeast of Quito (Map: Ecuador, B 3). It has some cotton and woolen mills, and a population of about 10,000. Once a considerable town with a population of about 16,000, Ibarra was almost wholly destroyed by the earthquake of 1868.

IBARRA, JOAQUIN (1725-85). A Spanish printer, born at Saragossa. He was appointed Court printer at Madrid. The following works from his press are among the masterpieces of the art of printing: A translation of Sallust by the Infante Don Gabriel (1772); an edition of Cervantes's *Don Quixote* (4 vols. quarto, 1780; 4 vols. octavo, 1782); the *Historia di Hispana* of Mariana (2 vols., 1780); and several fine editions of the Bible.

IBERCOURT, ē'bâr'kōōr', HENRY LOUIS D' (1771-1818). A Flemish traveler, born in Mons. His journeyings began in the West India Islands, and extended over a great part of South America. His narrations include: *L'Amérique dévoilée* (1811); *Voyage en Chili* (1812); and *Nouveau traité sur les légumineuses de l'Amérique du Sud* (1815). He also wrote a romance, *Un voyageur captif en Patagonie* (1814), and a pamphlet, *La constitution des Etats-Unis, est-elle applicable à l'Europe?* (1818), which so deeply offended the

Dutch Government that the author suffered a short term of imprisonment.

IBE'RIAN MADONNA. A wonder-working picture in the Kremlin, Moscow.

IBE'RIANS (Lat. *Iberes*, Gk. *Ἴβηρες*). A people anciently living at the mouth of the Iberus or Ebro River, in Eastern Spain. Later, the inhabitants of the entire Peninsula were so called. The term is now applied to the primitive Neolithic and Bronze-age men whose remains and relics are found in ancient graves, grottoes, and refuse heaps throughout Western Europe. Their ovoid and ellipsoid crania, called Pelasgic type by Sergi, resemble those of ancient Italy, Greece, Asia Minor, Egypt, Ethiopia, and North Africa, belonging to what he denominates the Mediterranean race. Keane also quotes Von der Gabelentz in the proof of identity between the Basque or Iberian and the Berber speech. This long-headed man, of low stature, has been traced as far as the British Isles, and is identified with the Picts and other groups. The term 'Iberian' is used by English ethnologists for the Mediterranean race, and Deniker's title for the same group is 'Ibero-Insular.' Keane subdivides the historical Iberian (Basque) as follows. The descendants from old extinct Iberian are:

Euscara (Spanish Basque)...	Guipuscoan Biscayan, or Upper Navarrese North Upper Navarrese South
Bascunse (French Basque)..	Labordin Souletin, or Lower Navarrese East Lower Navarrese West

Consult: Keane, *Man: Past and Present* (Cambridge, 1899); Sergi, *Mediterranean Race* (London, 1901).

IBE'RIS. See CANDYTUFT.

IBE'RUS. The ancient name of the Ebro (q.v.).

IBERVILLE, ē'bâr'vēl', PIERRE LE MOYNE, Sieur D' (1661-1706). A French-Canadian soldier, naval commander, and explorer, founder of Louisiana. He was one of the ten famous sons of Charles le Moyne of Montreal. He studied seamanship in the French Navy, but his first exploits were inland—from the Ottawa north to James's Bay, with an expedition destined to gain possession of the English forts there (1686). He took part in the expedition for the destruction of Schenectady (1690). After capturing (1696) and demolishing the stone fort at Pemaquid, built to protect New England, Iberville thought of taking Boston, but sailed instead to Newfoundland, where he burned the village of Saint John's, laying waste all the British settlements on the island. Thence he steered for Hudson Bay, where he had a gallant victory over three English ships against his one, and destroyed the last remaining post of the Hudson's Bay Company. From the far North he went to the far South, sailing from France (1699) to the Gulf of Mexico in search of the mouth of the Mississippi, found it, and built a fort at Biloxi (q.v.), changing afterwards to Mobile, thus fulfilling La Salle's dream of planting a French colony on the Gulf. He left Canada in 1702, and died in France.

IBEX (Lat., chamois). The ancient name of the 'steinbock' of the Alps; and now designating a section or subgenus of goats having the horns flat, and marked with prominent transverse knots in front, whereas those of the typical goats are compressed and keeled in front, and rounded behind. The group contains four species, all inhabitants of high mountainous regions, as described below. All are characterized by a nearly uniform coloration; but the hue varies with age and season, from gray, yellowish, or grizzled, to various degrees of brown, usually lighter on the throat, belly, and inside of the legs than elsewhere. The short summer coat is exchanged in winter for a longer, warmer one, mixed with an under wool. The pairing season of all is in midwinter, and the kids, usually two, are born in early summer. Compare GOAT; and see Plate of WILD GOATS.

The typical ibex (*Capra ibex*), called 'bouquetin' by the French, and 'steinbock' by the Germans, has long been exterminated as a wild animal, but is preserved by the Italian Government in a few valleys of the Piedmontese region. Formerly it seems to have roamed all over the Alps of Switzerland, Savoy, and the Tyrol, but always kept as high as possible, seeking its food, mainly by browsing bushes, at the edge of the snow, and not descending the valleys as does the chamois. Though larger and more powerful than the common goat, it is smaller than the other ibexes. The horns rarely exceed 30 inches in length and have the knobs not prominent, while the beard of the males is so small as to be hardly visible in the summer coat. This ibex is easily tamed when taken young, and interbreeds readily with domestic goats.

The Himalayan ibex (*Capra Sibirica*) is still numerous, and well known to sportsmen. A ram stands 40 inches high at the withers, has a heavy beard, and the roughly knobbed horns often measure more than 50 inches along the outside curve, and 11 to 12 inches in greatest girth. It inhabits all the mountain ranges of Central Asia from the borders of Persia eastward to the frontier of Tibet, and northward into Siberia; and is found not only on the summits, but on the open plateaus of the Pamir. Ordinarily, however, ibexes remain upon the crags as near as possible to the snow-line. They descend in winter only so far as is necessary to find uncovered pasturage, and often linger at that season at great altitudes where the wind sweeps steep slopes, and allows them to nibble a scanty subsistence from the withered herbage. The resistance to cold and hardiness of constitution generally which this implies are characteristic of the race. They usually go about in small bands, led by old rams, but sometimes gather into herds of 100 or more. In the spring the males separate from the band and betake themselves to the highest crags, while the females seek retired places in which to bring forth their young. In spite of constant pursuit by hunters, the ravages of wild dogs, and destruction by avalanches, these animals seem to maintain their numbers (except near Kashmir), as they are prolific, and accustomed to wandering widely. Ibex-shooting is one of the most exciting and difficult feats offered to the sportsman, because of the nature of the country in which the animals live, and their extreme wariness and ability to escape down precipices and over crags which baffle their pursuers. The books of men like MacIntyre, Kinloch, Markham, Pollok, and other Anglo-Indian sportsmen are full of entertaining accounts of this adven-

turous hunting, and to these observers we owe most of our knowledge of the haunts and habits of these animals.

The Arabian ibex (*Capra Sinaitica*), or 'beden,' occupies the rough heights of the Sinaitic Peninsula, Arabia Petræa, Palestine as far as Lebanon, and Upper Egypt. It is rather smaller than the Himalayan, and the knobs on the front of the horns are less prominent and regular. An Abyssinian species, the 'walie' (*Capra walie*), also exists, and differs from the others in the curvature of its horns and a protuberance in the centre of the forehead.

IBILAO, ē'bē-lä'ō. A head-hunting Malay-Negrito tribe in central Luzon. See PHILIPPINE ISLANDS.

IBIS (Lat. *ibis*, Gk. ἶβις, of Egyptian origin). A stork-like bird of the family Ibidæ. The bill is long, slender, curved, thick at the base, the point rather obtuse, the upper mandible deeply grooved throughout its length. The face, and generally the greater part of the head, and sometimes even the neck, are destitute of feathers, at least in adult birds. The neck is long. The legs are rather long, naked above the tarsal joint, with three partially united toes in front, and one behind; the wings are moderately long; the tail is very short. The family is usually ranked with the storks in the same order as the herons, but there are important points in which the ibises approach the curlews. The sacred ibis, or Egyptian ibis (*Ibis Æthiopica*), is an African bird, 2½ feet in length, although the body is little larger than that of a common fowl. The glossy ibis (*Plegadis falcinellus*) is a smaller species, also African, but migrating northward into Continental Europe, and occasionally seen in Great Britain. It occurs in the tropical and subtropical parts of all the world, but is quite uncommon in North America. In the Southwestern United States it is replaced by the white-faced glossy ibis (*Plegadis guarauna*), a species in which the adults have the region about the base of the bill white. The habits of both species resemble those of the sacred ibis. The color is black, varied with reddish brown, and exhibiting fine purple and green reflections. There are no loose pendent feathers. The white ibis (*Gama alba*), a species with pure white plumage, abounds on the coasts of Florida, and is locally abundant as far north as South Carolina and southern Illinois. Audubon saw multitudes on a low islet, and counted 47 nests on a single tree. (For its egg, see Colored Plate under EGG.) The scarlet ibis (*Ibis ruber*) is a tropical American species, remarkable for its brilliant plumage, which is scarlet, with the tips of a few outer primaries glossy black. The straw-necked ibis (*Carphibis spinicollis*) is a large Australian bird of fine plumage, remarkable for stiff, naked, yellow feather-shafts on the neck and throat, which look extraordinarily like bits of straw. The bird known in the Southern United States as 'wood-ibis' is not an ibis at all, but a stork (q.v.).

The sacred ibis, one of the birds worshiped by the ancient Egyptians, and called by them *hab* or *hib*, and by the modern Egyptians *abu-Hannes* (i.e. Father John), is a bird with long beak and legs, and is covered with black and white plumage. It was supposed, from the color of its feathers, to symbolize the light and shade of the moon, its body to represent the heart; its legs described a triangle, and with its beak it performed a medical operation; from all which esoterical ideas it was the avatar of the god Thoth or Hermes (see HERMES), who escaped in that shape the pursuit of Typhon, as the hawk was that of Ra, or Horus, the sun. Its feathers were supposed to scare, and even kill, the crocodile. It appeared in Egypt at the rise, and disappeared at the inundation of the Nile, and was thought at that time to deliver Egypt from the winged and other serpents which came from Arabia in certain narrow passes. As it did not make its nest in Egypt, it was thought to be self-engendering, and to lay eggs for a lunar month. According to some, the basilisk was engendered by it. It was celebrated for its purity, and only drank from the purest water, and the most strict of the priesthood only drank of the pools where it had been seen; besides which, it was fabled to entertain the most invincible love of Egypt, and to die of self-starvation if transported elsewhere. Its flesh was thought to be incorruptible after death, and to kill it was punishable with death. Ibises were kept in the temples, and unmolested in the neighborhood of cities. After death they were mummied, and there is no animal of which so many remains have been found at Thebes, Memphis, Hermopolis Magna, or Eshmun, and at Ibiu or Ibeum, 14 miles north of the latter place. They are made up into a conical shape, the wings flat, the legs bent back to the breast, the head placed on the left side, and the beak under the tail. They were prepared as other mummies, and wrapped up in linen bandages, which are sometimes plaited in patterns externally. At Thebes they are found in linen bandages only; at Hermopolis, well preserved in wooden or stone boxes of oblong form, sometimes in form of the bird itself, or the god Thoth; at Memphis, in conical sugar-loaf-shaped red earthenware jars, the tail downward, the cover of convex form, cemented by lime. There appear to be two sorts of embalmed 'ibises'—a smaller one of the size of a rail, very black, and the other black and white. The former is not an ibis at all, but some smaller wading bird. The last is usually found with its eggs, and with its food in its stomach. By the Jews it was held to be an unclean bird. Consult: Wilkinson, *Manners and Customs of the Ancient Egyptians* (New York, 1879); Pettigrew, *History of Egyptian Mummies* (London, 1840).

IB'LIS. One of the names of the Devil, in the Koran, who, however, is more often called *Shaitān* (Satan). Iblis is the chief of the fallen angels, who was once a good angel named Azazil, but having refused at God's command to render homage to Adam, was first condemned to death, but subsequently respited till the judgment day (Koran, vii. 13). The legend is borrowed from Jewish sources, and is embodied in the Midrashic exposition of Genesis, chapter iii. (consult Wünsche, *Midrash Bereshit Rabba*, p. 32 sqq., Leipzig, 1881). Both words for devil used by Mohammed appear to be of foreign origin, the form *Shaitān* coming close to the designation of Satan in Ethiopic—while *Iblis* may be a distortion of *diabolus*, modified in order to adapt it to a derivation from an Arabic stem *balasa* 'to confuse,' with which, however, it has really nothing to do. Of the two terms, the former is found in the Koran 87 times, the latter only 11 times. Moreover, the plural of

and the later literature, is used as a general designation for devils or evilly disposed demons. On the basis of the utterances in the Koran, the doctrine of the Devil is further developed in Mohammedan theology, influenced by the specifically Christian and Jewish conceptions current in the Orient whereby the Devil, as a single personage, usurps the powers and attributes of the numerous body of jinns (q.v.) of popular belief. The latter, however, as a survival of primitive religion, continue to hold sway among the people in general, so that in the folklore of the Arabs it is the jinns who are constantly introduced, both for good and evil purposes, whereas the mention of Iblis and of the Śatans is largely confined to the body of theological writings. In the latter the contrast between the Devil and the angels is prominently put forward, and the view is expressed that each individual has a devil and an angel appointed as his companions, the former tempting him to evil deeds, the latter prompting him to good. The life of man passes in a constant struggle to be rid of the former and to keep close to the latter. Consult Weil, *Biblische Legenden der Muselmänner* (Frankfort, 1845).

IBN ABI USEIBIA, ĭb'n ă'bê ōō-sā'bê-a, MUWAFFAK AD-DIN (c.1195-1269). An Arabic physician and author. He was born in Cairo, of a family of physicians; lived in Egypt and Syria, and was educated at Damascus (1227-33). For two years he was head of a hospital at Damascus, then became court doctor to a Syrian emir. He is best known for his biographical lexicon of Mohammedan physicians, which has been edited by August Müller (Konigsberg, 1884), and commented on by the same in *Ueber Ibn Abi und seine Geschichte der Aerzte* (Leyden, 1885). Consult: Wüstefeld, *Geschichte der arabischen Aerzte und Naturforscher* (Göttingen, 1840); Leclerc, *Histoire de la médecine arabe* (Paris, 1876); *Travaux de la VIème session du Congrès international des Orientalistes à Leide*, vol. ii. (Leyden, 1884).

IBN AL-ATHIR, ĭb'n ăl-ă-thēr', IZZ-AD-DIN AL-JAZARI (1160-1230). An Arabic historian, who was born of good family in Mesopotamia, and lived in Mosul. He wrote *Kâmil*, a history of the world to the year 1231, edited by Tornberg under the title *Ibn-el-Athiri Chronicon quod Perfectissimum Inscribitur* (1851-76); *Usd al-ghâba*, on the successors of Mohammed (1864); and a lexicon, edited by Seybold (Weimar, 1896). Excerpts from his other works may be found in Reinaud, *Historiens des croisades* (Paris, 1829).

IBN ARABSHAH, ĭb'n ă'răb-shä', AHMED (1388-1450). An Arabic author, born at Damascus. He was carried captive with his family (1400) to Samarkand, after the invasion of Syria by Timur; took advantage of this opportunity to study Turkish and Persian; traveled through Mongolia and Astrakhan; and at Adrianople was employed by the Sultan to translate Arabian writings into Turkish and Persian. The most important of his works is the biography of Timur or Tamerlane (last ed., Calcutta, 1818). The book of anecdotes written by him has been

IBN BADJA, ĭb'n bă-jă'. See AVEMPACE.

IBN BATÛTA, ĭb'n bă-tōō'tă, ABU ABDALLAH MOHAMMED (1304-77). An Arabic traveler. He was born at Tangier, Morocco, and spent many years in traversing Western and Central Asia, large portions of Africa, Russia, India, China, and Spain. For three and one-half years he acted as cadi at Delhi and in the Maldive Islands. After his travels he settled in Morocco. His narrative of his journeys, replete with graphic and picturesque description, has been published in the French translation by Defrémery and Sanguinetti (Paris, 2d ed. 1874-77). There is an English translation from an epitomized version by S. Lee (1829).

IBN DOREID, ĭb'n dō-rā'ĕd, MOHAMMED (838-933). An Arabic poet and scholar, born at Basra, and later resident in Oman, Persia, and Bagdad. His most famous poem is the elegy entitled *Alkasida-al-Maksura*, dealing with the question of good luck and bad. Among his philological works may be mentioned an etymological and genealogical dictionary of Arabic proper names, edited by Wüstenfeld (1853-54), and two briefer studies in lexicography, edited by Thorbecke (1882).

IBN HISHAM, ĭb'n hĕ-shăm', ABU MOHAMMED ABD AL-MALIK (c.760-833). An Arabic scholar of Basra. He is famed for his genealogical writings and his revision of the life of the Prophet Mohammed, written by Ibn Ishak (c.700-768). The biography was edited by Wüstenfeld (Göttingen, 1858-60), and translated into German by Weil as *Das Leben Mohammeds* (1864).

IBN JANACH, ēb'n hă-năch', ABULWALID MERWAN, or JONAH MARINUS. A Jewish grammarian of Spain. He was born near the end of the tenth century and died about the middle of the eleventh century, but the exact dates are unknown. He studied Hebrew at his birthplace, Cordova, and in Lucena, under Jewish teachers, and also took up the study of medicine. In 1012, in consequence of political disturbances, he was obliged, with many other Jews, to leave Cordova and settled in Saragossa, where he appears to have spent the rest of his days, and where, while continuing his practice of medicine, he devoted himself also to the investigation of Hebrew grammar, guided largely by the researches of his predecessor, Hayyuj (q.v.). Ibn Janach was enabled to advance the knowledge of Hebrew morphology far beyond the point that Hayyuj had reached. He did not hesitate to make slight changes in the biblical text where it seemed to be meaningless as it stood. His main work consists of two parts, the first dealing with grammar, *Kitâb-al-Luma*, published by J. Derenbourg (Paris, 1886); the second a lexicon, *Kitâb-al-'Usûl*, published by Neubauer (Oxford, 1873-75). The grammar, based on Arabic models, is the first systematic attempt to cover the entire field of Hebrew grammar. The dictionary is characterized by the same comprehensive knowledge and clear perception as the grammar, and, incidental to the explanation of words, furnishes valuable and elaborate discussion of grammatical points. Both the grammar and the dictionary were translated by Judah ben Saul Ion Tibbon (c.1120-1190),

the former having been published by B. Goldberg (Frankfort, 1856); the latter by W. Bacher (Leipzig, 1889). He also wrote several minor grammatical treatises (published by J. and H. Derenbourg, Paris, 1880), in which he defended his views and those of Hayyuj against attacks, and also amplified the grammatical treatises of the latter. Ibn Janach was also interested in philosophical questions, and strenuously opposed the speculations of Ibn Gebirol and other men of the day on the relation of God to the world, on the ground that they led to disbelief. Consult Bacher, *Leben und Werke des Abulwalid Merwan ibn Ganach* (Leipzig, 1885).

IBN KHALDUN, ĭb'n kăl-dōōn', ABD AR-RAHMAN (1332-1406). An Arabic historian, born at Tunis, of a family from Seville. He early entered the public service, first in Tunis, then under the ruler of Fez. In 1362, under the Sultan of Granada, he carried on negotiations for peace with Pedro of Castile; in 1374 was imprisoned in Northern Africa, where he was intriguing, but returned home in 1378. Four years afterwards he set out for Mecca; on his way stayed three years in Egypt, whither he returned after the pilgrimage, and where he lived for a few years before he took service under Timur in Syria. His historical work is the first among the Arabs to leave the annalistic method, and the introduction especially is conceived in a philosophic manner. Besides this introduction, edited by Quatremère (Paris, 1858), and translated into French by De Slane (Paris, 1862-68), the work has two main divisions—the history of the eastern caliphate, partly edited, with Latin translation, *Ibn Khalduni Narratio de Expeditionibus Francorum*, by Tornberg (1840), and the account of the Berbers and the dynasties of North Africa, edited and translated into French by De Slane (Paris, 1862). Consult Kremer, *Ibn Chaldûn und seine Kulturgeschichte der islamischen Völker* (Vienna, 1879).

IBN KHALLIKAN, ĭb'n kă'lê-kăn', SHAMS AD-DIN AHMED (1211-82). An Arabic historian, born at Arbela, of the family of the Barmecides. He held important offices in Cairo and in Damascus, where he died. His most important work is a biographical dictionary, a very important source of knowledge of Arabian literature and its history from the eighth century to his own time. It is edited by Wüstenfeld (Göttingen, 1840-65), and translated into English by MacGuckin de Slane (London, 1842-71).

IBN KOTEIBA, ĭb'n kō-tā'ê-bȧ, ABDALLAH (828-c.889). An Arabic philologist and historian. He was born probably at Bagdad or Kufa, and for some time held high judicial offices at Dînâver. Later he was a teacher in Bagdad, and died there. Of his works, the most important are: *Adab al-Kâtib*, mainly philological, and of great value on literary style and on antiquities, of which Sproull published a part as *An Extract from Ibn Koteiba's Adab al-Kâtib* (1877), and which was edited by Grünert (1900); a collection of biographies of the Arabian poets, of which only the introduction has been published, by Rittershausen, with Dutch translation (1875); *Kâtib al-ma-Arif*, an outline of history for practical use, edited by Wüstenfeld (1850); and *Uyun al akhbâr*, a treatise upon government, war, nobility, character, science, friendship, food, women, and other topics, edited by Brockelmann (Weimar, 1898).

IBN-ROSHD, ĭb'n rōsh't. See AVERROES.

IBN SAYIG, ĭb'n sī-ĕg'. See AVEMPACE.

IBN SINA, ĭb'n sē'nȧ. See AVICENNA.

IBN TOPHAIL, ĭb'n tō'fȧ-ĕl. See ABU-BEKR MOHAMMED IBN TOPHAIL.

IBN ZOAR, ĭb'n zōr, or **IBN ZOHR.** See AVENZOAR.

IBOS, ē'bōz. Dominant negro people of the Niger Delta. Slaves from this region formerly were called 'Ibo.' Their language is akin to the Ewe and the Tshi.

IBRAHIM, ē'brȧ-hēm' (1615-48). An Ottoman Sultan, third son of Ahmed I. On the death (1640) of his brother, Amurath IV., whose cruelty he had escaped by feigning madness, he came to the throne. His short reign was filled with excess, debauchery, and prodigality. In 1645 he attacked the island of Crete, which was then under the control of Venice, but did not live to finish this war, which was the result of an intrigue in his harem. His government was so cruel and the taxes so oppressive that in 1648 the Janizaries rebelled and dethroned him, and strangled him a few days later.

IBRAHIM, OU L'ILLUSTRE BASSA, ē'brȧ'ŋ' ōō lē'lŭs'tr' bȧ'. A romance by Mademoiselle de Scudéry, originally published under the name of her brother (1641).

IBRAHIM PASHA, ē'brȧ-hēm' pȧ-shȧ' (1789-1848). An Egyptian general. He was the adopted son of Mehemet Ali (q.v.), Governor and subsequently Viceroy of Egypt, and was born at Kavala, in the Province of Saloniki, in European Turkey. In 1816 he led an army into Arabia, and in the course of three years overthrew the Wahabi power in Western Arabia and in Nejd. During the War of Greek Independence he was dispatched at the head of a powerful fleet and a finely disciplined land force to the aid of the Turks in the Morea. In 1825 he stormed Navarino and Tripolitza, and in the following year took Missolonghi, after a long siege. The destruction of the Turkish-Egyptian fleet in the harbor of Navarino, October 20, 1827, and the landing of a French force, led to the evacuation of the Morea by Ibrahim in September of the following year. As the result of a dispute with the Pasha of Acre, an Egyptian army under Ibrahim invaded Syria in 1831, stormed Acre, May 27, 1832, and defeated the Turkish forces at Homes, Beylan, and Konieh. By the Treaty of Kutayah, May 14, 1833, Mehemet Ali received possession of Syria, while Ibrahim was made Governor of Cilicia. War with the Porte broke out again in 1839, and on June 24th of that year Ibrahim overwhelmed the Turkish army at Nisib, near the Euphrates. Only the interference of the Great Powers saved the Porte from the victorious armies of Mehemet Ali. Ibrahim was forced to evacuate Syria in 1840 and to return to Egypt, suffering the most severe hardships on his march through the desert. He died at Cairo, November 10, 1848, after acting for some months as Regent during the incapacity of Mehemet Ali. His son, Ismail Pasha (q.v.), subsequently became Khedive of Egypt.

IBRAIL, ē-brī'ĕl. See BRAÏLA.

IBSAMBUL, ĕb-săm'bōōl. A noted group of ruins on the Nubian Nile. See ABU-SIMBEL.

IBSEN, Ip'sen, HENRIK (1828—). A Norwegian dramatist, born at Skien, March 20, 1828, whose influence is marked in German, French, English, and Italian literatures. His great-grandmother was Scotch, his grandmother and mother German, his grandfather's grandfather Danish. They were a family of shipmasters. His father, Knud Ibsen, a merchant, met with reverses in Henrik's boyhood, which compelled the youth to pass six years (1836-42) in great poverty. In the latter years of this period he attended a scientific school at Skien, and late in 1843 he became an apothecary's apprentice at Grimstad, where he remained till 1849 writing a *Catiline* in three acts (published 1850), and some poems. He now sought the University of Christiania to learn medicine, but in 1850 he was diverted by the successful production at Christiania of his *The Warrior's Mound* from academic studies to the drama. In 1851 he helped to found a short-lived weekly, *Man*, in which appeared his political satire, *Norma*. In November he was appointed stage manager at Bergen, with leave of absence for three months to study the art he was to practice. These he spent in Germany, writing the unsuccessful and unpublished *Saint John's Night*. In 1856 *The Banquet at Solhaug*, the first of his national dramas, was produced in the theatrical centres of Norway and Sweden. It won him enthusiastic applause and national renown. In 1857 he became director of the Norwegian Theatre at Christiania, but five years of his management reduced it to bankruptcy. Here were produced *Lady Inger of Ostraat*, a saga drama (1855); *The Vikings at Helgeland* (1859); and *Love's Comedy* (1862). In this period he wrote also the longest of his minor poems, *On the Mountain Plains* (1860). In 1862, after the bankruptcy of the theatre, Ibsen gladly accepted a position as æsthetic adviser in the other house. The Storthing granted a pension to Björnson, but refused a petition in Ibsen's behalf. Full of bitterness, the poet left Norway in April, 1869, and went by way of Berlin and Triest to Rome, whence he flung the satire *Brand* at the loose livers of Norway. In 1866 the Storthing yielded. In 1868 Ibsen left Rome for Dresden, where he remained till 1874. After a voluntary exile of ten years, he went back to Norway. In 1891 Ibsen made Christiania his home. On his seventieth birthday the poet-dramatist received gifts and greetings from everywhere in the world. A bronze statue of him was set outside the new National Theatre in September, 1899. His influence is felt in Germany, France, Italy, and England.

Besides the dramas above named, Ibsen's works include: *The Pretenders* (1864), an historical drama; *Brand* (1866) and *Peer Gynt* (1867), dramatic poems; *The League of Youth*, a political comedy (1869); the bulky two-fold historical drama, *Emperor and Galilean* (1873); and, beginning with 1877, the yet better-known series of dramas that are more characteristic of what passes for Ibsenism: *The Pillars of Society* (1877); *A Doll's House* (1879); *Ghosts* (1881); *An Enemy of the People* (1882); *The Wild Duck* (1884); *Rosmersholm* (1886); *The Lady from the Sea* (1888); *Hedda Gabler* (1890); *Master Builder Solness* (1892); *Lille Eyolf* (1894); *John Gabriel Borkman* (1896); *When We Dead Awaken* (1900). Ibsen's dramatic work had been at first romantic. This phase culminated in the *Banquet at Solhaug*. Then it was historic, but still romantic, up to the *Vikings at Helgeland*. Next the psychologic interest becomes prominent, and with it a tendency to social satire very marked in *Love's Comedy*, a masterpiece of swift action and of biting irony. The dramas from 1864 to 1867 are polemically national rather than social. *The League of Youth* marks the transition from political to social interests. From this time on Ibsen is a pathologist of social ills, dealing, as he does, with conditions universal to modern life, and thus winning an ever widening cosmopolitan audience. All these latter plays have been several times translated into English, best, so far as he goes, by William Archer (6 vols., 1890-92). Of comment there is cloud rather than illumination. By some Ibsen's work is assailed as immoral, cynical, pessimistic, unfit to be seen or read; by others it is hailed as a new gospel of truth and emancipation. It is not wholly either. The plays are studies in human responsibility under modern social conditions, which, in many points, Ibsen considers dangerously diseased and as threatening the whole body with a gangrene. So he has become the poet of protest, the unveiler of sophistries, the scourger of hypocrisies. He writes of vice, but it is with loathing. He lays bare the cause of evils and leaves it to others to prescribe the remedy.

But leaving the moral question aside, these social dramas mark a new stage in the evolution of dramatic art. It is a drama of descending, not ascending action, not of preludes, but of consequences. The plays are apt to begin with their climax. They are thoroughly realistic, absolutely unconventional. Their dialogues are so natural as to give the illusion of real though fascinating conversation which the playwright allows his audience to overhear. It would be hard to match them in any literature. Hence their power has been felt throughout the dramatic and literary world, while the realistic dramas of the French naturalistic school, of the Goncourts and Zola, have been regarded with languid curiosity as the products of artistic theory. For Ibsen's life, consult: Jaeger, *Henrik Ibsen: A Critical Biography* (Chicago, 1894); for summaries and comment on the dramas, Boyesen, *Commentary on the Writings of Henrik Ibsen* (New York, 1894); Shaw, *The Quintessence of Ibsenism* (London, 1893); Wicksteed, *Four Lectures on Ibsen* (ib., 1892); and Archer, "The Real Ibsen," in *International Monthly* (ib., 1901).

The German Ibsen literature native and translated is very extensive; among the more noteworthy and recent contributions to it are: Brahm, *H. Ibsen* (Berlin, 1887); Andreas-Salome, *Ibsen's Frauengestalten* (Berlin, 1892); Wörner, *Ibsen's Jugenddramen* (Munich, 1895), and *H. Ibsen* (Munich, 1899 seq.); Jäger, *H. Ibsen* (Swedish, Christiania, 1892; German, Dresden, 1897); Von Haustein, *Ibsen als Idealist* (Leipzig, 1897); Garde (translated by Küchler), *Der Grundgedanke in Ibsen's Dichtung* (Leipzig, 1898); Brandes, *H. Ibsen* (Copenhagen, 1898); Reich, *Ibsen's Dramen* (Dresden, 1900); Litzmann, *Ibsen's Dramen* (Hamburg, 1901).

IBYCUS, ĭb'ĭ-kŭs (Lat., from Gk. Ἴβυκος, *Ibykos*). A Greek lyric poet of the sixth century

B.C., born at Rhegium in Italy. He lived the life of a wandering minstrel, and passed some time at the Court of Polycrates, the tyrant of Samos. The story of his death near Corinth, and the detection of his murderers by means of a flock of cranes, which has been so beautifully told by Schiller in *Die Kraniche des Ibykus*, is based on a similarity between the name of the poet and the Greek *ἴβυξ*, 'a crane.' Of his poems, which were mostly of an erotic character, only fragments have been preserved. These are published by Schneidewin, *Ibyci Rhegini Carminum Reliquiæ* (Göttingen, 1833); and in Bergk, *Poetæ Lyrici Græci*, iii. (Leipzig, 1882).

ICA, ē'kȧ. A maritime department of Peru, bounded by the departments of Lima and Huancavelica on the north, Ayacucho on the east, Arequipa on the southeast, and the Pacific on the southwest (Map: Peru, B 6). Area, 8718 square miles. The surface is of varied formation. The eastern part is mountainous, the western is lower and traversed by ridges of low hills. The climate is hot and dry, and the soil, with the exception of the valleys, is thin. The vine and sugar-cane are cultivated extensively; corn, cotton, and indigo are also raised. The population was officially estimated, in 1896, at 90,962. Capital, Ica.

ICA. The capital of the Peruvian department of the same name, situated on the river Ica, 46 miles by rail from Pisco on the coast (Map: Peru, B 6). It manufactures wine and brandy. It was founded in 1563, and has suffered greatly from earthquakes. Population, estimated at 10,000.

IÇÁ, ē-sä', or **PUTUMAYO**, pōō'tōō-mä'yō. An important tributary of the Amazon. It rises in the Colombian Andes, and flows southeasterly in a very tortuous course, joining the Amazon near San Antonio in the Brazilian State of Amazonas (Map: Brazil, D 4). Its total length is about 1000 miles, and it is navigable during the rainy season for nearly 900 miles. The region through which it flows is very sparsely inhabited and covered mostly with thick forests, so that at present the commercial value of the river is unimportant. The Içá was partly explored in 1878-79.

ICARIA, ī-kā'rĭ-ȧ (Lat., from Gk. *Ἰκαρία*, *Ikaria*). A deme of Attica, where excavations were carried on by the American School at Athens in 1888, when many interesting remains were found. Icaria is noted as the birthplace of Thespis, and as the spot to which legend assigns the introduction of wine-making and of the cult of Dionysus by the god himself.

ICARIA. An island of the Ægean. See NICARIA.

ICARIANS. Members of a communistic society, founded by Cabet (q.v.) to realize the ideals set forth in his romance *Voyage en Icarie*. During the years preceding the Revolution of 1848 communistic doctrines had a wide following in France; and when, in 1847, Cabet announced the acquisition of land in Texas, a large number of persons agreed to emigrate with him to found a settlement there. In 1848 sixty-nine persons set out for the colony, but were unable to endure the climate, and returned after a few months to New Orleans, where they were joined by Cabet with 400 more. Early the following year Cabet, with about 300 followers, emigrated to Nauvoo, Ill., then recently deserted by the Mormons, where the colony was moderately prosperous for a few years, undertaking agriculture as well as trades and manufactures. Dissensions arose, and in 1856 Cabet was expelled together with those members of the community who supported him. In 1860 financial difficulties rendered it necessary for the remaining Icarians to abandon Nauvoo, and thirty-five of them founded a new settlement in western Iowa. For twenty years they grew in wealth and numbers; but in 1880 the community split into two factions, the Young and the Old Party. The former soon broke up; the latter existed until 1895, when it, too, was dissolved. In 1881 a few members of the Iowa community went to California, where they established Icaria Speranza, a society, however, more like a business corporation than a communistic settlement.

The organization of the Icarian communities was democratic. Directors were elected, but they could only execute the orders of the whole body. The members lived in little houses around a central hall where they took their meals in common. They were sociable in their habits, took great pains to educate their children, and were remarkable for their thrift, industry, and the good order they maintained. Excluding the purely religious communists, the Icarian settlements were by far the most successful of the communistic experiments of which the early nineteenth century was so prolific. Consult: Lux, *Etienne Cabet und der Ikarische Kommunismus* (Stuttgart, 1894); Shaw, *Icaria* (New York, 1884).

ICA'RIUS (Lat., from Gk. *Ἰκάριος*, *Ikarios*). (1) In Greek mythology, an Athenian to whom Dionysus taught the cultivation of the vine. (2) A Lacedæmonian, the father of Penelope, wife of Odysseus. When Odysseus declined to settle at Lacedæmon as desired by Icarius, and gave Penelope her choice of following him to Ithaca or of remaining with her father, the bride covered her face with her veil and chose her husband. Icarius then ceased his solicitations and raised a temple to Modesty on the spot.

IC'ARUS. See DÆDALUS.

ICAZBALCETA, ē'käth-bäl-sā'tȧ, JOAQUIN GARCIA (1825—). A Mexican author. He was born in the City of Mexico, and began his historical and archæological researches at an early age. His first literary work was done in the preparation of the *Diccionario universal de historia y geografía* (1885), and he afterwards published a *Colección de documentos para la historia de México* (1858-66), and *Historia eclesiástica indiana, obra escrita á fines del siglo XVI. por Francisco Gerónimo Mendieta de la órden de San Francisco* (1870).

ICE (AS., OHG. *īs*, Ger. *Eis*). Water in the solid state. It is crystallized in the hexagonal system. Ordinarily the crystalline structure of a block of ice is not apparent, owing to the close contact and perfectly regular arrangement of the crystals. But when a piece of ice is exposed to radiation from any luminous source, as the sun, a glowing fire, a gas or oil flame, disintegration gradually takes place, and by the use of a lens, numerous small crystals may be seen studding the interior of the block; as the heat continues, these crystals expand and finally assume

scale. The influence of changes of pressure on the freezing-point is so slight that for all ordinary atmospheric pressures the freezing-point of pure water may be considered a constant quantity. Great pressures, however, have the effect of lowering the freezing-point very considerably, and by raising the pressure to many thousand pounds per square inch ice has been caused to melt at 0° F. By cooling pure and clear water cautiously, it may be 'undercooled,' i.e. it may, under ordinary pressure, be obtained in the liquid state at temperatures several degrees below its normal freezing-point. But this is quite different from the effect of high pressures; the state of 'undercooled' water is just as unstable as the state of a 'supersaturated' solution, and a slight disturbance may cause the whole mass to freeze very rapidly, just as it may cause rapid crystallization to take place in a supersaturated solution. The lowering of the freezing-point by pressure has furnished one of the theories explaining the motion of glaciers. This 'regelation theory' is illustrated by the following phenomenon: If a wire holding heavy weights at its ends is thrown over a block of ice, it gradually cuts its way through the block, and yet the latter remains entire. Along the line where the wire presses upon the block, the melting-point is lowered, and hence the ice melts and allows the wire to descend through a minute distance; the water immediately above the wire then freezes, because it is freed from pressure, and at the same time the ice immediately below the wire melts, allowing the wire to descend a little farther. Thus melting and almost immediate regelation proceed until the wire has cut through the block. The freezing-point of water, as that of any other liquid, is considerably lowered by dissolving in it substances of any kind, and sea-water, on account of its salt, is found to freeze at —2.5° to —3.0° C. The solid separating out, under ordinary circumstances, from freezing sea-water, is not a mixture of ice and salt, but pure ice, and this fact has been utilized in two ways: (1) for concentrating brine in the manufacture of salt; (2) for obtaining sweet drinking-water from the salt water of the sea.

Unlike most other substances, water, on passing from the liquid to the solid state, does not contract, but expands. Therefore ice, having a lower specific gravity than water, floats on its surface. The specific gravity of ice at its normal melting-point is 0.918. The specific heat of ice, i.e. the amount of heat required to raise its temperature 1° C., is much less than that of water in the liquid state; within 30° C. below the freezing-point it is very near one-half, and at lower temperatures it is even somewhat less than one-half, that of water. In the process of melting, ice absorbs more heat than any other solid (see FREEZING-MIXTURES), more than 80 calories being required to melt one gram of ice; the same amount of heat would raise the temperature of the gram of melted water to 80° C. (176° F.).

ICE-PACK, or PACK-ICE. A name given to the large sheets or pans of ice (*floes*) which have united to form a *pack*, and which occupy the open surface of the sea. The ice is almost wholly the result of direct freezing of the superficial ice-pack is frequently of greater thickness than would be brought about by freezing alone, and it is not rare to meet with 'hummocks' on the borders of the pack 30 to 40 feet in height, and more. The individual pans, sheets, or floes that help to build up the pack are of varying dimensions, ranging from small cakes to solid sheets many miles across, and a pack itself may measure a hundred miles, or even considerably more. Even where virtually unbroken, they may contain here and there pockets or 'lakes' of inclosed water, and penetrating water-ways (*leads*), connecting these lakes or wholly independent of them, are of common occurrence. The central part of the Arctic Basin is frequently assumed, but perhaps without sufficient reason, to be occupied by a stationary pack; along its southern border it is freely moving, sending down those vast sheets of ice which constitute the 'pack-drift.' The remarkable drift of the *Fram* has demonstrated that the northern pack was still moving close to the 86th parallel of north latitude, or within less than 300 miles of the Pole. The strong southerly drift of the pack-ice in the region about Greenland, Grinnell, and Grant Lands, jamming between the opposing land-masses, is that which has so largely baffled exploration along what is known as the 'American route' to the Pole. The great centrally located ice-mass which in Davis Strait and Baffin's Bay separates Greenland on the east from the disconnected lands of Arctic and sub-Arctic America on the West, is known by whalers and others as the 'Middle Pack.'

The Antarctic pack is less thoroughly known than the Arctic, although its extent appears to be very much greater, and during many years its front edge or that of the pack-drift has passed far beyond (northward of) the Antarctic Circle. Various names have been given by navigators to particular conditions of ice. The border of sea-ice which clings to the land, and is not affected by the movements of tides, is called the *ice-foot*. Ice that has been crushed into fragments by the impact of moving floes is called rubble. A piece of ice that floats with the upper surface just awash is called a *growler*. *Anchor-ice* or *ground-ice* is fresh-water ice that has frozen to the bottom of a lake or river. *Young ice* is ice new-formed, in distinction from ice of previous seasons. *Palæocrystic ice* is ice that has been formed during a number of seasons by floes overlaid one upon another, has been increased year by year by snowfall, and has been welded by sun and rain into a single mass. See ARCTIC REGION; ANTARCTIC REGION.

ICEBERG. Under this name is understood a detached fragment or section of a glacier, whose terminal foot has reached a body of water, whether fresh or salt, and there broken (calved) off. Fresh-water bergs are those of lakes, and are of comparatively rare occurrence, and never of large size. The oceanic bergs, on the other hand, are frequently of very great size; they may measure even miles in length, as those of parts of the Antarctic waters and even of Melville Bay, off the west coast of Greenland; and they not infrequently rise 250 or even 300 feet above the surface of the sea. In the case of the

common condition to find the larger bergs 'stranded' or anchored at this depth to the floor of the sea. The pinnacled or fancy-shaped bergs are usually those which have undergone considerable weathering or beating up by the sea, and are thus necessarily of smaller size than those of even contour. It is a common statement that the Antarctic bergs differ from those of the Arctic by their larger and more generally tabular form; but these differences are not fundamental, and are hardly more than comparative. But it may be questioned whether all the larger detached masses of ice in the Antarctic Ocean are, indeed, true glacial bergs; many of them might well be only accumulated sea-ice, formed by accretional growth, independent of any assisting land-mass.

The source of practically all the icebergs of Arctic and sub-Arctic waters is Greenland, from whose ice-cap and névé radiate off hundreds of glaciers, the vast majority of which—at least, those of larger size—reach the sea, either directly or through the long fjords which extend 20 to 70 miles into the land. One or more of the glaciers of Melville Bay present ocean fronts of 25 or 30 miles, and there are a number of nearly equal size in Western, Southwestern, and Eastern Greenland.

Owing to the northward set of the West Greenland current, the bergs of this side are carried first to the north, and it is only at about the 74th or 75th parallel that they begin to make their way westward to come down on the 'American side.' Many of the East Greenland bergs follow in the trail of these, rounding the southern apex of the great insular land-mass. The lower point reached by the bergs in North-Atlantic waters is about 40° in the western half of the basin; eastward, the zone of distribution, following largely in the course of Gulf-Stream drift, rises sharply northward, and entirely clears the coast of Scandinavia.

Icebergs are apt to carry much debrital material with them, the remains or parts of the glacial moraines which were formed on land. These, on the melting of the ice, naturally find their way to the bottom of the sea, whether deep or shallow, and these help to build up a 'bowlder-clay deposit,' somewhat similar to the basal till of glaciers. The stranding of bergs on rock-masses also tends to bring about grooving and polishing, again similar to what is produced by moving land-ice (glaciers). Consult Tyndall, *The Forms of Water in Clouds and Rivers, Ice, and Glaciers* (New York, 1872). See WATER; MELTING-POINT; FREEZING-POINT; GLACIER; REFRIGERATING MACHINES.

ICE, LAW OF. After ice has been harvested it is personalty, and is subject to the rules of law governing that form of property. Before it is harvested it is deemed realty for most purposes, although some courts have held that a contract for the sale of all the ice on a certain pond is to be treated as a contract for the sale of a chattel, and not of an interest in real estate.

If the land beneath a particular body of water is subject to private ownership, the ice that forms on the water belongs to the owner of such land, and he has exclusive authority to gather or dispose of it. Hence a lease of the land or a conveyance of an accession to the land, being an increment arising from a formation over it, and is a part of the real estate under the rule that the ownership thereof extends indefinitely upward from the soil.

The landowner may grant to another the right to take ice from private waters, as a profit *à prendre;* that is, as a right to take the products or proceeds of land. Accordingly, the grant of a half-acre of land adjoining a mill-pond with the exclusive right to take the ice from the pond attaches this right as a profit *à prendre* to the half-acre, and it will pass to a second grantee of the half-acre as an appurtenance thereto. On the other hand, the landowner does not part with his right to ice which forms upon a mill-pond by granting to the mill-owner the privilege of flooding the land in question and maintaining a pond thereon. The ice attends the ownership of the soil, not the easement of covering it with water; and if the mill owner needlessly draws off the water for the sole purpose of destroying the ice or preventing its formation, he is liable in damages to the landowner. Again, the owner of land under a private stream is entitled to dam the stream and take ice therefrom, provided such use does not unreasonably interfere with the rights of riparian owners below him to the use of the water.

A riparian owner's right to ice on navigable rivers depends upon his ownership of the land under them. In States where the fee of such rivers is vested in the public the adjoining landowner has no title to the ice, and it belongs to the first appropriator. In other States, where riparian owners are accorded title to the land under navigable waters, they can maintain trespass against any one taking the ice without their consent. At times ice-covered streams or lakes are used as highways of travel, and the question has arisen whether the harvesting of ice upon such a thoroughfare amounts to a nuisance, as an unlawful obstruction to travel. The courts have given this answer: In the absence of legislation on the subject, the right of travel and the right of harvesting ice on navigable waters are public and are to be exercised reasonably. What is a reasonable use of either right depends upon the relative benefits to the community from its exercise. If the privilege of harvesting ice is of greater importance than that of traveling upon it, the latter cannot be set up to prevent or abridge the exercise of the former.

The right to harvest ice forming upon public waters is not private, but public or common. Any citizen may enter such ice fields and take what he pleases, so long as he does not unlawfully interfere with the like right of others. What acts amount to an appropriation of ice on public waters is a question upon which the courts are not agreed. One view is that an appropriation is made by marking and staking off a plot of ice, and preparing the surface for cutting. The other view is that a person does not gain any property rights in such a plot of ice until he has actually reduced it to possession. The subject is regulated in some States by statute. Consult: Gould, *The Law of Waters, Including Riparian Rights* (Chicago, 1900);

PERIOD.

ICE-BEAR. The polar bear. See BEAR.

ICEBERG. See ICE.

ICE-BREAKING STEAMER. A vessel used for keeping open a navigable passage through ice. Such vessels are much used on the Great Lakes of the United States, where they are usually adapted for carrying cargoes or railway cars. They are very heavily built to stand the shock of ramming the ice or of running up on it at the bow and breaking it by reason of their weight. During the past few years the problem of constructing such vessels has been studied by Admiral Makaroff, of the Russian Navy, and several vessels have been built from his designs. The largest of these was built in England in 1898-99, and is called the *Yermak*. She is of 8000 tons displacement and has four screws, one under the overhanging bow to suck down the ice, so that the bow will ride over it, and, descending, crush it. This screw also creates a current which drives the broken ice astern. The stern is recessed to receive the bow of a vessel following her through the channel which she makes. Her length is 305 feet; beam, 71 feet; and draught, 25 feet. The coal capacity is very great—3000 tons—as it was intended to use her in Arctic exploration; she spent some months in the Arctic Ocean during the summer of 1900, and was very successful in breaking her way through ice-fields in harbors; but in 1901, against the heavy ice of the polar pack, she proved inefficient.

ICE-CAVE. Any natural formation of ice in a cave or crevice. The walls of caves often become cooled to such a point by the infiltration of cold air in winter or during the frosty nights of spring and autumn, that the percolating waters rapidly freeze. The ice usually disappears for a few weeks in September. The most celebrated ice-cave in the world is that of Dobschau (Dobsina), in Hungary, situated in the Carpathians, at an elevation of about 2700 feet. Consult Balch, *Glacières or Freezing Caverns* (Philadelphia, 1900).

ICE-COLUMNS. See FROST.

ICE-GULL. A name given to several gulls encountered by sailors in icy regions, most properly perhaps to Ross's gull. See GULL.

ICE INDUSTRY, THE. The ice industry is divided into two branches, in accordance with the origin of the ice itself. *Natural ice* is cut in winter from rivers, lakes, and ponds, stored in ice-houses, and distributed to consumers as needed. Manufactured ice, or, as it is more commonly called, *artificial ice*, is produced when and where required, and is generally distributed with comparatively little intervening storage. The collection and preservation of ice and snow, on a scale which was small indeed as compared with the operations of the present day, appear to have been practiced from early times by most civilized nations having the natural products within their reach. Where neither snow nor ice was provided by nature, various means of artificial production have been practiced in a small way for centuries; such as the exposure of water in porous receptacles, and packing common or ships from cold northern to warm southern ports; and the production and sale of manufactured ice has, within the last twenty-five or thirty years, attained large proportions and made an ample and cheap ice-supply quite independent of local temperatures.

NATURAL ICE. It is said that both the Greeks and the Romans packed snow in deep underground pits, and that Nero established ice-houses in Rome. At the end of the seventeenth century dealers in ice and snow were quite common in France. In 1799 a cargo of ice, cut from a pond near Canal Street, in New York City, was shipped to Charleston, S. C. This may be considered as of little moment; but in the winter of 1805-06 Frederick Tudor, of Boston, Mass., entered the ice field in good earnest, and, after some heavy losses, succeeded in establishing an export trade in ice which was the beginning of the modern industry. Tudor's first ice cargo, of 130 tons, was shipped from Boston to Martinique in the winter of 1805-06, but though the ice reached its destination in safety, the venture resulted in a loss. Two years later a shipment of 240 tons to Havana, Cuba, also resulted in a loss to Tudor. A monopoly of the ice trade with the British West Indies was secured by Tudor about 1816, and a like privilege from Spain in 1815-16. From 1815 to 1820 the same merchant extended his ice trade to Charleston, S. C., Savannah, Ga., and New Orleans, La. Others followed his example, until in 1855 ice exports from the United States, according to statistics of the Treasury Department, amounted to 41,117 tons, valued at $190,793. These exports increased to 68,802 tons, valued at $267,702, in 1870, since which time, according to the authority already cited, there has been an almost constant decrease, until in 1900 the tonnage was only 13,720, and its value $29,501. If the figures were available it would doubtless appear that the foreign ice trade was soon outstripped by the domestic commerce in what has long since changed from a luxury to a necessity. The *Ice Trade Journal* has published figures for the harvest of Maine and Hudson River ice for the years 1878 to 1900, inclusive, which show that those two sources alone produced yearly quantities ranging from 2,226,000 tons in 1880 to 5,626,430 tons in 1899. The capacity of Hudson River ice-houses in 1900 was placed at 4,216,000 tons. The combined Maine and Hudson River yield, enormous as it may seem, is estimated at only about half the commercial product of natural ice in the United States; but even if this be not too low for the total, it should be remembered that, in the aggregate, the additional harvest for private purposes is immense.

HARVESTING ICE is a comparatively simple operation, or series of operations, the main features of which are as follows: The snow, if any, lying on the ice is removed by scrapers. In case there is an upper layer of snow ice, it is loosened by field planes and then removed. Markers are next used to outline the blocks, which are followed by plows, which cut the grooves still deeper. The scrapers, planes, markers, and plows are drawn by horses or mules. The parallel grooves, it should be understood, are

first cut in one direction, then another series is cut at right angles to the first. The final grooves extend nearly through the ice, so that the

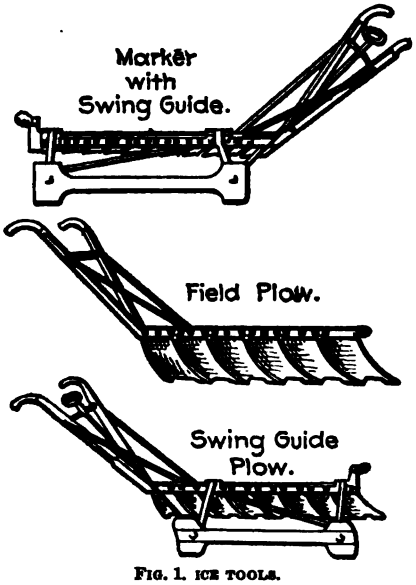


FIG. 1. ICE TOOLS.

cakes may readily be pried apart by means of suitable tools. When the latter operation has been effected the cakes are floated to the shore through channels provided for the purpose, and there elevators, generally inclined, lift the ice to the ice-houses. The cakes are packed close

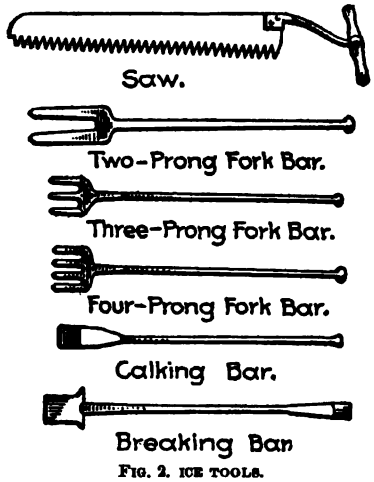


FIG. 2. ICE TOOLS.

together, with sawdust or other insulating material above the final layer, and between the ice and the outer walls of the ice-house. The ice-houses are generally tall structures, with outer walls composed of one to three compartments. Probably the most approved plan is to have an outer compartment in which the air is allowed to circulate; an inner or dead-air compartment; and a central space packed tightly with sawdust. The bottom of the ice-house must be well drained, and ample provision must be made for ventilation in order to prevent the accumulation of watery vapors above the stored ice. Railway sidings, or docks, or both, afford means for shipping the ice to distributing centres. Specially constructed cars, with lined sides and bottoms, are used where ice is to be shipped long distances, and in the South the cakes are carefully packed in addition.

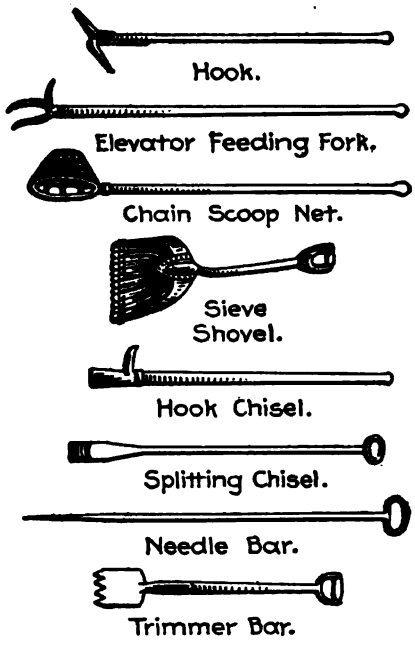


FIG. 3. ICE TOOLS.

Besides the ice tools already named (snow-scraper, ice-plane, marker, and plow) the following may be mentioned: Augers and tapping-axes for inspecting the ice and for draining it of surface water; saws; forked and pronged and chisel and needle bars, for separating the cakes after the markers and plows have done their work; trimmer bars for squaring the cakes, and hooks, grapples, and forks, for pushing them to the elevator; chain scoop-nets and sieve shovels, for removing slush ice from the channels; hoisting, drag, and edging tongs, adzes and long-handled chisels for packing the ice in the houses; saws and bars for loosening the ice preparatory to shipment from the houses; and, finally, delivery wagons, tongs, saws, axes, shaves, and scales.

ARTIFICIAL ICE. A sketch of the development of ice-making apparatus and descriptions of the principles and practices involved will be found under REFRIGERATION. The following figures regarding the growth of the industry in this country are taken from the section on the Manufacture of Ice Industry in the Twelfth Census of the United States. The first ice factory of importance in this country was erected at New Orleans in 1866. In 1870 three other factories were included in the census returns. The number of establishments reported increased to 25 in 1880, 222 in 1890, and 787 in 1900. The total capital invested in these 787 plants was $38,204,054, and the value of the products was $13,874,513. These figures, like those previously given for natural ice, do not include the hundreds of plants making ice exclusively for their

of the 787 factories was 4,294,439 tons, of which 4,139,764 tons, or 96.4 per cent., was can ice, and only 154,675 tons plate ice. The Middle States produced more ice than any other group, the amount being 1,574,980 tons, as compared with 1,414,158 tons for the Southern States, and only 40.059 tons for the New England States. The average value of the ice at the plants, for the whole country, was $3.11 per ton for can ice, and $2.85 for plate ice. As a rule, the Southern States now depend wholly upon the manufactured product for their ice-supply, the few possible exceptions being some of the coast cities. As one goes farther North, natural ice comes more and more into competition with the manufactured article, until at the extreme North it actually, or practically, displaces the latter. But the use of manufactured ice has increased rapidly of late and is continually extending toward the North.

SANITARY ASPECTS. The sanitary quality of ice-supplies depends chiefly upon the presence or absence of disease germs, chiefly those of typhoid fever, in the original water, and upon the effect of freezing upon such germs. In addition there is the possibility that manufactured ice may become contaminated during the freezing process by sick or careless workmen, and that any ice may be fouled while it is being distributed to consumers. Proper washing of ice before domestic use, care not to bring ice in contact with food or water, and proper supervision of ice factories, would go far toward preventing danger from what may be termed incidental contamination. The water from which artificial ice is made is frequently distilled or filtered, or both. In general, it may be said that artificial ice should be made from none but naturally pure water or from that which has been purified, and that natural ice should not be harvested from polluted streams or lakes. It may be noted, however, that natural ice, when formed in fairly deep and quiet water, eliminates much of the impurities while freezing, and that recent bacterial studies show that after a few weeks practically all bacteria, and particularly the dangerous ones, disappear. Under anything like carefully guarded conditions, therefore, the chance of typhoid infection by means of ice is small. In the case of artificial ice, the freezing process, being from the outside in, concentrates the impurities at and near the centre of the cake.

BIBLIOGRAPHY. Consult Hile, *The Ice Crop* (New York, 1892); and for the sanitary aspects of the subject, consult: *Reports of the Massachusetts State Board of Health* for 1889, 1892, and 1900; the *Report of the Boston Board of Health* for 1901; and Prudden, *Drinking Water and Ice Supplies* (New York, 1900).

ICELAND. An island and Danish colony in the North Atlantic, on the northern edge of the temperate zone. The Arctic Circle cuts the two most northern points of the island, which extends south to latitude 63° 35′ N., and from longitude 13° 23′ to 24° 35′ W. (Map: Denmark, F 1). It is about 600 miles distant from Norway, and 250 from Greenland. Its area is 39,756 square miles, of which only about one-sixth is habitable. The southern coast has no indentations, but the west, north, and east coasts are

Iceland is a land of plateaus, built up of volcanic masses of old and recent origin; formations dating from before the Tertiary period are nowhere found. The average height of the land is from 1600 to 2000 feet. The few low grounds are small, and occupy only about one-fourteenth of the total area. Only these low grounds, the coasts, and some narrow valleys are inhabited, while the extensive highlands are quite unfit for settlement; the outer edges only are utilized as summer pastures for sheep. Basalt and volcanic breccia are the component rocks; the latter is found in the centre and extends down to the south, while the greater part of the west, north, and east coasts consists of basalt.

Above the elevated plains of the interior rise the broad domes of the ice-covered mountains; the largest of them rest on breccia, and where the glaciers descend almost to the sea, as on the south coast, there are no fiords or harbors, for these have been filled up by detritus. The basaltic regions, on the contrary, are intersected by numerous fiords, and contain many good harbors, often lying behind narrow tongues of land, which probably are old glacier moraines.

There are many lakes, but most of them are small. In the valleys of the basaltic tracts are deep lakes hollowed out of the solid rocks, as, for instance, the Lagarfljot, the surface of which lies 85 feet above sea-level, while its bottom is 275 feet below. In the highlands one finds several groups of moraine lakes, and in recent times large sheets of water have been formed by the damming up of glacier streams. Certain lakes fill hollows formed by the sinking of lava streams, while others are typical crater lakes. During a journey in 1889 Herr Thoroddsen discovered to the west of the great snow-field of Vatnajökull, a grand and beautiful group of crater lakes. This country is remarkable for its natural beauty; the whole surface is covered with colossal craters filled with water, and would resemble a landscape in the moon were it not for the greenish pools that show themselves everywhere among the coal-black lava, the brownish mounds of ashes, and the red heaps of scoriæ.

The glaciers of Iceland cover an area of 5200 square miles. The climate is peculiarly suited for the development of large glaciers, for the air is keen, cold, and damp. On the southeast coast the rainfall is considerable, and here lies the great Vatnajökull, 3100 square miles in area. The humidity on the coast is much greater than it is in the interior highlands, as is shown by the height of the snow-line. On the south side of Vatnajökull the snow-line descends to 1970 feet, while on the north side it is 4270 feet above the sea. The Breidamerkurjökull glacier advances on the south to 65 feet above the sea, while the lowest glacier on the north terminates at an altitude of 2500. Large areas (4300 to 4600 square miles) in the very centre of the island are covered with lava of recent origin. The higher lava-fields are almost entirely devoid of vegetation, and present a most dreary appearance. The most extensive lava desert is the Odadahraun, to the north of Vatnajökull, which covers an area of over 1540 square miles, and lies 2000 to 4000 feet above

the sea. Its volume is probably more than 51 cubic miles, and it has been formed by the ejectamenta of 20 volcanoes. There are about 100 volcanoes, of which 20 have been in eruption in modern times. The best-known volcanoes are Hecla, Katla, and Askja. The crater of Askja is 16 square miles in area, and is covered with glaciers which melt in times of eruption, causing great inundations. There are many hot springs, and the geysers are famous for their intermittent eruptions of scalding water. About 75 severe earthquakes have occurred in the past century, many of which have done great damage to life and property. Several shocks in the closing years of the nineteenth century were severely felt in Reykjavik, the capital and chief town.

The climate is not very severe, considering the high latitude, as the island is open to the ameliorating influences of the Atlantic. In the highlands of the interior it is more severe and variable; here snow-storms often occur even in the middle of summer. The winter is long and damp, the summer short and cool. A journey can seldom be commenced before July, for in spring the soil is saturated with snow-water, and the mountains and elevated plateaus covered with snow. Grass first appears on elevated spots in July, while in the highlands of the interior the scattered patches of verdure seldom yield fodder for horses before the end of August. The greatest hindrance to exploration is this scarcity of grass. The lowlands and the valleys have a great depth of rich soil, and on the field slopes grasses of several kinds mingle with the scrubby mountain birch and stunted willow, and afford luxuriant herbage for the sheep. A few mountain ashes are the only trees worthy of the name, *Elymus arenarius*, a species of wild corn, is grown along the sandy coasts; and Iceland moss is a lucrative article of commerce.

The fauna embraces, in seven families, 34 species of mammals, 24 of which live in the water. Seals breed around the coasts, several varieties of whales, basking sharks, and over 60 species of fishes abound in the adjacent waters, and walruses are sometimes caught. White and blue foxes are numerous and are hunted for their fur. In 1770 reindeer were imported from Denmark, and are now found wild in the interior. Polar bears frequently arrive on ice-drifts from Greenland. The horse, the cow, the sheep, dog, and cat are the domestic animals. The dog resembles the Scotch collie and the Eskimo dog. Among indigenous birds are the falcon, ptarmigan, whistling swan, and several species of ducks. The eider-duck is especially valuable for its down, and is jealously protected.

Agriculture and Other Industries. About five-sixths of the inhabitants live by horse, cattle, and sheep raising. A large part of the slopes and river valleys of the plateaus affords excellent pasture for sheep, and in the low-lying lands are extensive meadows, which, properly managed, could support twice the number of cattle that now graze on them. The island contains about 1,000,000 sheep and 20,000 cows. A great deal has been done latterly to improve the soil. Agricultural societies have been formed, and there are now four agricultural schools. At one time a little barley was grown, but it could not be made to pay, and therefore field cultivation has been abandoned. Horticulture, on the other hand, makes great progress, potatoes, cabbages, and rhubarb thrive well, and some berries, such as currants, are cultivated. Woods have never existed since the glacial period, and the brushwood of birch is less extensive than formerly, owing to the sheep. The birch is seldom higher than a man, though in one place on the east side some specimens attain a height of over thirty feet. The mountain ash reaches the same height. The fishing grounds (cod, herring, flounders, whale, and seal) are frequented by English and French boats. The sea is very stormy, and therefore fishing is best pursued in large and strong vessels. The fishermen of Iceland have had to content themselves with small open boats. They brave the billows of the ocean in winter with the greatest boldness and contempt of danger, and every year many lose their lives. Want of capital has prevented them from acquiring large vessels, but considerable progress has been made in this direction, and the Icelanders now possess a fair fleet of fishing smacks. Manufacturing industries, with the exception of fish oil, are utterly absent. The simpler articles of dress and necessaries of life are usually supplied by every native for himself, and the number of artisans is very small. The mineral deposits are not sufficiently large to repay exploitation. Turf is the chief fuel, but some coal is imported.

The chief exports are dried fish, wool, live sheep and horses, eider-down, salted meat, oil, and whalebone. The annual value of the exports amounts at present to over $2,000,000. The imports consist of textiles, cereals, and other foodstuffs, and have an annual value of between $2,000,000 and $2,500,000. Up to 1854 the trade of Iceland was a State monopoly of Denmark. Since then it has been free, and is now chiefly in the hands of Denmark and Great Britain. Iceland has regular steam communication every three weeks with Denmark via Leith, the port of Edinburgh. There are a number of trading stations on the island, and six commercial centres. There are few roads. In the settled districts the traveler follows bridle-paths worn by the hoofs of the small Iceland horses. But a few good roads have now been built, and some of the streams are being bridged. The people are sturdy, and have not allowed the hardships they have endured to crush them. As the farthest outpost of civilization they have always had to fight a hard battle with nature. They are of an earnest, quiet, and somewhat melancholy disposition, and as a rule very intelligent. Though the lower classes live in poor circumstances, they are very enlightened; perhaps in no other country of Europe are so many books, in proportion to the population, printed and sold as in Iceland. The island contains five printing establishments, from which issue ten newspapers and eight periodicals. During recent decades many Icelanders have emigrated to America, and have founded flourishing colonies in Manitoba. In all about 12,000 have crossed the Atlantic, but of late years the emigration has fallen off. Besides Reykjavik, the capital, with a population of about 4000, the chief settlements are Akreyri and Isafiord.

Government. At the head of the administration is a Governor-General, appointed by the King of Denmark, and exercising his authority under the supervision of the Secretary for Iceland at Copenhagen. The Althing, or the Parliament of the colony, although in existence since

the Norwegian occupation, had not attained its full power before 1874, when the new Constitution granted by the King of Denmark endowed it with complete legislative authority. The Althing consists of 36 members, of whom 30 are elected by the people, and 6 appointed by the Crown. It is convened every two years, and is divided into two chambers, of which the upper is composed of six elected, and as many appointed members, and the lower one consists of 24 elected members. For purposes of administration the island is divided into three districts—the South, the West, and the North and East—administered by two officials having their seats at Reykjavik and Akreyri. The districts are subdivided into 20 smaller divisions known as syssels, and administered by sheriffs, who perform the functions of tax collectors, and judges of first instance. At Reykjavik there is a court of second instance from which appeals are made to the Supreme Court at Copenhagen. The revenue is derived from customs and tax on spirits, tobacco, coffee, and sugar. Elementary education is well provided for, and the number of illiterates is remarkably small. There are also a number of higher schools, a theological seminary, and a college at Reykjavik, with about 100 students. For religious purposes Iceland forms a separate bishopric in the Lutheran Church.

POPULATION. The population, estimated at over 46,000 at the beginning of the nineteenth century, was 72,422 in 1880; 70,927 in 1890. The birth-rate is large, but it is offset by the large infant mortality resulting from the severity of the climate. The Icelanders are of Scandinavian origin, and belong exclusively to the Lutheran Church. They live mostly on isolated farms, there being very few settlements.

HISTORY. Iceland was not visited by Europeans, as far as is known, until the end of the eighth century, when some Celts landed on the island, but its history really dates from about 870, when various Norsemen discovered it, chiefly by accident. One of these, Flóki Vilgerthar-son, gave it its present name. Soon thereafter the Scandinavians came in large numbers, owing to the despotism of Harold Haarfager (q.v.) at home, and permanent settlements were made, among them the present capital, Reykjavik. The settlements were all independent of one another, and for some time the only bond of union was furnished by their common religion, until finally in 927 one Ulfljotr was sent to Norway to prepare a code of laws. He did so, returning in 930. His Constitution provided for a yearly assembly, but all details are lacking to us. Many legal changes, however, had to take place before even a semblance of order prevailed in Iceland. In time, regular territorial divisions appeared, and a system of law very similar to that of Anglo-Saxon England. The most important event in the early history of Iceland was the conversion of its inhabitants to Christianity. The first missionary was Thorvaldr Kothranson, who came in 981, but after five years left the country, having failed utterly. More successful was the attempt made under the auspices of King Olaf Tryggvason of Norway (995-1000), who introduced Christianity, chiefly by force, in the year 1000. Under the influence of the new religion civilization gradually spread, and the laws became milder. Until 1103 Iceland belonged to the province of the Archbishop of Bremen, later to that of Lund. Meanwhile the kings of Norway regarded Iceland with a jealous eye, for it was a place of refuge for all their rebellious subjects, but all attempts to conquer it failed for many years. The history of the island was mainly one of rivalries of different chiefs, and about the beginning of the twelfth century all the contests in the land were connected with those of the three sons of Sturle, the historian Snorri, Thord, and Sieghvat, the most powerful chiefs of their time. By marriage and other means, Sturle Thordson had become *godar*, or supreme magistrate, of several provinces, for these offices were hereditary in certain families. These offices he transmitted to his sons, who, however, were unable to agree. Finally, in 1262, Norway having been appealed to, King Hakon of that country induced Iceland to join its fortunes to that of Norway. The prosperity of the country from that time onward rapidly declined as strict navigation laws were enforced. In 1380 Iceland, joined together with Norway, came under the Crown of Denmark. Much of the subsequent history of the island is filled with the relation of physical evils which desolated the land, and effectually subdued the spirit of its inhabitants. Thus there were repeatedly severe volcanic eruptions, and between 1402 and 1404 the black death depopulated the island, sweeping away, it is said, two-thirds of the population. In 1540 Christian III. of Denmark began to introduce into Iceland the Reformation, which rapidly prevailed throughout the whole country. Its history since that time has been on the whole scarce in striking events. During the Napoleonic wars England captured it, but gave it back to Denmark by the Treaty of Vienna in 1815. The Althing or Legislative Assembly, which had existed since the earliest times, was now dissolved, but was reorganized in 1843. For many years constitutional conflicts with Denmark went on, which were finally amicably settled in 1874. Since then Iceland has had practically home rule.

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ICELANDIC LANGUAGE. With the Norwegian popular dialects and Faroese, Icelandic forms the West Norse subdivision of the Scandi-

navian languages (q.v.), as opposed to the East Norse, made up of Swedish and Danish. The history of Icelandic begins with the settlement of Iceland by Norwegians, principally from Western Norway, at the end of the ninth century. After this time there was gradually developed in Iceland a particular West Norwegian dialect, which, however, at the outset differed but slightly from the parent Norwegian. Only after the introduction of Christianity, about the year 1000, is it possible to speak of languages instead of dialects in the whole Scandinavian north, and at this time Icelandic, too, ranged itself by the side of Norwegian, Swedish, and Danish as a separate language, with characteristic differences in sounds, inflection, and vocabulary.

In the history of Icelandic it is customary to distinguish two main periods—Old Icelandic, from the settlement of the island, in the ninth century, to the Reformation, at the middle of the sixteenth century, and New Icelandic, down to the present day. Old Icelandic is further subdivided into three periods, the first of which extends from 874 until about 1200; the second, the so-called classical period, during which the principal literary works were produced, from 1200 to about 1350; and the third, or transitional period, from 1350 to 1540. The language of the first period, at the beginning identical with that of Norway, at the end is distinguishable from it by but comparatively few differences. One of the most plainly discernible and characteristic distinctions between the two is the retention in Icelandic of initial *hl*, *hm*, *hr*, whose *h* early disappears in Norwegian, as it does in Swedish and Danish, but which has remained in Icelandic, alone of all the Germanic languages, to this very day. The language of the second period, on the other hand, exhibits many important changes along broad lines, in phonetic conditions and in inflectional forms, that from this time on sharply differentiate Icelandic and Norwegian. This forms an intermediary period which witnesses the gradual growth of those changes in the language whose consummation marks the beginning of the new period of Icelandic. During this whole time the language remained practically homogeneous throughout the island, and no sharply defined dialectic differences were developed. Manuscripts of the thirteenth and fourteenth centuries from the west of Iceland show, it is true, characteristic phonetic conditions in certain instances, and it is likely that others existed as between the north, west, and southeast, but none of them are important. From 983 to about 1400 Icelandic was also spoken in the settlements of Greenland, but to what extent this language deviated from that of Iceland cannot be determined from the few runic inscriptions which have come down to us.

Old Icelandic, both from the standpoint of the language itself and of the literature written in it, is by far the most important of the ancient Scandinavian languages. The sources of our knowledge of it are an almost unparalleled literature in prose and verse, written after the early part of the twelfth century, but often of far more ancient ultimate origin. The alphabet used is the usual Latin script of the end of the Middle Ages, introduced by way of England and modified to fit the special conditions of the language. The few runic inscriptions that exist in Iceland are unimportant from a linguistic point of view, in that they are all more recent than the oldest manuscripts written in Latin letters. The oldest conditions, however, are in many cases not to be found in the oldest manuscripts, but in poems contained in manuscripts of the thirteenth century, which, as a consequence of their metrical construction, have kept forms as old, in some instances, as the ninth century, from which early time they had been transmitted orally from generation to generation. The oldest manuscript that has been preserved is an inventory of the church at Reykjaholt, in Iceland, the most ancient part of which was probably written between 1178 and 1193. The principal manuscript of the Elder Edda, the so-called Codex Regius, dates from the end of the thirteenth century; the principal manuscript of the Snorri Edda, the so-called Codex Upsaliensis, is of the same period. The best manuscripts are all written before the middle of the fourteenth century. Icelandic manuscripts are both parchment and paper. The former medium was used from the beginning of writing, at the end of the twelfth century, down into the sixteenth century; the latter from the fifteenth century almost to the present day. Old Icelandic manuscripts are preserved principally in four large collections—viz. the Arnamagnæan collection, so called from the Icelander Árni Magnusson, who collected and gave it to the University Library in Copenhagen; the collection in the Royal Library in Copenhagen; the so-called Delagardic collection, in the University Library in Upsala, Sweden; and the collection in the Royal Library in Stockholm. Besides these, there are a few manuscripts in the University Library in Christiania, Norway; in the British Museum, in London; the Bodleian Library, in Oxford; the Advocates' Library, in Edinburgh; in Germany, in Wolfenbüttel, in Tübingen; in Utrecht, Holland; in Vienna and Paris. No manuscripts of importance whatever have been left in Iceland, with the exception of the Reykjaholt inventory, which is a single quarto leaf of parchment preserved in the public archives in Reykjavik.

The most predominant characteristics of Old Icelandic as a Scandinavian language are, in the main, the following: To an extent unknown to the other members of the Germanic group, Icelandic exhibits a consistent and widely developed process of assimilation in consonants and vowels; under this head falls the extraordinary extension of umlaut, which is here not merely a process of palatalization, as elsewhere in the Germanic languages, but of labialization as well. There is besides this a characteristic preference for suffixes, as exhibited in the use of the suffixed definite article with substantives, masc. *-nn*, fem. *-n*, neut. *-t;* the formation of an entirely new medio-passive conjugation by the suffixal use of the reflexive pronoun; and the expression of negation by an added *-gi*, *-a*, or *-at*. Other important characteristics are the universal shortening of the vowels of inflection and of derivation; the disappearance of final *n* in the so-called weak inflection of substantives and adjectives, and in the infinitive of verbs, whose accompanying preposition, furthermore, is *at*, instead of *du* (*zu*), as in the other Germanic languages, and the use of the consonantal case ending *-r*, elsewhere retained only in Gothic as *-s*, in masculine and feminine substantives. There are, in addition, many

landic possesses, as a whole, as is to be expected, a much more ancient character in sounds and in inflectional forms. It is, however, by no means invariably the most conservative. The far greater extension of the process of umlaut, for instance, in Old Icelandic, results in a large number of forms that are more recent than the corresponding ones in the other Scandinavian languages in their oldest period. The notably wide vocabulary of Old Icelandic shows some admixture of foreign elements. These are Latin words, introduced mainly through the Church after the Christianization of Iceland in the year 1000; Celtic words, introduced in considerable number as a result of the contact of Celtic-speaking people in the British Islands with the Norwegian settlers of Iceland, many of whom came by the way of Scotland, Ireland, the Orkneys, the Hebrides, and the Shetlands, where they had previously lived for longer or shorter periods; Anglo-Saxon words, which came in as a consequence of the close contact of Icelanders in England with the people, their language, and their culture; and finally, a few French and German words, due to the use in literature of foreign material, derived either directly or remotely from these sources.

The history of New Icelandic, or the present period of the language, begins with the Reformation, although the conditions that characterize it can already be observed in process of development in the transitional period at the end of Old Icelandic. The earliest literary monument of New Icelandic is the first Icelandic printed book, the New Testament, translated by Odd Gottskalksson, and printed at Roeskilde, in Denmark, in 1540. In general, Icelandic has still retained, to the present time, along broad lines, in inflections and vocabulary, its archaic characteristics, so that to-day it is on the whole the most ancient in appearance of the Germanic tongues. Since the beginning of the period the language has, however, in reality undergone a continual internal development. This is particularly true of the sounds, which have been very materially changed in pronunciation, although frequently the conservative retention of the old orthography gives no clue to it. What has helped Icelandic to retain its early conditions is, more than anything else, its relative isolation and the consequent minimum contact with other languages, on the one side, and the fact of its unbroken use in literature on the other. The production of literature in Iceland, although it dwindles in value and amount after the classical period until it is awakened to new life by the Reformation, has never wholly ceased since its very beginning. All this, with the continuous culture of the old literature, which has in some form or other never been forgotten, has tended to keep the language phenomenally pure and homogeneous throughout the island. After 1380, when Iceland, which since the end of the Republic in 1262 had belonged to Norway, fell with that country under the sovereignty of Denmark, a Danish influence was exerted upon the language which has continued, with varying effect, down to the present time. This influence was particularly active in the two centuries immediately following the Reformation, to such an extent that the language seemed on the way to lose forever its characteristic purity. It was an appeal to the old literature which furnished the missing norm, and not only checked the further introduction of Danicisms, but set on foot a reactionary tendency toward the forms and orthography of the classical period of the language. This puristic movement began toward the end of the eighteenth century, but was particularly furthered by the formation of the Icelandic Literary Society by the Danish philologist Rask in 1816. Since that time an influence has been carefully and intelligently exerted, both to eliminate foreign elements from the vocabulary, and either to rehabilitate old forms or to set in their place new forms made out of the old elements of the language, and to reform the orthography from the standpoint of etymology. A printed page of Icelandic at the present day has as a consequence a much more primitive character than the facts of its pronunciation actually warrant. In comparison with the other Germanic languages, changes have, nevertheless, been relatively few, and Icelandic, not only apparently, but in reality, as it is in use to-day, is inherently the best preserved of this entire group.

The present territory of Icelandic, aside from small settlements in the United States and in British America, is the island of Iceland, where it is the spoken and written language of the 70,000 inhabitants. The literary language of the present time is to all intents and purposes the spoken speech, not of any particular region or of any separate class, but of the people of the whole country, with the reservation that in the capital and the trading places along the coast much Danish is in use, and the spoken language is no longer as pure as elsewhere. As in the old period, there are no dialects in modern Icelandic, although there are still, as then, minor differences that give the language of certain parts of the country a local color.

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its references, but marred by careless etymologies. For the poetical language the standard work is still Sveinbjörn Egilsson's *Lexicon Poeticum Antiquæ Linguæ Septentrionalis* (Copenhagen, 1860). The best recent dictionary is Fritzner's *Ordbog over det gamle norske Sprog* (2d ed., Christiania, 1883-96), with renderings in Danish. Larsson's *Ordförradet i de älsta islanska handskrifterna* (Lund, 1891) contains an exact reference to each occurrence of every word in the oldest Icelandic manuscripts. Gering's *Glossar zu den Liedern der Edda* (2d ed., Paderborn, 1896), and Möbius's *Altnordisches Glossar* (Leipzig, 1866) are valuable special dictionaries. Thorkelsson's *Supplement til islandske Ordböger* (Reykjavik, 1876-85) contains words not found in previous dictionaries, including Icelandic through the seventeenth century.

ICELANDIC LITERATURE. In order to understand the remarkable brilliancy of the classical Icelandic literature of the twelfth and thirteenth centuries, it is necessary to bear in mind the fact that the early settlers were among the cream of the Norwegian people. In spite of the political difficulties that had induced these hardy Norsemen to seek a home almost in the ocean itself, intercourse between Iceland and the Scandinavian Peninsula continued to be very close, especially as a result of the frequent visits made to Norway by young Icelanders of rank. Another reason for the literary supremacy of the early Icelanders is closely connected with one of the principal natural drawbacks of the island, its severe climate, and the consequent isolation of the people during the greater part of the year. Persons in Iceland were thus greatly thrown upon their own resources. As a result, the art of story-telling was resorted to for passing away the monotony of the dark winter days. The periodical meetings in summer were used for an interchange of news and of stories and poems, and to this day the Icelanders are probably the greatest lovers of oral literature. The Icelandic classics still form the most popular reading matter of the masses of the people. This vitality of the Icelandic literature is again closely connected with social conditions. The Icelanders are a homogeneous people, and in reading the accounts of the early heroes of Iceland they read the stories of their own ancestors, whose names have been familiar to them from early childhood. For them the long genealogies, which the most patient foreign reader finds tiresome, are full of interest as family records of the remote past, and the most insignificant detail is fraught with the vividness of personal association.

Turning to the literature itself, we find, as is the case with the other literatures of the world, that the earliest monuments are in verse form. The earliest monument of Icelandic literature, furthermore, the so-called *Older Edda*, is, like our own Beowulf, the most important and interesting work produced, and claims, more than any other single work, the attention of Icelandic scholars. The *Older Edda* is not a poem, in the strict sense of the word, but a collection of more or less closely connected poems of varying length and character, which were preserved for a long time by oral tradition, suffering inevitable changes in the process of transmission. For many centuries the manuscript containing the poems was forgotten, and on its discovery in 1643 it was attributed to the classical writer Sæmund, called the Wise, who lived in the last half of the eleventh and the first half of the twelfth century. It has since been proved conclusively that it was redacted by an unknown Icelander. A curious error is also frequently repeated with regard to the etymology of the word Edda itself, which is explained as meaning great-grandmother. As a matter of fact the name was improperly extended from a prose work, the so-called *Younger Edda*, the work of Snorri Sturluson (q.v.). The age of the *Older Edda* has been greatly exaggerated, the oldest portions probably belonging in their present form to the tenth century. (For an account of the poems, see EDDA.) *The Younger*, or *Prose Edda*, is of great value, because of the information it gives of Icelandic mythology and the language of the early skalds. It is a sort of *ars poetica*, and was compiled for the guidance of young poets. Its style is admirable, its tales of the gods and goddesses being related with a due attention to effect. The style of most of the early Icelandic poetry is in marked contrast to the simplicity and directness of the classical prose. The most complicated figures and the most obscure references are freely used. The form is alliteration combined with assonance, or the agreement of medial vowels. Most of the poems of the skalds are short, eight verses each, but some few longer poems occur. The most striking of the latter are the three poems by Egil Skallagrimsson, the hero of the Egils Saga. They are much simpler than the short poems by the same author, and are full of feeling and dignity. Egil's elegy on his son may be ranked among the great poems of the world. To the eleventh and twelfth centuries belong poems composed in imitation of the ancient works, consisting of moral and didactic maxims, the former conceived from an assumed heathen, the latter from a Christian point of view. In the thirteenth century the skaldic art declined and gave place to an inferior literature based upon biblical stories and legends of the saints. Two centuries later appeared the *ríma*, or ballad, which closely resembles in form and subject matter the ballad as found on the Continent. These continued in popularity until the seventeenth century. Frequently the classical sagas were paraphrased in these *ríma*s.

The earliest Icelandic prose belongs to the beginning of the twelfth century, when Ari the Wise (1067-1148) composed a history of his native island and its population in the *Islendinga-bók* (The Book of the Icelanders), which is a revision of an earlier work by Ari. The value of this work is historical rather than literary, for its facts, while detailed and reliable, are not presented in an interesting style. It has been edited, with a German introduction and notes (Halle, 1891). The *Landnáma-bók* (Landtaking Book), also by Ari, is based upon the earlier *Islendinga-bók*. It describes the discovery and settlement of Iceland, and contains detailed accounts of 3000 persons and 1700 places. It was continued by others. There is an English translation by T. Ellwood (London, 1898). These works entered largely into the composition of the annals of the early kings of Norway, composed a century later by Snorri Sturluson (q.v.), under the title of the *Heimskringla* (Circuit of the World), the opening word of the work. This work deserves special notice as being the most important historical contribution of the Middle Ages.

It is characterized by a vivid style, and so strongly does it appeal to the Icelandic consciousness that it is still the most popular book after the Bible in Iceland. A new translation into Dano-Norwegian has been made (1900) by G. Storm, and published with a subvention by the Norwegian Parliament. The best edition in the original is that edited by F. Jónsson (1893-1901). A continuation of the *Heimskringla* was composed by several authors. It has twice been translated into English, by David Laing (London, 1844 and 1889), and by W. Morris and E. Magnússon (London, 1895). Other histories belonging to a later period are *Flateyarbók*, containing a rather confused selection of sagas, the *Færeyingasaga*, which tells of the introduction of Christianity into the Faroe Islands (translated by F. York Powell, 1896), and the *Orkneyingasaga*, relating the history of the earls of the Orkneys. The parts of the *Flateyarbók* relating to the discovery of America have been edited by A. M. Reeves in *The Finding of Wineland the Good* (London, 1890). The compilation of the laws of the island attracted the attention of the Icelanders at an early period, and in 1118 a complete code, known as the *Grágás* (gray goose), which had been derived from the ancient Norse law, was submitted to the *Althing*, or popular assembly, and in 1123 the canons of the Church, or the *Kristinrettr*, were settled and reduced to writing. A collection of these enactments in the ancient and subsequent codes has been made by Stephensen and Sigurdsson (Copenhagen, 1853), under the title of *Lagasafn handa Islandiæ*.

Of hardly inferior interest to the *Edda* and the *Heimskringla* are the sagas (q.v.). This term in its broadest sense includes all Icelandic prose works of a narrative character. Thus, strictly speaking, Ari's works cited above are sagas, as is also the *Heimskringla*. But as generally used the term saga is applied to shorter narratives, the interest of which centres in one person. The scene of the saga may be laid either wholly or in part in Iceland, or occasionally altogether outside of Iceland. Sagas are divided into several classes, the first of which is the mythic-heroic. The representatives of this class often give a later version of some well-known story which appears in other literatures. This is notably the case with the most interesting representative, the *Völsunga Saga*, earlier traces of which appear in the Eddas, and a later version in the *Nibelungenlied* (q.v.). It has been translated by W. Morris and E. Magnússon (London, 1870). The *Vilkina Saga*, treating of Dietrich of Bern, is later, and shows German influence. The *Fridthiofs Saga* is of special interest as being the earliest version of the story made famous by the Swedish poet Tegnér (q.v.). A number of legendary stories were translated into Icelandic prose, the most important of which is the *Saga of Burlaam and Josaphat* (q.v.). The second and most characteristic class of sagas are the family sagas, accounts of individual men and their families. These biographies, as they would now be called, deal with the earliest settlers of the island, and extend to about 1050. They are marked by great simplicity of style, with frequent highly dramatic passages, extreme detail, especially in connection with genealogies and chronologies, and keen characterization. A striking feature of all the sagas is the introduction of verses supposed to be the work of the characters. This is particularly noticeable in the *Kormaks Saga*, which contains an average of over one poem to each page. The family sagas are subdivided into two classes, the larger sagas and the smaller sagas. To the first belong the *Njáls*, the *Egils*, the *Laxdæla*, and the *Eyrbyggja*. Of these, the first has been admirably translated by G. Webbe Dasent (2 vols., Edinburgh, 1861), and the last was translated in a condensed form by Sir Walter Scott. The *Egils Saga* has been edited with a German introduction and notes by Finnur Jónsson (Halle, 1894), and in the same series the *Laxdæla Saga* has appeared, edited by Kr. Kaalund (1896). Among the smaller sagas, the most interesting are the *Kormaks Saga* and the *Saga of Gunnlaug Serpent Tongue*, both of which are love tales. Apart from their literary qualities, the Icelandic sagas are of great value in throwing light upon many Old Norse customs—religious, legal, and social—that would otherwise be entirely unknown. This is especially true of the *Eyrbyggja*. For the English reader, the introduction to Dasent's translation of the *Egils Saga* is of interest in connection with the general subject of sagas.

Modern Icelandic literature begins with the introduction of printing (1530) by the last Roman Catholic Bishop of Iceland. The first Icelandic translation of the New Testament was made in 1540. During the seventeenth century many learned works were written, the leader in this movement being Arngrim Jónsson (1568-1648). Many manuscripts were collected and copied, and communication between Icelandic and Danish and Swedish scholars was close. Grammars and dictionaries were compiled, and many antiquarian works were published. Among the principal scholars of this period were Thormod Torfæus (1636-1719) and Arni Magnússon (q.v.). During this same period, and without interruption down to the present day, Iceland has produced a surprisingly large number of poets—the largest number, indeed, in proportion to the population, of any country in Europe. Among these poets may be mentioned Hallgrimur Pjetursson (1614-74), the leading Icelandic psalmwriter; Stefan Olafsson (1620-88); Eggert Olafsson (1726-67); and Jon Thorlaksson (1744-1819). The latter made an excellent translation of *Paradise Lost* and Klopstock's *Messias*. Among nineteenth-century poets may be noted Bjárna Thórarenson (1786-1841), who is probably the most popular recent Icelandic poet; Jónas Hallgrimsson (1807-45), who introduced several foreign verse forms, notably the hexameter. Of the younger poets we may mention Gestur Pálsson (1852-91); Matthias Jochumsson (1835—), one of the most productive Icelandic poets and author of one of the few successful dramas; Thorsteinn Erlingsson (1858—); and Hannes Hafsteinn (1861—). The principal Icelandic novels are Jón Thordarson's *Piltur ok Stulka* (The Boy and the Girl) and *Mathur ok Kona* (Man and Wife).

BIBLIOGRAPHY. The standard history of Old Norse literature is Finnur Jónsson's *Den Oldnorske og Oldislanske Litteraturs Historie* (3 vols., Copenhagen, 1893-1900). The only treatment of the whole subject in English is Winkel Horn, *History of the Literature of the Scandinavian North*, translated by Anderson (Chicago, 1884). This contains a useful bibliography. The

Prolegomena to Vigfússon's edition of the *Sturlunga Saga* (Oxford, 1878) discusses the classical literature, and the same author's *Corpus Poeticum Boreale* (ib., 1883) contains a complete collection of the poetry down to the thirteenth century, with English translations, notes, etc. The value of this work is impaired by the arbitrary arrangement of many of the poems, especially those of the *Older Edda*. Extracts from the literature will be found in Vigfusson and Powell, *Icelandic Prose Reader* (London, 1868), and in other similar works. Consult also the introductions to the translations of individual sagas in the *Saga Library*, edited by Morris and Magnússon (London, 1884).

ICELAND MOSS (*Cetraria Icelandica*). A lichen found in cold climates, especially in Iceland and Norway, in which places it forms an important article of commerce. It is also met with on the higher mountains to the south, but is neglected. It is largely used as a food by the Icelanders and the Laplanders, who either powder the dried plant and make it into bread, or boil it with milk. As food also it has been used in other countries to which it is exported. Before it becomes edible, however, it must be steeped in water to remove a bitter principle. Other uses are in the manufacture of sizing-paper and in dressing the warp in weaving. Formerly it was used as a remedy in pulmonary troubles, but is now regarded as a bland mucilaginous diet in such cases.

ICELAND SPAR. A transparent variety of calcite that is found chiefly in Iceland. Owing to its transparency and double refracting property, it is used for polarizing prisms and in other optical instruments. See CALCITE.

ICE-NEEDLES. See FROST.

ICE'NI. A tribe of ancient Britain, occupying, as is supposed, the present counties of Norfolk and Suffolk. The Iceni joined the ranks of Aulus Plautius in A.D. 43, and secured the defeat of the sons of Cymbeline (q.v.). Some years later (A.D. 61), when the Romans endeavored to establish their authority more firmly in the country, the Iceni rebelled under their Queen, Boadicea, but were subdued. See BOADICEA.

ICE-PACK. See ICE.

ICE-PETREL. A brown and white petrel (*Puffinus gelidus*) of the Antarctic seas.

ICE-PLANT (*Mesembryanthemum crystallinum*). A tender greenhouse annual herb native of Africa and of the south of Europe, remarkable for the glistening bladder-shaped hairs with which its whole surface is covered, and which sparkle in the sun like granules of ice. The seeds are used for food in the Madeira Islands. The ashes supply barilla, which is extensively used as a source of carbonate of soda in soap and glass making, and for which the plant is burned in countries where it abounds. There are in all about four hundred species of this genus, most of which are natives of the south of Africa. The ice-plant is introduced and spreading in southern California. *Mesembryanthemum æquilaterale*, a trailing plant, is also common in California, where its purple flowers, one and a half inches across, are very striking. *Mesembryanthemum edule* bears edible fruits called Hottentot figs.

ICE POLO. A game on skates, which should not be confounded with ice hockey, nor with the equestrian game of polo, though it is related to both these games. Whether ice polo is derived directly from them is uncertain, and of little consequence. It is sufficient to point out the main differences in these two games. The words hockey and polo have been loosely applied to a number of games, but there should be little difficulty in placing them properly. While ice polo is similar in object to ice hockey, it is very different in methods of play. A ball is used instead of a puck, the construction of the stick and the method of handling it are different, and there is a more open manner of play. This open play is brought about through the permission to indulge, in an ice-polo game, in what would in ice hockey be off-side play, that is, getting between the ball and the opponents' goal. Five men make up a team, two less than in ice hockey. There are two rushers, one centre, one halfback, and one goal-tend. The goals are four feet wide and the distance from goal to goal is 150 feet. There are two playing periods of twenty minutes each, with ten minutes' interval. A goal counts three points. The game never had much vogue outside of New England. See HOCKEY.

ICE-PLANT.

ICE YACHTING. Excepting Russia, no country in the world shares with America the sport of ice yachting, and Russia is only a sharer in the sense that a few of its boats, such as those of 'the Russian River Club,' are sailed over a portion of the Gulf of Finland, near Saint Petersburg. As early as the year 1790 there were ice boats, and contests at Poughkeepsie on the Hudson, the runners of one of the boats being still preserved. It was built by Oliver Booth, and was little more than a square box on three runner skates: one on each side of the box, and the rudder one set in an oak post with an oar-tiller. It was sailed with a small flat-headed spritsail. More than half a century passed before there was much improvement in this primitive design. The first real innovation was that of Allaire of Red Bank, N. J., on the Shrewsbury River, who in 1856 mounted his three runners on a triangular frame,

a pattern that was at once seen to give advantage over the previous method. From this the Hudson River boats were gradually developed, the side bars forming with the body a bridge or runner plank (at right angles with the body of the yacht) projecting on each side, and carrying at each end one runner or skate. The mast was stepped at the junction of the runner plank with the main beam; and they had low sails with large jibs, short non-peaked gaffs, and booms extending many feet out from the stern. This style reached its limit in 1869 in the old *Icicle*. The stepping of the mast over the runner plank placed the centre of effort so far aft that the boats would run away with their occupants, and throw them out, sometimes to their great peril. In 1879 this class was practically superseded by the *Robert Scott* type of a single backbone, with an elliptical steering-box. Then the mast was stepped forward of the intersecting runner-plank, and the jibs and boom shortened. Improvements have continued, but mainly in construction, which has aimed at strength combined with lightness in backbone and masts, and springiness in the cross or runner plank: a very desirable condition, for if a runner under an ice yacht weighing 2000 pounds, and going at 45 miles an hour, strikes a hummock of ice, and has no give or spring in it, the consequence may be a shock that will reduce the craft to pieces. In the year 1866 the lateen sail was adopted, both on the Hudson and Shrewsbury rivers. *Scud*, with the largest lateen ever rigged, was sent from the Shrewsbury to Poughkeepsie on the Hudson, and entered for the pennant several years. She, as well as *Ariel* and *Blizzard*, were exceedingly fast, but, without apparent reason, they would spin round on their heels like tops, or bolt, and in spite of its admittedly many good qualities, and undoubted speed, the rig lost supporters. Theoretically any sailing craft should do its best with all its canvas in one piece. *Flying Scud* modified the lateen by spreading its 615 feet of sail, or cat-boat fashion, by supplementing it with a small jib, and *Vixen* and *Ranger* had other developments of the lateen. The lateen sail has still some stanch friends. The *Georgie* of the Shrewsbury River fleet, and Colonel Higginson's *Cold Wave*, with the Mohegan cat-rig, are two examples of it.

The latest design in runners is that of H. Percy Ashley, known as the rocker type. These have a curve fore and aft. They are especially useful on rough ice. The elongated tiller, too, is of the utmost importance on occasions, because it allows the sailor to lie head forward in the steering-box and guide the yacht with his feet while yet tending sheet with his hands.

The usual course in races is a triangle of one mile on each leg, of which only one can be before the wind, and five times around the triangle constitutes a heat. This necessitates ten sharp turns. The time made by boats over such a course necessarily varies very much on each leg, and still more from day to day, according to the condition of the ice, and the force and direction of the wind. The fastest time made in the pennant championship over the regulation course was by *Icicle* in 1897 in 46 minutes 19 seconds. Much faster time has been made on a straight-away course in a favorable wind: it is not an uncommon incident under those circumstances for a boat to pick a race alongside the railroad on the Hudson's banks, and outsail an express train.

The principal original locations for ice yachting were the Hudson River above Poughkeepsie, Newburgh, and Orange Lake, N. Y., and the Shrewsbury River in New Jersey. From these the sport spread westward in the sixties to Lake Minnetonka, Minn., where it was introduced by Theodore Wetmore, and much fine sport has been had by yachtsmen from Saint Paul and Minneapolis. Lake Winnebago, Wis., has also a half-dozen clubs on its borders. Lake Pepin, about 40 miles south of Saint Paul, is the centre for the boats of several towns. At Bar Harbor Lake in Maine there is excellent sport, as well as at Burlington, Vt., on Lake Champlain. In Canada ice yachting is very popular, and on Lake Ontario there is much racing of boats from clubs, both in the Canadian and American ports. So there is in the Bay of Quinto, and on the Saint Lawrence River. No favorable conditions are allowed to pass either at Montreal or Quebec, and on many other of the large inland lakes followers of the sport test their skill.

There are many prizes annually competed for; but as ice yachts are by their nature difficult to move from watershed to watershed, they are mostly local.

ICHABOD, ĭk'â-bŏd. A poem by Whittier, intended as a rebuke to Daniel Webster for his change of attitude toward the question of slavery.

I-CHANG, ē'chäng', **Ē CHANG**. A *fu* or departmental city of the Province of Hu-peh, China, situated on the left bank of the river Yang-tse, about 1100 miles from the sea, and about 15 miles below the entrance to the great Yang-tse Gorges (Map: China, D 5). It stands in the centre of a hilly country rich in rice, cotton, wheat, barley, and wood-oil trees (the *T'ung-shu* or *Aleurites cordata*), and many kinds of fruit grown in the sheltered valleys near by. The climate is dry, with warm summers and pleasant winters.

The place is of great commercial importance. It is for the present the limit of up-stream steam navigation, the few attempts that have been made to mount the rapids of the Upper Yang-tse having resulted in disaster. Hence all cargoes destined up-stream are here trans-shipped to craft specially constructed for the navigation of the river above I-Chang, and most of the down-stream cargoes from Sze-chuen are also trans-shipped. The city is one of four opened in 1877 to foreign residence and trade, in accordance with the convention signed at Chi-fu in 1876, and a few foreign business houses have agents here. Great godowns or warehouses have been built to accommodate this transit trade, and a foreign settlement has been laid out just below the native city. In 1900 the total trade of the port amounted to 23,143,617 Haikwan or custom-house taels. The total imports of foreign goods amounted to 10,995,273 taels, and of this goods to the value of 10,479,156 taels were reshipped by native craft to Chung-king in Sze-chuen. The value of the Sze-chuen produce reshipped to ports down-stream was 7,154,970 taels. I-Chang has no direct trade with foreign countries.

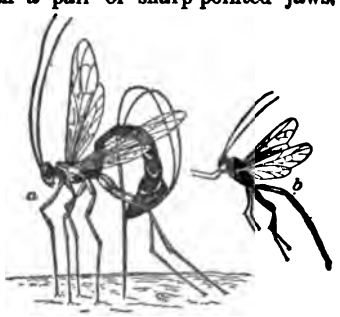
The steamer traffic is entirely in the hands of the British and the Chinese. About 15,000 native craft of all sizes (the largest probably about 60 tons) pass this port or call at it, in

the course of the year, the river being practically the only way of reaching the great province of Sze-chuen (where the richest coal-fields in the world are situated), and the northern parts of Kwei-chow and Yun-nan. The population of I-Chang is 35,000, including a score or more of foreigners.

ICH DIEN, ĭk dēn (Ger., I serve). The motto of the Prince of Wales, which, surmounted by three ostrich-feathers (originally one), forms his official crest. According to the theory of its derivation Edward I. on presenting his new-born son, Edward of Carnarvon, to the Welsh, who had demanded a native-born prince, used the expression in its Welsh signification—*Eich dyn,* "Behold your man." Another view, not historically verified, attributes it to the occasion of the killing of John, King of Bohemia, by the English at Crécy, and asserts that the Black Prince found the motto under the plume worn by the dead King, and assumed it to imply that 'he served under the King, his father.'

ICHNEUMON, ĭk-nū'mŏn (Lat., from Gk. *ιχνεύμων, ichneumōn,* tracker, from *ἰχνεύειν, ichneuein,* to track, from *ἴχνος, ichnios,* track). An old name for the civets of the genus Herpestes, now generally called mungooses. (See MUNGOOSE.) The name belongs specifically to the Egyptian mungoose, or Pharaoh's rat' (*Herpestes ichneumon*).

ICHNEUMON-FLY. An insect of a group of parasitic Hymenoptera, forming the family Ichneumonidæ. More than 1100 genera of ichneumon-flies have been described, and many thousands of species. Economically considered they are among the most important groups of insects, since without exception they are parasitic upon or within other insects, and in the very great majority of instances they destroy injurious species. As a rule the ichneumon-fly lays her eggs beneath the skin of the host insect. The egg hatches, and the young footless grub feeds upon the fat and blood and lymph of the host, piercing the fatty tissue with a pair of sharp-pointed jaws. It respects the viscera and vital organs of the host up to the last limit, and only sacrifices them toward the completion of its growth. Its skin is very delicate, and it breathes by absorbing oxygen through this skin from the blood of the host insect, and not, as the older writers supposed, by placing itself in communication with the tracheæ of the host. The digestive tube has a very large stomach which is closed behind, and remains closed until the larva is full grown. When this time is reached, and the larva transforms to pupa, a rectal opening is formed, and the excrement is voided. That such an economy as this is necessary to the life of the parasitic larva is at once seen when we consider that if the excrement were voided daily it would cause speedy inflammation and the death of the host insect before the parasite could become mature. It was formerly supposed that for this same reason the parasitic larva did not cast its skin, but Seurat has recently shown that some of them do occasionally molt.



A LARGE ICHNEUMON-FLY.

Male (*b*) and female (*a*) of *thalessa lunator,* in relative size, the latter in the act of forcing her ovipositor into a log.

Some ichneumon-flies lay their eggs on the skin of the insects they attack, and others near the host insect, so that the parasitic larva, after hatching, finds its way to its prey. When the host insect is an internal feeder, like a woodborer or a gall-insect, the ichneumon larva lives upon instead of within the host. There is no uniformity in the degree of rapidity with which they develop, and they may pass the winter months either as larvæ, pupæ, or adults. As a rule they are long-bodied, slender insects, varying much in size. Many of them have long, sting-like ovipositors—in some instances, as in Rhyssa, more than twice as long as the body.

Both the scientific and popular names of this group of insects were derived from the Egyptian ichneumon or 'Pharaoh's rat,' which devours the eggs and young of the crocodile.

Consult: Sharp, *Cambridge Natural History,* vol. v. (London, 1895); Comstock, *Manual for the Study of Insects* (Ithaca, 1885); Ashmead, "Classification of the Ichneumon-Flies," in *Proceedings of the United States National Museum* (Washington, 1900). See Colored Plate of INSECTS.

ICHNOLOGY, ĭk-nŏl'ō-jĭ (from Gk. *ἴχνος, ichnos,* trace + *-λογία, -logia,* account, from *λέγειν, legein,* to say). The study of fossil footprints, tracks, trails, and impressions found in the rocks of various geological ages. The most prolific sources of such footprints and impressions in North America are the Jura-Trias sandstones of Massachusetts, Connecticut, and New Jersey. Prof. Edward Hitchcock gathered a great collection of them from the New England localities and placed it in the Amherst College Museum. This collection contains over 8000 tracks, and it furnished the material for Hitchcock's *Ichnology of New England: A Report on the Sandstone of the Connecticut Valley, Especially Its Fossil Footmarks.* Many of the tracks therein described were first supposed to have been made by birds, but they are now known to be the footprints of ornithopod dinosaurs like Anchisaurus (q.v.). Still others were made by heavy five-toed animals of unknown nature. Some of the smaller tracks were made by insect larvæ which are found in the same series of deposits. (See MORMOLUCOIDES.) For an entertaining account of fossil footprints, see the chapter on "Impressions of the Past," in Lucas, *Animals of the Past* (New York, 1901). See FOSSIL; JURASSIC SYSTEM; TRIASSIC SYSTEM.

ICH'THYODOR'ULITES (Neo-Lat. nom. pl., from Gk. *ἰχθύς, ichthys,* fish + *δόρυ, dory,* spear + *λίθος, lithos,* stone). The fossil spines of sharks, which are often found isolated in the ancient rocks. Many of them are of large size, and because of their hardness and phosphatic nature have been preserved with a considerable degree of perfection. Some of them are well

known under the names of Ctenacanthus, Macæracanthus, Pleuracanthus, Cyracanthus, etc. Some of these spines have been found in their original positions at the front edges of the fins of fossil sharks. See FOSSIL; and SHARK.

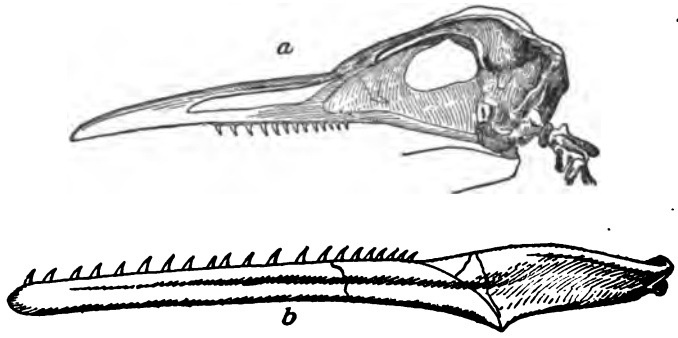
ICHTHYOL, ĭk'thĭ-ŏl (from Gk. *ἰχθύς, ichthys,* fish), or AMMONIUM ICHTHYOL SULPHONATE. A dark-red oily liquid obtained from a bituminous quartz rich in fossil fish, found in the Tyrol. To prepare the drug, the mineral is distilled with strong sulphuric acid, a saturated aqueous solution of common salt is added to the distillate, and the ichthyol-sulphonic acid which separates out is neutralized with ammonia. The ichthyol thus obtained has a somewhat disagreeable bituminous odor and taste, and is soluble in water, in glycerin, and in various oils. It is an antiseptic, mild irritant, and somewhat of a styptic. It is absorbed with ease by the skin when applied externally, and by the intestinal mucous membrane when administered internally. It is one of the best-known remedies for erysipelas, in which disease it is applied externally in the form of an ointment made up with lanolin. The same preparation is highly recommended for cases of acute articular rheumatism, as affording prompt relief by reducing the pain and the swelling. Unna has declared it to be the remedy par excellence in acne. He applies it externally in the form of a 15 per cent. ointment, and gives it internally in doses of from 2 to 10 grains in pills or in capsules; he also recommends the free use of ichthyol soap. Ichthyol is extensively employed in the treatment of various skin diseases, and is said to be particularly efficacious in eczema, chronic urticaria, and simple sycosis. It is frequently prescribed, with success, as a local application in chronic nasal catarrh, especially in the form known as ulcerative rhinitis.

ICHTHYOLOGY, ĭk'thĭ-ŏl'ŏ-jĭ (Gk. *ἰχθύς, ichthys,* a fish + *-λογία, -logia,* account, from *λέγειν, legein,* to say). That branch of natural history which treats of fishes. See FISH.

ICHTHYOPHAGI, ĭk'thĭ-ŏf'ā-jī (Lat. nom. pl., from Gk. *Ἰχθυοφάγοι, Ichthyophagoi,* fish-eater, from *ἰχθύς, ichthys,* fish + *φαγεῖν, phagein,* to eat). Among the ancient Greeks, a name for various tribes of coast dwellers on the southern seas; in Asia, on the coast of Southern China, Gedrosia, and Northeastern Arabia; in Africa, on the west coast of the Arabian Gulf and in Senegambia.

ICHTHYOPSIDA, ĭk'thĭ-ŏp'sĭ-dâ (Neo-Lat., from Gk. *ἰχθύς, ichthys,* fish + *ὄψις, opsis,* appearance). A division of the Vertebrata, including all such forms as have no amnion and alantois, but which have, either persistently or temporarily, gills as their respiratory organs. The group includes the Amphibia (q.v.) and the fish-like forms. This division was introduced by Huxley.

ICHTHYORNIS, ĭk'thĭ-ôr'nĭs (Neo-Lat., from *ἰχθύς, ichthys,* fish + *ὄρνις, ornis,* bird). A genus of toothed birds of the Cretaceous age, found fossil numerously in western Kansas, along with remains of Hesperornis, Aptornis, and the like. These two genera represent the division Odontotormæ of the toothed birds (see ODONTORNITHES), characterized by having the teeth, with which the mandibles were plentifully furnished, set each in a separate alveolar socket. The various species were birds not greater than a pigeon in size, and resembling terns in general appearance and probably in habits. They were sea-birds of powerful flight, and the structure of their wings, legs, and carinate sternum much resembles that of modern birds. The skull, however, retains many reptilian features besides the teeth, such as the diminutive elongated space for the brain, the single-headed quadrate bone, and the union of the lower jaws in front by a ligament. The vertebræ, also, differ from those of Hesperornis and all modern birds, in being biconcave. This form of vertebra is seen in a few recent and many extinct reptiles, but is especially characteristic of fishes; the presence of this character alone would indicate the very antique origin of the group. These birds doubtless lived and fed as do modern gulls, seizing living fishes, and going ashore only to breed and roost at night. They were doubtless well feathered, and seem to have flourished until the end of the Cretaceous era. Most of the fossil remains thus far obtained are in the museums of Yale University and of the University of Kansas. See HESPERORNIS; and consult the authorities there referred to.



SKULL OF ICHTHYORNIS.

a, Cranium and upper mandible of *Ichthyornis regalis; b*, lower mandible of the larger *Ichthyornis victor.*

ICHTHYOSAURUS, ĭk'thĭ-ô-sạ'rŭs (Neo-Lat., from Gk. *ἰχθύς, ichthys,* fish + *σαῦρος, sauros,* lizard). An extinct genus of fish-like reptiles found in the Mesozoic rocks of Europe and North America. The ichthyosaurs among reptiles are analogous to the whales among mammals, and they have many points of resemblance to these. Their bodies were round and tapering, heads large, with long snouts and very short necks, limbs reduced to paddles, and they had a broad, vertical fin on the tail and a triangular fin at the middle of the back. The body was covered with thin, smooth skin and no traces of dermal plates have been discovered. The jaws were armed with a large number of sharp, conical teeth that have a complicated internal structure similar to that of the teeth of Labyrinthodonts or Stegocephalia. The eyes are surrounded by circles of sclerotic bones, and there is a large pineal foramen on top of the skull between the eyes. The vertebræ are biconcave, and the pelvic

arch is separated from the vertebral column, for there is no sacrum. In size they ranged from 4 to 40 feet, and they must have swarmed in immense numbers in some portions of the European seas, especially during Liassic time, for their remains have been found in abundance in deposits of that age at Lyme Regis, England, and in Württemberg, Germany. That they were predaceous animals and fed largely on fish, is evidenced by the fish fragments found within their coprolites and also within the abdominal cavity of some skeletons. Some ichthyosaurs were viviparous, for specimens obtained in the Württemberg quarries show several small embryonic skeletons contained in the abdominal cavities of the adults. About thirty-five species of Ichthyosaurus are known, and they have been found in the Mesozoic deposits of Europe, the East Indies, Australia, New Zealand, and South America. Allied genera are Mixosaurus, of small size from the Trias, and Ophthalmosaurus, a toothless ichthyosaur from the Upper Jurassic and Lower Cretaceous. A single representative, Baptanodon, is found in the North American Jurassic, and is very close to Ophthalmosaurus. The ichthyosaurs and their allies, together with the Sauropterygia, comprising the plesiosaurs and allied forms, were formerly included in an order Enaliosauria, which is not now recognized.

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ICHTHYOSIS, ĭk'thĭ-ō'sĭs (Neo-Lat., from Gk. *ἰχθυώσις*, from *ἰχθύς*, *ichthys*, fish), or FISH-SKIN DISEASE. A disease characterized by a hardened, thickened, rough, and almost horny state of the epidermis, which breaks into small, irregular, scale-like pieces, which do not readily exfoliate, but which if removed are speedily reproduced. In the localities less profoundly altered by the ichthyotic condition, there is hypersecretion of sweat; in the hardened and thickened places, many sudoriparous glands are suppressed and the surface is dry. The disease may affect almost the whole surface or may be confined to a single part; and is most frequently, but not always, congenital. It is attended with no constitutional disturbance. The disease is extremely obstinate, and when congenital may be considered as incurable. The treatment consists in the frequent use of the warm or vapor bath, so as to soften the thickened epidermis and to facilitate its removal, and friction by means of a piece of flannel may be conjoined with the bath. The internal administration of tar, cod-liver oil, etc., sometimes gives relief.

ICHTHYS, ĭk'thĭs (Gk. *ἰχθύς*, *ichthys*, fish). An early Christian symbol. It was discovered that the Greek word for fish consisted of the first letters of the common ascriptive title to Christ: Jesus Christ, the Son of God, the Saviour, or in Greek Ἰ|ησοῦς Χ|ριστὸς Θ|εοῦ Υἱός Σ|ωτήρ. A fish thus became the symbol of Christ, and to make the sign of a fish was to give to the initiated the plainest indication of being a Christian. Accordingly, it entered into the freemasonry of early Christianity. The acrostic appears upon the monuments, and the figure of a fish likewise.

ICICA, ĭs'ĭ-kȧ. See PROTIUM.

ICILIUS. The name of a plebeian family in Rome, which produced some of the most zealous defenders of the plebeian interest against the patricians. The name of one of them, betrothed to the unfortunate Virginia, is associated with one of the most touching incidents in the legendary history of Rome. See APPIUS CLAUDIUS CRASSUS.

ICKELSAMER, ĭk'el-sä'mĕr, VALENTIN (c.1500-c.1537). A German grammarian. Nothing definite is known of his life. He was born at Rothenburg-an-der-Tauber, it is conjectured, as about 1525 he was schoolmaster there, and from the title-page of one of his works we may gather that he lived for a time, possibly as schoolmaster, at Karlstadt. Afterwards he lived at Erfurt and at Augsburg. His two principal works were: *Rechte Weis auffs kürtzist lesen zu lernen* (c.1527), the foundation of the German phonetic method; and *Teutsche Grammatica* (c.1534), one of the earliest German grammars. Both these books are reprinted in Müller, *Quellenschriften und Geschichte des deutschsprachlichen Unterrichts* (Gotha, 1882).

ICKNIELD (ĭk'nēld) STREET, or WAY. An ancient road running from Cornwall to Norfolk in England. The name is connected with the Iceni.

ICOD, or ICOD DE LOS VINOS, ē-kōd' dā lōs vē'nōs. A small town on the northwest coast of Teneriffe, one of the Canaries (q.v.) (Map: Spain, F 5). Population, in 1900, 7282.

ICOLMKILL, ĭ'kŏm-kĭl. See IONA.

ICON BASILIKE, ĭ'kŏn bȧ-sĭl'ĭ-kē. See EIKON BASILIKE.

ICO'NIUM. A town of Asia Minor. See KONIEH.

ICONOCLASM (from Gk. *εἰκών*, *eikōn*, image + *κλᾶν*, *klan*, to break). The name given to any movement against the religious use of images, but especially to the crusade against their use which excited the whole Eastern Church in the eighth century, dating in its definite character from a decree of the Emperor Leo, the Isaurian, which enjoined the destruction of such images. The question was settled by ecclesiastical authority at the second Council of Nicæa (787), but several succeeding emperors confirmed and attempted to enforce the edict against much popular opposition. The course of the Reformation in Western Europe was marked by wholesale destruction of sacred statues, and many of the English cathedrals still bear traces of the iconoclasm of Cromwell and his soldiers.

ICON'OCLAST. The nom-de-plume of Charles Bradlaugh.

ICONOCLAST EMPERORS. The Byzantine Emperors by whom the contest against iconolatry in the Eastern Church was waged: Leo III., the Isaurian, Constantine V., Leo IV., Leo V., the Armenian, and Theophilus.

ICONOG'RAPHY. A term originally used, in its etymological sense, to signify the science of antique portraiture, i.e. the discussion, enumeration, and history of the portraits of prominent persons in statues, busts, paintings, coins, gems, etc. This science was first resurrected by

personages and objects of antiquity—a subject generally treated in the article MYTHOLOGY. Its chief use, however, is in reference to the attributes, emblems, and symbols with which Christian deities, saints, and conceptions are represented in art.

CHRISTIAN ICONOGRAPHY. In the early Christian centuries the representations were few in number and quite simple, leaving much freedom to the artist. They embraced subjects like the "Good Shepherd" and the emblems of faith, familiar to all. In the fourth and fifth centuries iconography became more complicated. The clergy began to use it as a factor of systematic religious instruction, controlling the representations which were now executed in strict accordance with formulas. Christ, as King of Heaven, was by far the favorite subject from the fourth to the seventh century, while from the eighth to the twelfth, the 'Last Judgment' and scenes from the Revelation were in vogue. There were two schools: the Eastern or Byzantine and the Western or Latino-German. The former was by far the most original and important, dominating not only the East, but Europe during the Carlovingian period, and remaining supreme in Italy until late in the Gothic age. It found its expression in mosaics, frescoes, and illuminated manuscripts, sculpture being excluded as a result of the Iconoclastic conflict. (See BYZANTINE ART.) The iconography of the Romanesque (q.v.) period was meagre and unsystematic, but during the Gothic age an independent Western system originated in France, spreading throughout Europe. In the North it found its chief expression in the sculptures of the great cathedrals, and endeavored to represent the encyclopædic conceptions of the scholastics. (See GOTHIC ART.) In Italy it manifested itself chiefly in painting. Iconography remained under clerical control until, with the Renaissance, the human element superseded the divine, the old subjects being used as a means for the expression of human feeling and artistic ability. The old subjects from biblical history, especially those illustrating the plans of salvation and those from the lives of the saints, continued to be used, the most popular subject being the Madonna with the Christ Child, represented as an earthly mother or in more divine attitudes. The more important subjects of Christian iconography are treated under separate titles, like CHRIST IN ART; HOLY FAMILY; VIRGIN IN ART. For the important part played by emblems and symbols in iconography, see the articles on these subjects, and such special articles as AUREOLE; NIMBUS, etc.

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See also Durand, *Histoire de Dieu, iconographie des personnes divines* (Paris, 1844); Wessely, *Ikonographie Gottes und der Heiligen* (Leipzig, 1875). The best modern works are: Barbier de Montault, *Traité d'iconographie chrétienne* (Paris, 1890), and Detzel, *Die christliche Ikonographie* (Freiburg, 1895). There is no good work on the subject in English, the writings of Mrs. *romaine* (3 vols., ib., 1818-20); Bernouilli, *Römische Ikonographie* (Stuttgart, 1882-91); *Griechische Ikonographie* (Munich, 1901).

ICTEROHÆMATURIA, ĭk'tĕr-ō-hĕm'ā-tū'rĭ-ā (Neo-Lat., from Gk. *ἴκτερος, ikteros*, jaundice + *αἷμα, haima*, blood + *οὖρον, ouron*, urine). A malignant disease of sheep, due to the action of a blood parasite similar to that of Texas fever. In Europe it is known as carceag. The micro-organism of the disease is found in the blood, urine, spleen, liver, and kidneys. The chief symptoms are fever, bloody urine, and jaundice of the eyelids, nostrils, and sometimes of the skin. Dropsical swellings occur on the head and neck, and the animal assumes a crouching position. During the progress of the disease there is a decrease in the number of red blood-corpuscles and an increase in the number of white corpuscles. Post-mortem examinations reveal an enlargement of the kidneys and a yellow color in the adipose tissue. The disease occurs in restricted localities, where it causes serious losses of sheep. It appears to be safe, however, to raise goats on such infected areas.

ICTI'NUS (Lat., from Gk. *Ἰκτῖνος*). The chief architect of the age of Pericles, designer of the Parthenon at Athens, the great hall for the mysteries (Telesterion) at Eleusis, and the Temple of Apollo Epicurius at Phigalia in Arcadia. He is said to have written an architectural treatise on the Parthenon.

I'DA (Lat., from Gk. *Ἴδη, Idē, Ἴδα, Ida*). A mountain range of Asia Minor, extending through Phrygia and Mysia; now known as Kaz-Dagh. The Granicus, the Simois, the Scamander, and other streams famous in ancient story, flowed from its sides. The highest peak was Mount Gargarus, 5748 feet, near the plain of Troy. Ida was an ancient seat of the worship of Cybele, who was hence called *Idæa Mater*. There was another Ida, almost equally famous, in Crete. This is now called Psiloriti. It rises to a height of about 8000 feet above sea-level. Zeus is said to have been nurtured in a cave in this mountain.

IDA. The princess, in Tennyson's poem of that name.

IDÆ'AN DAC'TYLI (Lat., from Gk. *Ἰδαῖοι Δάκτυλοι, Idaioi Daktyloi*). Like the Corybantes and Curetes, attendants upon Cybele, who were originally connected with Mount Ida in Phrygia, whence they were transferred to Mount Ida in Crete, where they watched the infant Zeus. They are supernatural metal-workers, and seem to derive their name from their ready fingers (*δάκτυλος*, finger). The number is given as five or ten, or sometimes even 100. In Greece they appear only at Olympia, where they seem to have been brought from Crete, and were identified with Hercules and four brothers, who first competed in the foot-race.

IDA GROVE. A town and the county-seat of Ida County, Iowa, 80 miles east by south of Sioux City, on the Maple River, and on the Chicago and Northwestern Railroad (Map: Iowa, B 2). It is the commercial centre of a fertile agricultural and stock-raising district, and has grain-elevators and flouring-mills, a broom-fac-

IDAHO, ī'dȧ-hō (North American Indian, gem of the mountains). One of the Western States of the American Union, lying between latitudes 42° and 49° N., and longitudes 111° and 117° W. It is bounded on the north by British Columbia, on the east by Montana and Wyoming, on the south by Utah and Nevada, and on the west by Oregon and Washington. The extreme length from north to south along the western boundary is 485 miles. The width varies from about 50 miles in the north to nearly 300 miles in the south. Its area is 84,800 square miles, including 510 square miles covered by lakes.

TOPOGRAPHY. The surface of Idaho is elevated and mostly mountainous. Lying between the main axis of the Rocky Mountains on the east and the Cascades on the west, the State embraces a portion of the Great Basin, a plateau lying 2000 to 5000 feet above the sea, while the northern and eastern parts are traversed by mountain ranges whose loftier summits rise above the snow-line. The principal ranges, the Salmon River and Bitter Root, attain their maximum development near the eastern border, but they send out spurs which extend nearly across the whole width of the State. Northward from the Bitter Root Mountains the system of elevations is continued by the Cœur d'Alêne and Cabinet ranges to the Canadian frontier. In the extreme southeast are the Bear, Blackfoot, and Snake River ranges, offshoots from the main Rocky Mountain system in Wyoming. Nearly the whole area of Idaho is drained into the Columbia by the Kootenai, Clark Fork, Spokane, and Snake rivers. The Snake, or Lewis Fork, is much the largest, its basin within the State covering more than 60,000 square miles, and its course being about 850 miles. It receives important tributaries in the Boise, Payette, Weiser, Owyhee, Salmon, and Clearwater, but its waters are usually shallow. In its course from east to west it passes over three falls, the American, the Shoshone, and the Salmon. The Shoshone Falls have a perpendicular descent of nearly 200 feet. Below the Salmon Falls the river is navigable for light-draught boats to the mouth of the Powder River. In the northern part of the State there are several lake basins, including Pend Oreille, Kaniksu, and Cœur d'Alêne, and in the southeast on the Utah boundary, Bear Lake drains through the Bear River into Great Salt Lake.

CLIMATE AND SOIL. The climate in the more elevated parts is severe, with heavy snowfall in winter; the plains and valleys have a milder climate, free from great extremes, as the summer heat is moderated by mountain breezes. The rainfall in the south is very light, increasing toward the north and east, where the elevated ranges arrest the moist winds. Agriculture is thus limited to the mountain valleys and to the basins of the large rivers, such as the Salmon, Clearwater, Payette, and Boise, where irrigation can be practiced. These basins have a rich alluvial soil that produces excellent crops of cereals and fruits. The uplands have a moderately fertile soil of sands and clays, and are best adapted to grazing.

FLORA AND FAUNA. See paragraphs on these respective topics under ROCKY MOUNTAINS and UNITED STATES.

of Paleozoic, Mesozoic, and later ages alternate with eruptive and metamorphic rocks. Along the Snake River there is a vast lava-bed forming a desert nearly 400 miles long and 40 to 60 miles wide, the eastern end of a volcanic belt that extends to the Pacific. The fissures from which the molten rock poured out during the late Tertiary period are generally concealed beneath the thick sheets, although their position may be indicated by the lines of flow. The surface of this region is a level plain, almost destitute of vegetation.

MINING. The mineral resources of the State, including deposits of gold, silver, lead, iron, coal, and salt, are of great importance. Gold is obtained from both placer and quartz mines in nearly every county. The first discoveries were made about 1860, and the total output up to 1901 amounted to more than $100,000,000. There has been a decrease in production in late years, owing to the exhaustion of the placer deposits; but with the opening of new fields for quartz mining, such as that at Thunder Mountain, the industry may regain its former prominence. Dredging operations for the recovery of gold from the bed of the Snake River have been carried on successfully for several years. The Cœur d'Alêne lead-silver district in Shoshone County is one of the richest in the United States. The metallic output of Idaho in 1900 was as follows: Gold, $1,727,700; silver, 6,429,100 ounces, valued at $3,986,042; lead, 85,444 short tons; copper, 290,162 pounds.

FORESTS AND FORESTRY. There are in the State 7,000,000 acres of timber land, the exploitation of which has just begun. Almost the whole of the forest area is in the northern part of the State, where the valleys are covered with an exceedingly dense growth. The larger part (3,456,000 acres) of the Bitter Root Timber Reserve is in Idaho. The higher elevation is known as the alpine fir region, constituting nearly three-fourths of the total reserve, the timber in this part being of little value. In the lower zone the yellow pine occupies the drier regions, and the red fir the more moist regions. The Idaho forests have suffered great losses from forest fires.

AGRICULTURE. A very large part of the State is arid and irreclaimable land. In the north the rainfall is greater, and supplies sufficient moisture for grain crops. Three-fourths of the total area is yet public land. This, however, is being rapidly taken up. The great development of the mining industry has created a home market for farm produce, and justifies incurring the heavy expense of irrigation. The channels of the main streams—the Snake and Clearwater—are generally deep, making irrigation impossible or highly expensive. But numerous smaller streams offer excellent irrigation facilities. This is especially true of the head-water region of the Snake River and of the large district, in the western part of the State, lying north of the Snake River and watered by the Boise River and other streams. The Bear Lake region in the southeast corner is also said to be adaptable to irrigation purposes. In 1900, 602,568 acres, or 42.6 per cent. of the improved land, were irrigated. Five and nine-tenths per cent. of the total area, or 3,204,903 acres, were reported for the same year

AREA AND POPULATION OF IDAHO BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Ada	A 4	Boise	1,177	8,368	11,559
Bannock	C 4	Pocatello	3,123	2,629	11,702
Bear Lake	C 4	Paris	964	6,057	7,051
Bingham	C 4	Blackfoot	4,814	13,575	10,447
Blaine	B 4	Hailey	6,309		4,900
Boise	A 3	Idaho City	4,203	3,342	4,174
Canyon	A 4	Caldwell	1,327		7,497
Cassia	B 4	Albion	4,511	3,143	3,951
Custer	B 3	Challis	4,670	2,176	2,049
Elmore	B 4	Mountainhome	2,431	1,870	2,286
Fremont	C 4	Saint Anthony	6,145		12,821
Idaho	A 3	Mount Idaho	11,074	2,955	9,121
Kootenai	A 1	Rathdrum	5,595	4,108	10,216
Latah	A 2	Moscow	1,114	9,178	13,451
Lemhi	C 3	Salmon	4,455	1,915	3,446
Lincoln	B 4	Shoshone	3,270	4,169	1,784
Nez Perces	A 2	Lewiston	1,421	2,847	13,748
Oneida	C 4	Malad City	2,695	6,819	8,983
Owyhee	A 4	Silver City	7,907	2,021	3,804
Shoshone	A 2	Wallace	4,677	5,382	11,950
Washington	A 3	Weiser	2,908	3,836	6,882

as contained in farms, the average size of which was 183.4 acres. As is common with irrigated lands, intensive farming is the rule, and the soil being very fertile when sufficiently watered, the yield of all crops is very abundant. Hay and forage is the most extensive and valuable crop, the annual acreage for which increased over two and a half times in the last decade of the nineteenth century. Over a third is alfalfa. In the same period the acreage devoted to cereals increased over threefold. Wheat constituted 72 per cent. of the cereal crop for 1899. Oats, barley, and flaxseed are of less importance, and corn is scarcely raised at all. The western part of Idaho, particularly the Boise Basin, is becoming noted for its fruits and vegetables. Apples and prunes are the chief varieties of orchard fruits.

STOCK-RAISING. Thus far, however, it has been the grazing rather than the farming facilities which have been most extensively utilized. There are 25,000,000 acres of pasture land in the State. In the northern and the mountainous parts of Idaho considerable expense is incurred in stock-raising, owing to the shortness of the summers and the depth of the winter snow. Herders and packers who use mules and horses in the northern mountains through the summer season withdraw to the valley of the Snake River to winter their stock. Along the Snake River, on both sides, there are numerous valleys where winters are not severe enough to prevent cattle and horses from picking up a living for themselves. In the decade ending with 1900 large gains were made in every variety of domestic animals. Sheep are the most important, having produced wool to the value of $2,210,790 in 1899. The following tables show the relative importance and increase of the different varieties of crops and domestic animals:

	Hay and forage, acres	Wheat, acres	Oats, acres	Barley, acres	Corn, acres	Potatoes (Irish), acres
1900	513,656	266,305	64,739	32,798	4,582	9,313
1890	190,501	63,704	21,997	10,004	1,362	3,721

	Dairy cows	Meat cattle	Horses	Mules and asses	Sheep	Swine
1900	51,929	311,605	170,120	2,155	1,965,467	114,080
1890	27,278	192,153	84,135	1,012	357,712	32,188

MANUFACTURES. The manufacturing industry, though not large, is making a vigorous growth. The value of products increased 283 per cent. during the last decade (1890-1900). Flour-milling is of some importance; but the sawing of lumber is the principal industry. The census for 1900 gives the following figures: Number of establishments, 591; capital, $2,941,524; wage-earners, 1477; wages, $862,088; value of products, $4,020,532.

TRANSPORTATION. The Union Pacific, passing through the southern part of the State, offers good railroad facilities to the Snake River Valley. The northern portion of the State is also well provided for by the Great Northern and the Northern Pacific lines. But the great central portion of the State is without railroads. The development of mines within this section has stimulated the construction of wagon roads and trails, but these are altogether inadequate to the needs of the district. The total railway mileage of the State was 1271 miles in 1899.

BANKS. October 31, 1900, there were 15 national banks, 10 of which were in operation. Capital stock, $575,000; outstanding circulation, $218,976. Deposits, September 5, 1900, $3,937,423; reserve held, $1,643,497. On June 30, 1900, there were 8 State banks, with a capital aggregating $185,500; deposits, $537,902; resources, $781,465. There were also 6 private banks with resources aggregating $329,320; capital, $81,665; and deposits, $210,693.

GOVERNMENT. Idaho became a State under its present Constitution, adopted by a convention held August 6, 1889. An amendment may be proposed in either branch of the Legislature, and if agreed to by two-thirds of all the members of each House is submitted to the people, and becomes a part of the Constitution if approved by a majority of the electors. If demanded by two-thirds of the members of each House, the question of calling a constitutional convention is submitted to the people, where it is decided by a majority of the electors voting. Suffrage is granted to both male and female citizens who have resided in the State six months, in the county thirty days, and are registered. There are various offenses which cause disqualification for the right of suffrage, among which are plural marriage, or in any manner teaching . . . or encouraging any person to enter into plural marriage, or membership in any organization which encourages it.

LEGISLATIVE. The number of State Senators cannot exceed 24, nor the Representatives 60, both being elected from counties or districts composed of contiguous undivided counties for the term of two years. The Legislature meets on the first Monday after the first day of January of even years, and at other times when convened by the Governor. Bills for raising revenue must originate in the Lower House. Members receive $5 per day and mileage, but the per diem allowance cannot exceed $300 for any one session.

EXECUTIVE. The Governor, Lieutenant-Governor, Secretary of State, Auditor, Treasurer, Attorney-General, and Superintendent of Public Instruction are elected for two years at the time and places of voting for members of the Legislature. The Governor, Secretary of State, and Attorney-General constitute a board of pardons. A vetoed bill or item of an appropriation bill is carried over the Governor's head by a two-thirds vote of the members present in each House.

JUDICIAL. The Senate constitutes a court for the trial of impeachments, the Lower House having the sole power of impeachment. The Supreme Court consists of three justices, elected by the State at large for a term of six years. The

State is divided into judicial districts, in each of which a judge is elected for a term of four years, and there is a district court in each county at least twice a year. A clerk of the district court is elected for each county, holding office four years. A prosecuting attorney is elected for each organized county for the term of two years. There are also probate courts, justices of the peace, and such other courts as may be established by law. Three-fourths of a jury may render a verdict in a civil action, or five-sixths of a jury in a criminal action for a misdemeanor.

LOCAL GOVERNMENT. The Legislature maintains a uniform system of county government, and by general laws provides for township and precinct organizations, and for the incorporation, organization, and classification of cities and towns. Each county biennially elects county commissioners, a sheriff, treasurer, probate judge, county superintendent of public instruction, assessor, coroner, and surveyor.

FINANCE. The bonded indebtedness of the State on January 1, 1901, was $443,500. Much of this was incurred in the construction of wagon roads. The outstanding State warrants for the same date were $124,766.

MILITIA. Able-bodied male residents between the ages of eighteen and forty-five are liable to military duty, except persons having conscientious scruples against bearing arms. These may be exempted from such duty in time of peace. In 1899 the State had an organized militia of 566 officers and men.

POPULATION. The development of the mineral and other resources of the State has induced a rapid growth in the population—almost doubling in the decade 1890-1900. The population consists predominantly of native-born Americans, only about one-sixth being foreign born. As in other mining and grazing States, the male sex is much in excess. The population, by decades, is as follows: in 1870, 14,999; in 1880, 32,610; in 1890, 84,385; in 1900, 161,772. In 1900, Boise, the capital, contained a population of 5957, and Pocatello, 4046.

INDIANS. According to the last census there were 4226 Indians in the State. There are four reservations, viz. the Fort Hall, Lenhi, Cœur d'Alêne, and Nez Percé. The Indians in the two last-named reservations have made much progress and are practically self-supporting. The others are still dependent upon the Government, receiving about 30 per cent. of their substance from Government rations.

RELIGION. In religion, Idaho is, like Utah, strongly Mormon. The Catholics are the next strongest, and the Methodists, Baptists, and Presbyterians follow in the order named.

EDUCATION. The school officers of the State consist of a superintendent of public instruction, a superintendent of each county, and a board of three trustees in each district. Schools cannot be supported from the public-school fund if any political or sectarian doctrines be taught therein; and the distribution of books, tracts, or documents of this character in them is forbidden by law. The public schools are sustained from the income of a general school fund, also from a county tax, from moneys arising from legal fines and forfeitures, and from fees paid by teachers for certificates of qualification. The basis for distribution of the school money is the number of individuals of school age (five to twenty-one years). Districts may levy special taxes for building or repairing school-houses, and, when the cost of repairs does not exceed $25, the trustees may levy a rate bill, to be collected from such patrons of the school as are able to pay. In 1900 only 4.6 per cent. of the population ten years of age and over were unable to read and write, which was smaller than the corresponding number for the whole country. The State institutions comprise the University of Idaho at Moscow; normal schools at Albion and Lewiston; and an agricultural and mechanical college at Idaho Falls. There are also the College of Idaho (Presbyterian) at Caldwell; Episcopal school at Lewiston; Saint Aloysius Academy at Lewiston; Saint Teresa's Academy at Boise; and an industrial school for Cœur d'Alêne Indian girls at Desmet.

CHARITABLE AND PENAL. Defectives are temporarily sent for purposes of education to Colorado institutions. In 1900 the State insane asylum at Blackfoot contained 118 male and 74 female inmates. In the same year the State prison at Boise contained an average daily enrollment of 150 prisoners.

HISTORY. The first white explorers of Idaho were Lewis and Clarke in the first decade of the nineteenth century. A mission is reported to have been established at Cœur d'Alêne in 1842, but for many years after that the region was visited only by hunters and prospectors. It was organized as a Territory on March 3, 1863, but with an area more than three times as large as at present, since it included the whole of Montana and nearly all of Wyoming. In May, 1864, a part was set off to Montana, and in 1868 Wyoming was organized. The discovery of gold in 1882 at Cœur d'Alêne in the northern part of the State was followed by a large immigration. In 1889 a new constitution was adopted, and the University of Idaho was established at Moscow. On July 3, 1890, Idaho was admitted to the Union. The presence of a large number of Mormons in the southern part of the State excited great alarm, and as early as 1883 led to hostile action on the part of the Legislature. A law depriving professed polygamists of the right to vote was carried to the United States Supreme Court, and there sustained. In 1893, however, the heads of the Mormon Church rejected polygamy as an essential element of their creed, the anti-Mormon restrictions were removed, and all single-wived Latter Day Saints were admitted to the ballot-box. From May to September, 1892, a miners' strike at Cœur d'Alêne was marked by a number of bloody conflicts between union and non-union workers. Federal troops were dispatched to the scene of disturbance, and military law was proclaimed. The strike failed, but dissatisfaction persisted among the mine workers, and in April, 1899, blazed out in renewed strikes and riots. Martial law was once more proclaimed, and nearly one thousand miners were seized and imprisoned by the United States troops till the strike was crushed out.

In national elections Idaho has been carried by the Democrats, or the Democrats and Populists in fusion, since 1892. The Governors since its organization as a Territory have been as follows.

TERRITORIAL

William H. Wallace	1863-64
Caleb Lyon	1864-66
David W. Ballard	1866-70
Gilman Marston, Thomas M. Bowen	resigned without acting
Thomas W. Bennett	1871-75
D. P. Thompson	1875-76
Mason Brayman	1876-80
John B. Nell	1880-83
John N. Irwin	1883
William M. Bunn	1884-85
Edward A. Stevenson	1885-89
George L. Shoup	1889-90

STATE

George L. Shoup	Republican	1890
Norman B. Willey	"	1891-92
William J. McConnell	"	1893-97
Frank Steunenberg	Democrat-Populist	1897-1901
Frank W. Hunt	" "	1901—

Consult: Onderdonk, *Idaho, Facts and Statistics Concerning Its Mining, Farming, and Industries* (San Francisco, 1885); Bancroft, *Washington, Idaho, and Montana* (San Francisco, 1890).

IDAHO, UNIVERSITY OF. A State educational institution situated at Moscow, Idaho. It was founded in 1889, but was not opened for the reception of students until 1892. It is under the control of five regents, and offers free instruction to students of both sexes. It comprises a course of letters and science, schools of agriculture and applied science, and a preparatory school. It maintains an agricultural experiment station, and has organized farmers' institutes throughout the State. Military drill is required of preparatory students, and of freshmen and sophomores in the university. The degrees of B.A., B.S., B.M., B.E.M., B.E.E., and B.C.E. are conferred. The total attendance averages 350, of whom about 150 are collegiate students. The library contains about 8000 volumes and 10,000 pamphlets. The endowment consists of 286,000 acres of land. The grounds and buildings are valued at $275,000, and the income is approximately $65,000.

IDAHO SPRINGS. A town in Clear Creek County, Colo., 37 miles west of Denver; on the Colorado and Southern Railroad (Map: Colorado, E 2). Picturesquely situated in the famous Clear Creek Cañon, at an elevation of 7543 feet, and having cold and hot soda springs, it is one of the noted summer resorts of the State. In 1859 gold was first discovered in Colorado, at Jackson's Bar, within the present city limits. Up to 1902 the mineral production of the district was over $200,000,000. The town has a number of concentrating mills, machine-shops, lumber-yards, etc., and is famed for its mining tunnels. There is a public library. Population, in 1890, 1338; in 1900, 2502.

IDA'LIUM (Lat., from Gk. Ἰδάλιον, *Idalion*). A town in Cyprus, adjoining which was a forest sacred to Aphrodite, who was hence sometimes called *Idalia*. The site is the modern Dalin.

IDDESLEIGH, Idz'lĭ, first Earl of. See NORTHCOTE.

IDDINGS, JOSEPH PAXSON (1857—). An American geologist, born in Baltimore, Md. He graduated at the Sheffield Scientific School of Yale in 1877, was a graduate student and assistant in mechanical drawing and surveying there until 1878, and continued his studies in geology and microscopic petrography at Columbia University and Heidelberg. From 1880 until 1892 he was in the service of the United States Geological Survey, to which he returned in 1895. In 1892 he became assistant professor, and in 1895 professor, of petrology at the University of Chicago. His Government explorations were described in many reports and contributions to scientific journals. Among his more important writings are: *The Nature and Origin of Lithophysæ and the Lamination of Acid Lavas* (1887), reprinted from the *American Journal of Science; On the Development of Crystallization in the Igneous Rocks of Washoe, Nev.* (1885), with Arnold Hague; and *The Origin of Igneous Rocks* (1892), in the *Bulletin* of the Washington Philosophical Society.

IDE (Norweg., Swed. *id*, roach). A fish (*Leuciscus idus*), closely allied to the roach. It inhabits the lakes of the northern parts of Europe, and ascends rivers in April and May to spawn. It is excellent for the table. A gold-colored variety, called 'orfe,' is bred in Germany, and is sold extensively for ornamental aquariums.

IDEA (Lat., from Gk. *ἰδέα*, form, from *ἰδεῖν*, *idein*, to see; connected with Lat. *videre*, to see, Skt. *vid*, AS. *witan*, Eng. *wit*, to know). The term 'idea' has undergone a radical change of meaning in the history of psychology. "Employed by Plato to express the real form of the intelligible world, in lofty contrast to the unreal images of the sensible, it was lowered by Descartes, who extended it to the objects of our consciousness in general" (Hamilton). In modern philosophy the word has a distinctly empirical flavor. Locke (q.v.) defines idea as "whatsoever is the object of the understanding when a man thinks," "that which the mind is applied about whilst thinking," and the intellectualistic tendencies of the English Associationist school (see ASSOCIATION OF IDEAS) made 'idea' almost equivalent to what is now termed 'mental process' (q.v.). In current psychological usage the word is either taken in a wide sense to denote the "conscious representation of some object or process of the external world" (Wundt), thus covering perception (q.v.), ideas of memory, and ideas of imagination; or it is restricted to the two latter categories, and opposed to perception, as a strictly re-presentative to a presentative process. Since there is no essential psychological difference between 'representation' and 'presentation,' the first and wider application of the term is preferable.

An idea which has been formed, after the manner of a composite photograph, from many ideas of similar character, and which has thus lost definiteness of detail, while it is liable to associative arousal at the hands of a large number of other ideas, is termed an 'abstract' idea. (See ABSTRACTION.) When the abstract idea is symbolic, and not pictorial—when, e.g., it is a word—it is named a 'concept.' Ideational masses of complex but vague contents, which require the operation of active attention to bring their constituents to separate recognition—such as our idea of the sentence that we are about to utter, or (on a still larger scale) our idea of self—are called 'aggregate' ideas. For ideas of memory and imagination, see those titles.

Consult: Sully, *The Human Mind*, vol. i. (London, 1892); Ladd, *Psychology, Descriptive and Explanatory* (New York, 1894); James, *Prin-*

ciples of Psychology (ib., 1890); Titchener, *Outline of Psychology* (New York, 1899).

IDEALISM. In philosophy, the theory that no reality is independent of consciousness. Its ordinary antithesis is realism, or the theory that the reality of things is not dependent upon their relation to consciousness. The *motif* of idealism can best be understood by contrasting idealism with agnosticism or skepticism (q.v.), which admits the existence or at least the possibility of reality in independence of consciousness, but denies the possibility of knowing such reality. A typical skeptic, such as Hume, admits that we do know the contents of our own consciousness. Most skeptics, among them Hume, go to the extent of formulating laws in accordance with which these contents appear and vary. But all this knowledge, satisfactory as it is in its own sphere, is knowledge only of phenomena, or of ideas in the Lockean sense of the word. Skepticism is thus idealistic in its epistemology or theory of knowledge, while anti-idealistic or noncommittal in its ontology (q.v.). The idealist escapes skepticism by refusing to take into consideration the possibility of the existence of a non-ideal reality. The realist asserts the existence of the non-ideal reality which the skeptic either admits or doubts without denying, but usually the realist also asserts the possibility of knowing that reality. Thus the idealist and the realist are antagonistic, both in epistemology and ontology, while the skeptic sides with the idealist in epistemology and yet refuses to take sides against the realist in ontology. Idealism has taken numerous forms. Among these may be mentioned subjective idealism, which assigns only subordinate reality to the content of consciousness and ultimate reality only to the conscious subject (Berkeley and Fichte); objective idealism, which interprets nature as reason made an object to itself (Schelling); absolute idealism, which assigns ultimate reality only to the unity consisting of both object (contents) and consciousness in indissoluble correlation (Hegel); and transcendental idealism, which regards the world of experience as dependent for its order upon the action of a conscious subject working in accordance with laws of thought, but which at the same time denies that ultimate reality is dependent upon such action (Kant). For a criticism of idealism, see KNOWLEDGE, THEORY OF; and see also PLATO; PLOTINUS; NEO-PLATONISM; BERKELEY; KANT; FICHTE; SCHELLING; HEGEL; LOTZE; GREEN, THOMAS HILL. Consult: Willmann, *Geschichte des Idealismus* (Brunswick, 1894-97), and the authorities referred to under KNOWLEDGE, THEORY OF; METAPHYSICS; ONTOLOGY.

For the question of idealism in literature, see ROMANTICISM; REALISM.

IDEAS, ASSOCIATION OF. See ASSOCIATION OF IDEAS.

IDELER, ē'de-lēr, CHRISTIAN LUDWIG (1766-1846). A German astronomer and chronologist, born at Gross-Brese, near Perleberg, in Prussia. After holding various offices he received a professorship at the University of Berlin in 1821, and in 1829 he was made a foreign member of the Institute of France. Ideler's most important works are: *Handbuch der mathematischen und Vochnischen Chronologie* (2 vols., 1825-26; 2d ed. 1883), which was the first work that presented a clear view of the reckoning of time among the ancients; and *Die Zeitrechnung der Chinesen* (1839), a supplement to the *Handbuch*. He also wrote, in conjunction with Nolte, handbooks of the French and English languages and literatures, which passed through numerous editions.

IDEN, ī'den, ALEXANDER. A Kentish squire in Shakespeare's *2 Henry VI.*, the slayer of Jack Cade.

IDENTITY (ML. *identitas*, sameness, from *identicus*, same, from Lat. *idem*, same), **THE LAW OF.** The principle that in any train of thought, such as a syllogism, there must be running through all the differences of contents a oneness of meaning, in which is found the consistency of the phrase of thought. This definition leads to the consideration of the dispute about the meaning of identity. Some have maintained that it is undifferentiated sameness, and that the differences which are found among similar things are accretions of unlikenesses around the core of sameness. Others have maintained that no two objects of consciousness are exactly alike, and that identity is not undifferentiated likeness, but a likeness in difference or a differentiated likeness. The debate centres around the conception of philosophical atomism. It is possible by abstraction to obtain an idea of some quality which is the element of likeness between several objects, and which can be thought as itself undifferentiated. Take color, for instance. In all the different colors, such as red, green, and yellow, can we find by abstraction some one element which is undifferentiatedly alike? Suppose we say that it is that quality of the visual sensation which is due to the stimulus of (relatively) homogeneous light vibrations. (See COLOR.) Even the answer does not secure undifferentiated likeness. *That* quality thus produced is not one quality, but it is "at least 160 spectral color qualities" (Titchener), each irreducible to any other. But even these are not sharply defined against each other. Although we cannot distinguish all the differences, there is every reason to suppose that there are differences which, though they affect our experience, we are not attentively aware of. There is a continuum of color. (See CONTINUITY, LAW OF.) If so, there is no undifferential sameness of color, although there is a sameness which we recognized *in* the differences. There is a oneness in all the reds, which oneness we *cannot isolate, although we can recognize.* So there is a oneness in all color, unisolable but distinguishable and recognizable. What is true of color is true of everything else. Atomistic explanation of color is false to fact. Undifferentiated sameness is not offered by experience. Hence an identity might be defined as an unisolable but distinguishable oneness of attributes in objects which at the same time might present a multiplicity within the same attributes. For the atomistic views of identity, consult James, *Principles of Psychology* (New York, 1893); for the opposite view, Bradley, *Principles of Logic*, books i., ii. (London, 1883); also the discussion between James and Bradley in *Mind*, new series, vol. ii. (London, 1893); Bradley, *Appearance and Reality* (see index for pertinent passages) (London, 1897); Bosanquet, *Logic* (see index for pertinent passages) (London, 1888); Fullerton, *Sameness and Identity* (Philadelphia, 1890); also the authorities referred to under LOGIC; KNOWLEDGE, THEORY OF.

ID'EOGRAPHY (from Gk. *ἰδέα, idea*, idea + *-γραφία, -graphia*, a writing, from *γράφειν, graphein*, to write). The art of representing ideas by graphic signs, as may be seen in the hieroglyphics (q.v.) found on the monumental relics of Egypt.

IDES. See under KALENDS.

IDIOCY (from Gk. *ἰδιωτεία, idiōteia*, uncouthness, from *ἰδιώτης, idiōtēs*, private citizen, from *ἴδιος, idios;* connected ultimately with Lat. *suus*, Skt. *sva*, own). A condition of arrest of development of the brain, and, in consequence, of the intellectual faculties, of the infant or child. If the non-development is such that the child is capable of feeding himself and of appreciating enough of his surroundings to avoid injury, the condition is usually termed *imbecility*. If there is no such evidence of mental capacity, *idiocy* is the term usually employed. *Feeble-mindedness* occupies an intermediate position between normality and imbecility. The defect or disease of the brain which interferes with normal evolution may be congenital or acquired; the cerebral functions may be all more or less involved. Ribot and also Sollier maintain that the slow development of the cerebral faculties is due to want of attention; that spontaneous attention is caused by affective states brought into action by sensations, and that those young children are the most attentive whose nervous systems are most easily stimulated. Hence the faculty of attention is closely related to the activity of the sensations. The greater the power of attention, the more intelligent does the individual become. In idiocy, owing to the diminution or loss of the power of attention, the perceptions aroused by sensations are more or less indefinite, and the resultant idea likewise ill-defined. Sensations become more numerous as the organism develops, and the lack of ideas and recognitions becomes more noticeable. Frederick Peterson, whose translation of Sollier we quote, sounds a warning that there are other faculties of mind, such as will and memory, which are absolutely necessary to all subsequent mental activity, and adds that lack of the power of attention, while common in idiocy, cannot be taken in any way as distinguishing this condition of mind from other forms of mental impairment. Frequently somatic and especially cranial and facial characteristics are noticeable upon the birth of the idiot, though idiocy exists also when physical evidence is wanting. An idiot may not take the breast, may cry without motive and with different notes from normal children. Deafness or blindness may be congenital. The senses of smell and of taste may be undeveloped. The movements of the eyes may be irregular. The idiot may be slow in responding to the stimulus of touch; he may not laugh; thermic sensibility is diminished; a constant rhythmic, automatic motion may be present; he may not learn to walk, and all voluntary movements may be acquired late in youth, and imperfectly. Organic sensations are blunted, including hunger, thirst, desire for defecation or urination. Lack of the faculty of attention exists, owing to defective senses which convey feeble impressions to the brain, as well as to a lack of the affective state; the internal form of attention (reflection of Ribot) is absent or deficient in the idiot. He is practically incapable of preoccupation. His instincts are defective, whether of hunger or of self-preservation; while the instinct of irritation is very strong; and the sexual instinct is seldom normal, being exaggerated, impaired, absent, or perverted. Occasionally remarkable special aptitudes are seen in idiots in the direction of music, mathematics, mechanical arts, drawing, painting, memory for facts or dates, playing certain games, and a low order of wit or drollery. It is said that the Court fools and jesters of ancient times were idiots of high grade or imbeciles, until others, seeing the emolument to be obtained, studied and practiced the art. Ribot says that Sikorski is authority for the statement that the activity and attention of normal children are mainly developed through play. Idiots for the greater part manifest little tendency to play, clinging to the simplest games of infancy and preferring solitary pastimes. Others of higher grade prefer noisy, destructive sports, and traits of brutality, selfishness, and quarrelsomeness are apparent. Civility and politeness are rarely acquired. Destructiveness, evidenced in their play, may develop into a vicious satisfaction in inflicting injury, commission of arson, or of homicide, or of self-mutilation. Sentiments and sensation are rudimentary or absent: the absence of ideas of right and wrong, the varying respect for authority, the absence of religious feeling, and the absence of veracity being especially noticeable.

It has been said that idiot children sometimes show facial characteristics at birth. They are always ungracious, uncouth, or ugly in figure, face, attitudes, or movements. Very common among them are misshapen or unsymmetrical heads, dwarfishness, lack of proportion of the limbs, stooping and slovenly postures, deformities of the hands or feet, and awkward gait (Peterson). The expression of the face varies from apathy to constant laughing, leering, or scowling; the mental characteristics being evident also. There may be deformities of the iris, cornea, or the lids of the eyes, as well as malformation of the nose, ears, and chin. Microcephalus, hydrocephalus, and cretinism are found in some idiots. There are speech defects. Sollier finds two kinds of mutism in idiots, a motor and a sensory aphasia (q.v.). In the first the idiot cannot talk, though he understands; in the second he understands nothing which is said. Language is developed late in the idiots who talk. As stated, when infants, their notes are not normal, but meaningless and monotonous cries take the place of the usual crowing of a baby. Speech disturbances are common, as regards both absence of words to express ideas, or imperfections of grammar, and also excessive and infinite loquacity. Reading is impossible in idiots who suffer from defects of the visual centres or the visual apparatus. The writing centre is the latest part of the linguistic cerebral equipment to be developed, together with its association tracts. They learn to reproduce letters, though never to write well, and they exhibit a tendency to write with the left hand, and also to write from right to left. They execute drawing only by copying, without perspective, or produce scrawls of fantastic nature.

From preceding statements it has been gathered that the intelligence of the idiot varies from the normal in different degrees. He has fewer ideas than the imbecile. Imitation does not furnish ideas for him: it simply centres on mechanism, except in the idiots of higher grade, in whom

nately is not retained, but lost. Sollier reminds us that memory is hereditary, organic, or acquired. (See MEMORY.) Hereditary memory exists often in idiots. Organic memory, or unconscious memory (as of walking and other associated movements), though sometimes completely absent in idiots, owing to defective nerve-centres and lack of attention, is nevertheless better developed than either hereditary or acquired memory. Attention being an absolute requisite for acquired memory, idiots are rarely possessed of this power. Memory fixed by repetition of sensation, without emotional basis, is found in educable idiots; as, e.g. memory of the location of the dining-room, of the bed, etc. The phenomenon of specialized memories, such as those for musical airs, or dates, for example, is inexplicable. Association of ideas, occurring, as it does, by resemblance, contrast, and contiguity, hardly exists in idiots. They experience an association of sensations. Judgment and reason also are very faulty. Volitions do not exist in the lowest order of idiots. Voluntary control of the sphincters occurs in idiots who walk only after they have learned to do so. In higher idiots the will is manifested by more complex movements than actions accomplished for the satisfaction of natural needs and appetites; but even these complex movements may become secondarily automatic. Self-respect, to which one may appeal in an imbecile, is little developed in the idiot.

As to the psychological development of an idiot points are reached in every case at which education ceases, and further mental progress is impossible. Peterson places the limits as follows: In the inferior types intellectual progress ceases at the age of six or seven, and sentiments and senses continue their development to eighteen or twenty; while in the superior grades the improvement of senses, sentiments, and intellect may all cease about puberty. Retrogression may occur, following the same law as dementia, to wit, enfeeblement of will, intelligence, sentiments, and sensations in this order. The causes of idiocy are various. Its elements are in many instances hereditary, that is to say, a course of conduct in a parent which tends to degeneration, such as excessive alcoholic indulgence of any kind, will tend to induce arrested normal healthy development in offspring. Other causes are injuries received during childbirth, acute disease of the brain or its coverings in early infancy, or even while intrauterine. Injury to the brain may result in idiocy. Chronic disease of the brain-coverings, tuberculosis, tumors within the brain, hydrocephalus, are other causes. A peculiar type of idiocy is due to mal-development of the thyroid gland. This is called cretinism or myxedematous idiocy. The attempt to educate idiots commenced in the seventeenth century with an experiment of Saint Vincent de Paul at the Priory of Saint Lazarus. His efforts to teach idiots, though continued for many years, were not successful. In 1799 the celebrated Itard took a wild boy found in the forests of Aveyron and attempted to teach him; and although the success in this particular case was slight, he believed that he had discovered methods and facts which would be of use in other cases. These he communicated to his pupil, Dr. Edouard Seguin, who, in 1838, opened a school for idiots in the Hospital for Incurables in Paris. He met with success

the hospital to be instructed, and in the course of three years he received the approval of the French Academy. Dr. Seguin adopted a system involving the theory that idiocy was prolonged infancy. His practice, founded upon this, was to excite and continue the process of development. Of course a variable success attended the experiment. The art of effecting such development requires much knowledge, tact, and patience. Different kinds of idiots need different stimulants, physical and mental. Pure air, good nutritious food, exercise; in short, any treatment which is calculated to increase the bodily and mental functions will improve the idiot. Wherever his interest can be awakened there will be a mental stimulus, and as the tendency of development is toward a normal standard, more or less improvement must follow. Dr. Seguin removed to New York City, where he established a school for idiots and feeble-minded children, which was very successful. Other similar institutions exist in various parts of the country. Statistics are unreliable, as confusion is apt to be caused by the inclusion of epileptics and insane people with the feeble-minded and imbecile. In 1890 it was stated that there were 95,500 'feeble-minded or idiotic' persons in the United States.

Consult: Sollier, *Psychologie de l'idiot et de l'imbecile* (Paris, 1891); Preyer, *The Mind of the Child*, trans. by H. W. Brown (New York, 1893); Ribot, *The Psychology of Attention* (Chicago, 1894); Bourneville, *Assistance, traitement et éducation des enfants idiots et dégénérés* (Paris, 1895); Peterson, "The Psychology of the Idiot," in *American Journal of Insanity* (Utica, New York, 1896).

IDIOCY (in law). A total lack of reasoning powers, or of those intellectual faculties by which man is peculiarly distinguished. Its legal consequences, so far as contract and tort obligations as well as criminal responsibility are concerned, are the same as those of insanity (q.v.). The term is ordinarily limited to those who have had no understanding from birth, although some courts have declared that it is properly applicable to those who have become totally imbecile from sickness or other causes, as well as to congenital fools. In case of one who has never possessed a glimmer of reason, the law presumes that he will never attain any. Hence the custody of his person and of his lands formerly vested in the lord of the fee or of the manor. Because of the abuse of this power, Parliament transferred the wardship of idiots to the King, by statute of 17 Ed. II., c. 9. In this country the care of their persons and property is provided for by statute or safeguarded by constitutional provisions. For example, the present Constitution of New York vests the care of idiots in the State Board of Charities, and not in the Commission of Lunacy. It was laid down by ancient English writers upon law that a man who is born blind, deaf, and dumb can have no understanding, and hence cannot make a valid contract, gift, or grant. This doctrine had its origin in a misconception of certain texts of the civil law, which declared that one who was deaf or dumb could not be a party to a *stipulatio*, that is, a contract which was entered into by an oral question and answer, in certain formal words. It is quite clear that a dumb person could not

be a party to this formal contract, for he could not ask the question nor speak the response. Deafness also incapacitated one for such a contract, by preventing his hearing the question or the answer. But the civil law never countenanced the presumption that a deaf and dumb person was mentally incapable of entering into a consensual contract. In modern English law the presumption is only *prima facie*, and may be repelled by evidence, that the particular person whose competency is brought into question does possess sufficient intelligence to rank as one of sound mind. Consult: the *Commentaries* of Blackstone and Kent; Holmes, *Misunderstandings of the Civil Law*, 6 Am. Law Rev., 37; and the authorities referred to under MEDICAL JURISPRUDENCE and INSANITY.

IDIOM (Lat. *idioma*, Gk. *ἴδιωμα, idiōma*, peculiarity, from *ἰδιοῦσθαι, idiousthai*, to make one's own, from *ἴδιος, idios*, one's own, peculiar). A term used to denote a phrase or form of words approved by the general usage of a language, while in many cases it will admit of neither grammatical nor logical analysis. In a broader sense, it denotes the genius or peculiar cast of a language; hence it is often applied to a peculiar form or variation of a language, a dialect.

IDIOPATHY (from Gk. *ἰδιοπάθεια, idiopatheia*, peculiar feeling, from *ἰδιοπαθής, idiopathēs*, affected peculiarly, from *ἴδιος, idios*, peculiar + *πάθος, pathos*, feeling). Idiosyncrasy (q.v.); peculiar susceptibility. The term is also used of the quality of being idiopathic. A disease is called idiopathic as distinguished from one resulting from a wound, traumatic. An idiopathic disease is therefore an idiopathy.

IDIOSYNCRASY (Gk. *ἰδιοσυγκρασία, idiosynkrasia*, peculiar temperament, from *ἴδιος, idios*, peculiar + *σύγκρασις, synkrasis*, mixture, from *συγκεραννύναι, synkerannynai*, to mix together, from *σύν, syn*, together + *κεραννύναι, kerannynai*, to mix, from *κρᾶσις, krasis*, mixture). An individual trait or constitutional peculiarity. Thus, there are persons who have a great dislike to particular kinds of food, smells, sounds, etc., which to most persons are agreeable; and, on the other hand, a desire is sometimes manifested for things generally disliked. In particular individuals an eruption of the skin will be caused by eating strawberries, or fainting by the smell of a rose, when the person is unaware of the cause. Idiosyncrasies also occur in consequence of which certain medicines become inoperative, or certain poisons harmless. Idiosyncrasies are either permanent or temporary, sometimes arising from mere morbid conditions, and disappearing along with them. The term is also employed to denote *mental*, as well as *physical* peculiarities, which are often signs of insanity, such as baseless antipathies to certain persons, bizarre arrangement of articles in one's room, permanent dread of passing certain objects, etc.

IDLE LAKE. In Spenser's *Faerie Queene*, the lake on which Phædria sailed.

IDLER, THE. The title of a series of papers by Dr. Johnson, published in Payne's *Universal Chronicle* (1758-60).

IDOL (OF. *idole*, Lat. *idolum*, from Gk. *εἴδωλον, eidōlon*, image, from *εἰδέναι, eidenai*, Skt. *vid*, to know, Lat. *videre*, to see). An image intended to represent a deity, and to be adored as such. The act of such adoration is idolatry. Through theological usage, the term idolatry has come to mean in a general sense any worship or obeisance paid to any other than the Supreme Being as conceived by Judaism, Christianity, or Islam. Confining ourselves to the more restricted usage, the worship of idols appears to be a phase of religious evolution that is natural to man at a certain stage of culture. It arises from the desire to furnish some tangible evidence of the presence of the powers upon whom man feels himself to be dependent. In this sense idolatry is to be distinguished from the attribution of divine force to a sacred stone, river, or other object. The sanctity is inherent, for one reason or the other, in such objects themselves, whereas the sanctity of an idol is due to its being a symbol. It becomes evident, therefore, that while the direct worship of objects is a link in leading to a symbolical image-worship, the latter belongs to a phase of religious thought transcending the more primitive manifestations of the religious instinct. This thesis finds an illustration in the religious history of the Semites, as well as in that of the Greeks and Romans. The localization of nature deities, such as the sun, moon, and certain planets, led in the case of the Babylonians and Egyptians to representation of the gods of a more or less fanciful character, and the development of the art instinct acts as a powerful factor in promoting and maintaining the worship of these gods under the form of images of men or animals, or of a combination of the two. The influence exerted by Babylonian and Egyptian culture led the nations of Palestine—notably the Phœnicians—to replace poles and stones by symbolical representations of the gods, and the Hebrews likewise after they had advanced to the agricultural stage fell a prey to these same influences until, through the reaction brought about by the teachings of the prophets, an emphatic protest against all manner of idolatry is embodied in the religious system and cult of post-exilic Judaism. The rise of Christianity helped to spread the doctrine throughout the ancient world, though even within the sphere of Christianity image-worship (q.v.) could not be entirely rooted out. Islam struck at the root of the evil by forbidding the making of any representation of any living thing, whether intended to be worshiped or not (cf. Ex. xx. 4). To give life was felt to be the exclusive prerogative of God, and to attempt to reproduce even the external form of a living thing was regarded as impiety. As a consequence wherever Islam secured a foothold idolatry was doomed. Zoroastrianism at least did not encourage idolatry, but it is noticeable that in the extreme East—India, China, and Japan—idolatry was not only reconciled with the remarkable development of religious thought that took place in those regions, but its hold seemed to grow stronger with each new phase in this evolution.

IDOMENEUS (Lat., from Gk. *Ἰδομενεύς*). The grandson of Minos, and son of Deucalion of Crete. As ruler of Cnosus and Crete, he led 80 ships to Troy. In the *Iliad* he is described as one of the mightiest of the heroes, and in the battle at the ships he plays a leading part. The early history makes him return to his home in

safety, and receive there in due time an honorable burial. In later writers he was represented as vowing during a storm to sacrifice to Poseidon the first living thing that met him on a safe return to Crete. The victim was his son, and his subjects drove him forth. He wandered to Calabria, where he built a temple to Athena, and later from Italy to Asia Minor, where he established a shrine of Apollo, near Colophon. Here he died and was buried.

IDRAC, ē'drȧk', ANTOINE (1849-84). A French sculptor, born at Toulouse. He studied under Guillaume, Cavelier, and Falguière, and at twenty-four won the Prix de Rome. He displayed especial mastery of the nude and was rapidly rising in his profession when he died, aged thirty-five. Idrac's works are: "Cupid Stung by a Bee," a theme of the Greek anthology (1878), bought by the French Government; "Mercury Discovering the Caduceus," a marble figure which won the first medal and is now in the Luxembourg Museum; and a "Salambo" (1882), which showed his ability to represent the supple nude form, won him the French Legion of Honor and received a first prize at the Munich Exposition of 1883.

IDRIA, ē'drē-ȧ. An important mining town in the Austrian Crownland of Carniola, situated in a deep caldron-shaped valley on the Idriza, 22 miles west-southwest of Laibach (Map: Austria, C 3). Idria is famous for its quicksilver-mines, believed to be the richest in Europe. They were discovered in 1497, and have been operated by the State since 1580, employing altogether about 1500 persons, and yielding over 500 tons of quicksilver annually. Population, in 1890, 5084; in 1900, 5772.

IDRISITES. A dynasty of Arab rulers in the northwest of Africa. The founder of the line was Idris of the race of Ali, who about 785 united a number of the native Berber tribes into a kingdom under his sway. His son Idris II. founded Fez and greatly increased his possessions by conquest, but on his death the kingdom was divided among his sons, and, thus weakened, it fell an easy prey to the power of the Fatimites in the third decade of the tenth century.

ID'UMÆ'A. See EDOM.

IDUN, ē'dōōn (Icel. *Iþunn;* connected with þ, energy, *iþenn*, energetic, OHG. *ïla*, energy). The name of a goddess of Scandinavian mythology. She was the daughter of the dwarf Ivald; but being received among the Æsir, she became the wife of Bragi. Idun possessed a box of apples, by the use of which the gods preserved their perpetual youth. She was carried off by the giant Thiassi, with the assistance of Loki. But the gods, beginning to grow old and gray without their apples, sent Loki after her, and, changing himself into a falcon and Idun into a nut, he returned with her to Asgard. In this myth Idun represents spring, and Thiassi winter. According to Sophus Bugge, the main story may be closely connected with the Greek myth of the golden apples of the Hesperides in an Irish version. The introduction of edible apples at a time when this fruit was unknown in the North seems to imply a foreign source.

ID'YA. A poetical name of Britannia.

I'DYL, or **I'DYLL** (from Fr. *idylle*, Lat. *idyllium*, from Gk. *εἰδύλλιον, eidyllion*, short poem, from *εἶδος, eidos*, form, scene). A term generally used to designate a species of poems representing scenes of pastoral or out-of-door life. It is, however, an error to suppose that the idyl is exclusively pastoral; certainly, there is no warrant for such a notion in either ancient or modern usage. Of the thirty-one idyls attributed to Theocritus, only ten are bucolic.

IDYLLS OF THE KING. Twelve poems by Tennyson, published between 1842 and 1885, based on the Arthurian romances. The titles are: "The Coming of Arthur," "Gareth and Lynette," "The Marriage of Geraint," "Geraint and Enid," "Balin and Balan," "Merlin and Vivien," "Lancelot and Elaine," "The Holy Grail," "Pelleas and Ettarre," "The Last Tournament," "Guinevere," "The Passing of Arthur."

IDZŬ, ē'dzōō. One of the fifteen provinces of Japan which make up the Tōkaidō or 'East Sea Circuit,' and through which the highway called the Tōkaidō runs. It is a mountainous peninsula, with numerous bays and promontories, 32 miles long and 16 wide, lying between the bays of Sagami on the east and Suruga on the west. Geologically and orographically it forms part of the volcanic range of mountains with which the name Hakone is associated. Its most important river is the Kanōgawa, which flows north into Suruga Bay, and its highest peak is Amagi-san, with a height of about 4800 feet. Its chief towns are Mishima, on the Tōkaidō, and the small but beautiful port of Shimoda, on the southeast coast. The rearing of silkworms and the reeling of silk form the principal industry of the peninsula. It abounds in hot springs and watering-places, the chief of which is Atami, about 45 miles from Yokohama. To Idzu belong, both geologically and politically, the 'Seven Volcanic Islands,' of which Oshima or Vries Island, 38 miles from the mainland, is the chief, and further south Hachi-joshima, long used as a place of banishment. See Rein, *Japan* (London, 1884); and Satow and Hawes, *Handbook for Travellers in Central and Northern Japan* (Yokohama, 1881).

IERNE, ī-ēr'nē. An ancient Greek name for Ireland.

IF, ēf. A rocky island about two miles west of Marseilles, with a castle, the Château d'If, built in 1529, and later used as a State prison. In it Mirabeau, Philippe Egalité, and others were confined. The castle is most widely known through Dumas's *Count of Monte Cristo*.

IFFLAND, ēf'lănt, AUGUST WILHELM (1759-1814). A German actor and dramatist. He was born at Hanover and was intended for the Church, but before he was nineteen the stage had become his choice. He went to Gotha, where he studied under Gotter, Beck, Beil, and Ekhof, and thence in 1779 to Mannheim, where he first became famous. Differences with his manager induced Iffland in 1796 to accept the post of director in the Berlin National Theatre. Fifteen years afterwards he was made superintendent of all the royal theatres, and under his management the Berlin stage reached its highest point. But he was not merely an able manager. As an actor he showed himself artistic, painstaking, and minute, strong in comedy of every-day life. Voice and figure unfitted him for tragedy. For the stage he translated and wrote himself, for the most part, plays of over-great sentiment, and too

strongly urged didactic purpose. But in them he displayed much literary talent and great practical knowledge of the stage. *Die Jäger*, *Dienstpflicht*, *Der Spieler*, and *Die Mündel* kept the stage for a century. Iffland's dramatic criticism is to be found in his *Almanach für Theater und Theaterfreunde* (1806-11), and *Theorie der Schauspielkunst* (1815). Consult the autobiography, *Meine theatralische Laufbahn* (ed. by Holstein, Heilbronn, 1886); Duncker, *Iffland in seinen Schriften* (Berlin, 1859); and Genée, *Ifflands Berliner Theaterleitung* (Berlin, 1896).

IFNI, ēf'nē. A seaport town of Africa, situated on the western coast of Morocco, opposite the Canary Islands. It was ceded by Morocco to Spain in 1883. Population, about 6000.

IFUGAO, ē'fōō-gä'ō. A head-hunting Malayan people in Nueva Vizcaya and Isabella provinces, Luzon. Their speech is distinct with many subdivisions. See PHILIPPINE ISLANDS.

IGBARA, ēg'bä-rä, or **IGBIRA**, ēg'bī-rä. A negro people of the Sudan living at Nupé on the right bank of the Niger and southward to Yoruba. They are said to be industrious and commercial. Their language belongs to the same linguistic group with Nupé, Ewe, and Tshi. Half a century ago the Kingdom of Nupé was subdued by the Hamitic Fulas, and the Igbaras, together with other kindred tribes, were brought under Moslem influence, though many are still pagan. The ruins of Fende or Panda, the capital of this once powerful dominion, are still to be seen. They are governed by a Fulah Emir, but are within the British Protectorate. See FULAH.

IGERNA, ī-gĕr'nä, **IGERNE**, ī-gĕrn', **IGRAINE**, ī-grān', or **YGNERNE**, īg-nĕrn'. In the Arthurian romance, the wife of Gorlois, Duke of Cornwall. She was loved by Uther, King of Britain, and by him became the mother of Arthur.

IGLAU, ē'glou. An ancient and, next to Brünn, the largest town of the Austrian Crownland of Moravia, situated on the Iglawa and on the Bohemian frontier (Map: Austria, D 2). It has a fine market-place; a number of interesting churches, including one dating from the eighth century; a Rathaus; barracks (formerly a Dominican monastery); and a cloth hall. In the Middle Ages Iglau was an important mining centre, but since the Thirty Years' War mining has been practically extinct, and the manufacturing of cloth is now the foremost industry. There are numerous weaving, spinning, and dyeing establishments, a cigar-factory employing over 2500 hands, potteries, and flour-mills. There is also a considerable trade in agricultural products, cloths, and lumber. Population, in 1890, 23,716; in 1900, 24,387, chiefly German Catholics, and including over 4000 Czechs. Iglau is a town of great antiquity, its silver-mines having been worked as early as the eighth century. By the Treaty of Iglau, in 1436, a settlement was effected between the Hussites and Sigismund, who was acknowledged King of Bohemia. The town suffered heavily from a fire in 1523, and was thrice captured by the Swedes during the Thirty Years' War.

IGLESIAS, ē-glā'sē-äs, JOSÉ MARIA (1823—). A Mexican statesman and author. He was born in the City of Mexico, studied law in the university there, and later became professor of jurisprudence in that institution. He early entered politics, and speedily attracted attention by his natural ability. Political preferment rewarded his loyalty to the Government, and in 1857 he became Secretary of Justice, and a little later Secretary of the Treasury. From 1853 to 1867 he was again Secretary of Justice. In 1868 he was a member of the General Congress, and the same year was appointed Minister of the Interior by Juarez, to whose fluctuating fortunes he had clung with unswerving fidelity. In 1873 he became president of the Supreme Court, and by virtue of that office assumed the Presidency of the Republic when Lerdo de Tejada was overthrown in 1876, but was soon compelled to give up the position to Diaz. After 1878 he applied himself to journalism, and published several works on Mexican history.

IGLESIAS DE LA CASA, dā lä kä'sä, José (1748-91). A Spanish poet, born at Salamanca. His earliest writings were satires in the form of epigrams and *letrillas* directed against contemporary society. After entering the Church he wrote works of a graver nature, and later his verses were merely rhymed theological discussions. His style has much clearness and animation, but lacks originality. The first edition of his works is that of Salamanca (1798). The idyls and romances included in this edition are not so well known as his poetry, and are of less value.

IGNACIO, ēg-nä'thē-ō, JOSE DE JESU MARIA (1721-80). A German Jesuit, whose secular name was Herman Loessing. He was born in Paderborn, and began his clerical career as professor of rhetoric and philosophy in the College of Old Mexico. While there he became interested in the antiquities of the country, and spent about ten years in collecting them. Returning to the fatherland with his spoils, he became librarian to the Archbishop of Cologne (1768), and published *De Arte Hieroglyphum Mexicanorum* (1774), *Historia Novæ Hispaniæ* (1777), *Reisen in Neu-Spanien* (1778), *Historia Regni Aztecorum* (1780), and *Cosmographia* (1780). He became blind before his death, and after it his notes were incorporated into two works by Chastelard.

IGNA'RO (Lat., I do not know). A character in Spenser's *Faerie Queene*, who answered all questions with "I cannot tell."

IGNATIEFF, īg-nä'tyĕf, NIKOLAI PAVLOVITCH, Count (1832—). A Russian general and diplomat, born in Saint Petersburg, January 29, 1832. He was the son of a favorite officer of the Emperor Nicholas, and was commissioned in the Guards in 1849; he served in the Crimean War, and was made a colonel in 1856, and a major-general in 1858. In the latter year he was made diplomatic attaché to General Muravieff, Governor of East Siberia, and in this capacity negotiated with China the Treaty of Aigun (May 28, 1858), by which Russia came into possession of the region of the Amur. He was subsequently sent on a special mission to Khiva and Bokhara, and as Plenipotentiary to Peking in 1860. He was made Adjutant-General of the Czar in 1863, and was placed at the head of the Asiatic department of the Ministry of Foreign Affairs. In the following year he was sent to Constantinople to represent the Czar at the Court of the Sultan, and he remained in this important

post until the outbreak of the Russo-Turkish war in 1877. He was an active agent in the events of this exciting and critical period, encouraging the restlessness of the Christian peoples of the Balkans, while endeavoring to maintain the Russian influence over the Sultan. In the pursuit of his ends Ignatieff did not hesitate to resort to duplicity and the basest kind of intrigue, and succeeded in gaining the sobriquet of 'Liar Pasha.' Through such means he was quite successful in maintaining the Russian influence during the life of Abdul Aziz, but after the latter's violent death and the deposition of Amurath V. (1876), the anti-Russian influence became predominant with Abdul Hamid, and events moved rapidly toward war. After the conference at Constantinople during the winter of 1876-77, Ignatieff hastened to Berlin, Vienna, and London on diplomatic business. At the close of the war he participated in the negotiations of Adrianople, and was mainly responsible for the Treaty of San Stefano. On account of disagreements with Gortchakoff, he retired from office, but on the accession of Alexander III. (1881) he was recalled and made Minister of the Imperial Domains, and then of the Interior. While holding this office he attained prominence as a persecutor of the Jews. This, as well as his opposition to M. de Giers, led to his retirement a second time, June 21, 1882. He subsequently participated in public affairs only as member of the Council of the Empire and of the Senate. He is a prominent figure in the Pan-Slavic or Nationalist Party.

IGNATIUS, ig-nā'shi-ŭs, SAINT (c.790-878). A patriarch of Constantinople, youngest son of the Emperor Michael I. In 813 the Armenian usurper Leo V. forced him to enter a cloister. From the position of abbot the Empress Theodora raised him to that of Patriarch of Constantinople (847). He had no sympathy with the iconoclasts, and so was in favor with the Empress. On the other hand, he excommunicated her brother Bardas, who made him one of his first victims when he took the reins of government for the young Michael III. (857). Ignatius refused to abdicate, until forced to do so in 866. He was reinstated on the accession of the Emperor Basil in 867. He is still a favorite saint in the Greek Church.

IGNATIUS OF ANTIOCH, SAINT. Bishop of Antioch in the reign of Trajan, and author of seven Greek letters which are included among the works of the Apostolic Fathers (q.v.). Little is known of Ignatius's life. He was born probably not far from the middle of the first century. Syria appears to have been his home. Tradition says that he was a disciple of the Apostle John, which is not impossible. Much less likely is the tradition which makes him the child whom Jesus took in His arms and blessed. There is no reasonable ground for doubting that Ignatius was Bishop of Antioch, but we do not know how long he held that office. The statement of Origen and Eusebius that he was the second Bishop may be accepted. This leaves Peter out of account, and makes Ignatius the successor of Evodius. Respecting the close of his life, we have more definite information. He was condemned to be killed by wild beasts in the arena, and for that purpose was taken to Rome, under guard of ten Roman soldiers. They passed through Asia Minor, stopping here and there, and being received with Christian hospitality by the churches along their route. At Smyrna Ignatius wrote letters to the churches of Ephesus, Magnesia, Tralles, and Rome. Further on, at Troas, he wrote to the Philadelphians, the Smyrnæans, and to Polycarp, Bishop of Smyrna. He then was led to Rome, where he suffered martyrdom, probably at some time between 107 and 117 A.D. The most definite early statements point to the tenth year of Trajan, which would be 107-108. It was believed, at a considerably later time, that his remains were carried to Antioch for burial.

The extant *Martyr Acts* of Ignatius are not authentic. Long and bitter controversy has raged over the epistles which bear his name. They are extant in several different versions, especially three: (1) *The longer Greek*, containing thirteen epistles; (2) *the shorter Greek*, containing seven epistles; (3) *the Syriac*, containing only three epistles. The critical question is, Which form, if any, is the genuine one? Opinions have varied widely. It has been held (a) that all the recensions are spurious; (b) that the shorter Greek form alone is genuine; (c) that the Syriac alone is genuine; (d) that, of the shorter Greek form, all the epistles except Romans are genuine; and (e) that Romans only is a genuine epistle. The best modern criticism holds to the authenticity of the seven epistles in the shorter Greek form. There is almost contemporary witness borne to the Ignatian letters in the Epistle of Polycarp to the Philippians (see POLYCARP).

Accepting these seven as genuine letters of Ignatius, we learn to know their author as a fervent, enthusiastic Christian bishop, of intense zeal for martyrdom. He constantly insists on maintaining allegiance and obedience to the bishop, who is the centre of unity. It is evident that the monarchical episcopate, i.e. the system of having one bishop over each church, had already been developed in Syria and other portions of the East, whatever may have been the case elsewhere. The heresy against which Ignatius warns is chiefly docetism (q.v.), for he declares that Christ suffered in fact, not merely in appearance. He also warns against Judaizing heresies. From the doctrinal point of view, Ignatius is highly important, standing as he does in the line of catholic development which passes from Paul and John, through Ignatius and Irenæus, to the full-grown Nicene theology. It is in his letter to the Christians of Smyrna that we meet for the first time with the phrase 'the Catholic Church.' It does not, however, bear its later, technical sense of the exclusive orthodox Church, but its earlier, etymological meaning of 'the universal Church.' We owe to Ignatius the application of the term 'eucharist' to the Lord's Supper. But above all else, his epistles bear witness to the earnest, devoted spirit of early second-century Christianity, and to the vitality of faith in the age succeeding that of the Apostles.

For the best edition of Ignatius, consult: Lightfoot, *The Apostolic Fathers: Part II., S. Ignatius and S. Polycarp* (London, 1889), with English translation. Text and translation are also found in the small edition of Lightfoot, *Apostolic Fathers*, by Harmer (London, 1893); English translation alone in the *Ante-Nicene Fathers*, edited by Roberts and Donaldson, vol. i. (Buffalo, 1886). In general, consult: Crutt-

well, *Literary History of Early Christianity* (London, 1893); Harnack, *Chronologie der altchristlichen Litteratur* (Leipzig, 1897); Von der Goltz, *Ignatius von Antiochien* (Leipzig, 1894); Smith and Wace, *Dictionary of Christian Biography*, article "Saint Ignatius."

IGNATIUS OF LOYOLA, lō-yō'lȧ, SAINT (1491 or 1495-1556). The founder of the Jesuits. Iñigo Lopez de Recalde was the youngest of thirteen children, of a noble family. Until recently he was said to have been born on Christmas night, 1491, but the Bollandists and Polanco are authority for the change to 1495. He was born in the ancestral Castle of Loyola, near Azpeitia, in the Basque Provinces, not far from the French frontier. At fourteen, after a scanty education, he became a page at the Court of Ferdinand the Catholic. Court life grew distasteful after some years, however, and he became a soldier under his relative, the Duke of Najera, in 1517. He fought bravely against the Navarrese, the Moors, the Portuguese, and the French. He had reached the rank of captain when, while directing the defense of Pamplona against the French in the war between Francis I. and Charles V., he was wounded severely, May 20, 1521. He was taken prisoner and conveyed to the Castle of Loyola. As a result of the wound, one leg was badly deformed. This would have been very unsightly in the fashionable hose of the day, and he bade the surgeon reduce the deformity at any cost. The leg was rebroken and he bore the operation and consequent suffering without complaint. His convalescence was prolonged, and time hung heavily on his hands. He asked for some romances of knight-errantry then popular, but there were none in the castle. Instead they brought him a translation of Ludolf of Saxony's life of Christ, and some lives of the Saints. Ignatius's life as a soldier had been far from a model. Polanco says: "Up to the age of twenty-six his life had been divided between the love of women and sports, and quarrels over points of honor." For want of anything better to do, however, he read and reread these pious books. The spiritual achievements of Saint Francis and Saint Dominic came to replace the deeds of his knightly heroes in his imagination. As soon as he was able, in the garb of a beggar he went to the shrine of the Virgin at Montserrat, where after a confession of his whole life on the vigil of the Annunciation, March 24, 1522, he hung up his arms as a votive offering and a symbol of his renunciation of his military career and of his entire devotion henceforth to the spiritual warfare. Then, barefoot, he went to the neighboring town of Manresa and served the sick and poor in the hospital. He lived in a cave, and his austerity finally impaired his health, though it was at this time that his *Spiritual Exercises*, from which he drew great spiritual strength, took form in his mind. After this he went on a pilgrimage to the Holy Land, and would have stayed at Jerusalem to spread the gospel among the infidels, but was discouraged by the local authorities. He returned to Barcelona in 1524. Realizing now that to do good he must have more knowledge, he began, at the age of thirty-three, the rudiments of grammar in a public school beside boys. After two years he went to the new University of Alcalá and later to Salamanca. Because of public religious teaching with what was thought insufficient education, he incurred the censure of ecclesiastical authorities at both places. In 1528 he repaired to Paris to continue his studies. He was robbed by a companion and had to lodge in a hospital, where he did menial work for his support while attending the university. During his summer vacations he visited Spanish merchants in Antwerp, Bruges, and London so as to obtain money to continue his studies. During his student years he had no resources but the charity of the faithful. At Paris he formed, with chosen companions, a pious confraternity, out of which developed later the Society of Jesus. (See JESUITS.) Ignatius's genius for knowing men can be inferred from the fact that of his earliest companions chosen thus at the University of Paris, one became later the great Apostle of the Indies, Francis Xavier, and three, Lainez, Salmeron, and Lejay, became the leading theological advisers to the Council of Trent. One of the others, Faber, received the honors of beatification from the Church. In the crypt of the Church of the Martyrs, on Montmartre, on the Feast of the Assumption, August 15, 1534, the little band took their vows as Jesuits. At first their intention was to evangelize Palestine. They made their way to Venice for this purpose, but the war between the Christians and the Turks closed the way to the Holy Land, so they resolved to offer themselves to the Pope for any service he might assign. Paul III. received them with great kindness. The pulpits of various churches were assigned to them, and their burning discourses and saintly lives soon attracted attention. No other of them was so effective as Ignatius himself, who spoke as the plain, blunt, but intensely earnest, soldier. In 1539 Ignatius asked for Papal approbation of his Order. In spite of opposition to the erection of another religious Order in the Church, the Pope read the draft of the Constitutions, and said: "The finger of God is here." While occupied with his constantly growing society, Ignatius found much to do besides its direction and the writings of the Constitutions. Though a Spaniard, he devoted himself to the care of the Jewish converts, and secured the correction of many abuses in the treatment of those who wished to remain orthodox Jews. He founded a house for fallen women, and was not ashamed to be seen conducting them to it through the streets. He tried to prevent the occasions of their fall by providing a home for friendless girls. He established orphan asylums for boys and girls. The influence he acquired can be understood from the fact that he was able to end a dispute between the Pope and John III. of Portugal that threatened serious harm to religion at the moment, and another between the citizens of Tivoli and their ruler, Margaret of Austria.

His writings consist only of the Constitutions and rules of the Society of Jesus, his Letters, and the *Exercitia Spiritualia*. This last little book of scarcely a hundred duodecimo pages has proved one of the most influential works ever written. From the very beginning it formed the basis of the spiritual training of the Jesuits themselves, and the mold in which their retreats and missions to the people were cast. It has come to be the acknowledged model after which the missions and retreats given by most of the other religious Orders of the Roman Catholic Church are conducted. Three things

vice of Jesus Christ, placed above all that the kings of the earth can offer; the discernment of spirits; and finally the choice of a state of life. It was this book that accomplished the reforms the Jesuits effected. The Constitutions of the Jesuits are entirely the expressions of Ignatius's ideas. They have been but slightly modified, never in any essential, by successive General Congregations. Great writers have called them one of the world's works of genius. It is often said that Ignatius founded the Jesuits to counteract the effects of the German Reformation, but there is good authority for believing that when Ignatius conceived the idea of his Order he had not even heard the name of Luther. Even more than a decade later, he seems to have paid little heed to the religious movements in Europe, especially in Germany. One year before his death in 1555 the society comprised eight provinces, divided as follows: Italy, two; Spain, three; Portugal, one; Brazil, one; India and Japan, one. In Germany there were but two residences—Cologne and Vienna. He died in Rome, July 31, 1556. He was beatified in 1609 and canonized in 1622.

Consult: Ribadeneira, *Vita Ignatii Loiolæ Soc. Jesu Fundatoris* (Naples, 1572; best recent edition, Barcelona, 1885), translated into most modern languages. For Ignatius's life as General of the Jesuits, his letters, *Cartas de San Ignacio de Loyola* (Madrid, 1874), are the authoritative sources of information. Ignatius dictated some autobiographical notes called the *Acta*, which must form the basis of an appreciation of the man himself. There are several English editions of this: *Autobiography of St. Ignatius* (ed. O'Conor, S. J., New York, 1900), and Rix, *The Testament of Ignatius Loyola* (Saint Louis, 1900). Of recent lives the most authoritative are: Clair, *La vie de Saint Ignace de Loyola* (Paris, 1891); in English, Stewart Rose (the Duchess of Buccleuch), *St. Ignatius of Loyola and the Early Jesuits* (New York, 1891); an excellent study of Ignatius the man, Joly, *Saint Ignatius of Loyola* (New York, 1899). In the *Monumenta Historica Societatis Jesu* (Madrid, 1894) there is a hitherto unissued life of Ignatius by Polanco, who was a close personal friend. Consult, also, Hughes, *Loyola and the Educational System of the Jesuits* (Great Educators Series, New York, 1892).

IGNATIUS'S BEAN, Saint. See Saint Ignatius's Bean.

IGNEOUS ROCKS (Lat. *igneus*, fiery, from *ignis*, Skt. *agni*, fire). Rocks produced as the result of solidification from a molten condition. Such rocks include lavas which have been poured out upon the earth's surface; the fillings of the fissures, pipes, and other passages in the earth's crust through which molten material was conducted during its rise to or toward the surface; and the larger masses which consolidated at great depths. The agents of decomposition and disintegration of rock material and those of transportation and degradation necessarily expose to view these several types of igneous rocks, each of which possesses certain general and distinguishing characteristics. The most noteworthy general characteristic of the igneous rocks, when unmetamorphosed, is a massive structure without lamination or bedding, such as is characteristic of the sedimentary or clastic rocks on the one hand; or schistose structure, such as is developed in the metamorphic rocks. Inasmuch, however, as it has been shown that many *metamorphic rocks* (q.v.) have been formed from igneous rocks, it is clear that no sharp line can be drawn to separate these classes on the basis of structure, although in the main the above distinction applies.

Prominent among the textures characteristic of the igneous rocks are the granitic, the porphyritic, and the vitreous or glassy. The granitic texture is crystalline throughout and consists of an interlocking mosaic of the different mineral constituents, the nearly uniform size of the grains indicating that the process of consolidation was essentially an uninterrupted one, and that practically the same conditions obtained during all stages of the process. In this mosaic the mineral constituents which first separated from the magma have more or less perfect crystal outlines, whereas those of later separation have irregular boundaries because sufficient space was not available in which to build out their crystal faces. The porphyritic texture, which is the next most common among the igneous rocks, has crystals of one or more of the mineral constituents of the rock imbedded in a base or ground mass of smaller crystals, or of rock glass. The crystals imbedded in the ground mass are known as porphyritic crystals or phenocrysts. It is generally supposed that the phenocrysts were crystallized out of the magma in a stage of the process of consolidation earlier than that which produced the ground mass of the rock, and as most igneous rocks of porphyritic texture have been formed either at the surface of the earth or at quite moderate depths below it, it is supposed that the phenocrysts were formed at considerable depths before the magma rose to or near the surface. In the lavas that flow from Vesuvius, or from most other volcanoes, the phenocrysts may be picked out of the still molten lava as it flows from the volcano. The vitreous or glassy texture is one of comparatively infrequent occurrence, but is represented by obsidian (q.v.) and pitchstone. It is now generally recognized that many igneous rocks which have an entirely crystalline texture were once largely composed of rock glass, which has devitrified through processes of chemical alteration and crystallization.

In addition to the above textures characteristic of igneous rocks and dependent upon the state of crystallization of the rock substance, there are many others. One of the most common observed in lava (q.v.) is a peculiar crumpled lamination of the rock caused by the arrangement of mineral constituents of unequal dimensions with their longer axes parallel to the crumpled lines of the texture. This fluxion texture is conditioned by the flow of the lava, the crumpled lines indicating the direction of flow. Other textures, as the amygdaloidal, scoriaceous, and pumiceous, which indicate different grades of cellular or porous texture, are conditioned by the steam once held in the lava and the opportunities for expansion and escape of this steam as the lava approached the surface of the earth.

In chemical composition the igneous rocks show wide variation, though limits are set by the laws of formation of magmas. No such limits are set for the clastic rocks. By processes of alteration the igneous rocks change into the metamorphic

IGNATIUS LOYOLA
AFTER A PAINTING BY RUBENS

rocks (as do also the clastic rocks), so that no sharp line can be drawn to separate these great divisions.

Great difficulties arise in the systematic classification of igneous rocks, by reason of the many ways in which it is possible to describe them, and the varying importance which is attached to each method; hence great difference of opinion exists among petrographers as to the best scheme to be adopted. On the Continent of Europe, and especially in Germany, the manner of occurrence of a rock, whether as a boss or batholite (q.v.), as a dike (q.v.), or as a sheet or flow, is given the first importance; and the age of the rock, once considered paramount, still retains its importance in the secondary classification. In America opinion seems to favor as bases of classification the chemical composition, the texture, and the mineral composition; but the future must be awaited before any classification free from serious objections is likely to be adopted. The almost hopeless confusion of the schemes now in use is generally recognized. The reader is referred to the following works, in which are given detailed descriptions of igenous rocks. Consult: Kemp, *Handbook of Rocks* (New York, 1896); Rosenbusch, *Mikroskopische Physiographie der Mineralien und Gesteine* (Stuttgart, 1896); Zirkel, *Lehrbuch der Petrographie* (Leipzig, 1894); Teall, *British Petrography* (London, 1888). See GEOLOGY.

IG'NIS FATUUS, fāt'ū-ŭs (Lat., vain fire). A luminous appearance frequently seen in marshy places, in churchyards, and over stagnant pools. It generally appears a little after sunset as a pale, bluish-colored flame, varying in size and shape; sometimes it shines steadily till morning, at other times disappears, and reappears within about half-hourly intervals. It floats in air at about two feet from the ground, is sometimes fixed, and sometimes travels with great rapidity. Many efforts have been made to discover its cause; but so varied are its appearances and so void of any common principle, that these attempts have totally failed. Two of the various explanations offered may be mentioned here. The first is that the ignis fatuus is due to phosphureted hydrogen gas (PH_3), which possesses the property of igniting when it comes in contact with dry atmospheric air; the gas would be generated by the decomposition of animal matter present in a marshy soil. The second is that it is due to the combustion of methane, or marsh-gas, CH_4, produced by the decomposition of vegetable matter; but though this supposition satisfactorily accounts for many appearances connected with the ignis fatuus, the gas itself is not spontaneously combustible, and an additional supposition requires to be made to account for its ignition. The probable conclusion is that a number of phenomena, apparently similar, but arising from different causes, are aggregated under the term ignis fatuus.

The appearance of ignis fatuus is not a common phenomenon, and many distinguished naturalists who desired to investigate it have never succeeded in finding it; but it is not unfrequently seen in the north of Germany, the swamp and moorland districts in the south and northwest of England, and in the lowlands of Scotland. It is seen in the above places from the middle of autumn till the beginning of November. In former times the ignis fatuus, under the names of Will-o'-the-Wisp, Jack-a-lantern, Spunkie, etc., was an object of superstition among the inhabitants of the districts where it appears, and was believed to be due to the agency of evil spirits attempting to lure travelers to their destruction.

IGNORANCE OF THE LAW. One of the important maxims of the common law is *ignorance of the law excuses no one.* It is not, however, an aphorism of universal application, nor is it to be pressed into the service of injustice; neither does it warrant the presumption that every one knows the law. There is no such presumption. It would be contrary to common sense and reason. Yet the rule that ignorance of law shall not serve as an excuse for illegal acts or omissions is common to all systems of law, and is not only expedient, but necessary.

The maxim is of prime importance in criminal law, yet here it has real or apparent exceptions. If a person is indicted for larceny he may show that he honestly believed the property to be his own, although it appeared that this belief was due to his ignorance of a rule of law which vested the property in another. This results, however, from the fact that he does not commit the crime of larceny unless he intended to appropriate another person's property to his own use. Had the indicted person been sued for conversion by the true owner, his ignorance of the law would have been no excuse. In the civil action for conversion his motive, or intention, or belief in taking would be immaterial. One who takes and uses property as his own acts at his peril. So if a person enters into an honest and fair contract he cannot, except in certain cases of fraud or deceit (q.v.), absolve himself from its obligation by showing that he would not thus have contracted had he known the rule of law applicable to the transaction.

In general it may also be said that a person who has paid money in ignorance of the law cannot recover it in a quasi-contract action. This means that no man will be permitted to exempt himself from a duty, or shelter himself from the consequences of infringing a prohibition imposed by law, or acquire an advantage in opposition to the legal rights and interests of another by pretending error or ignorance of law. See MISTAKE; QUASI-CONTRACT; and the authorities there cited.

IG'NORAN'TINES (from Lat. *ignorare*, to be ignorant). A religious congregation of men in the Roman Catholic Church, associated for the gratuitous instruction of poor children in sacred as well as secular learning. See SCHOOLS, BROTHERS OF CHRISTIAN.

IGORROTE, ē'gōr-rō'tā. A warlike people of mixed Malay-Mongoloid blood, speaking several dialects; chiefly in Benguet Province, Luzon. Also any wild Filipinos of Malay blood. Variants, Ygolot, Ygulut, etc. See PHILIPPINE ISLANDS.

IGOR'S (ē'gōrz) BAND, SONG OF (Russ. *Slovo o polku Igorevē*). The only Russian poetical monument, dating from the twelfth century. It recites the unfortunate outcome of the expedition (1185) of Igor, Prince of Novgorod-Syeversk, into the country of the Polovtsy in Southern Russia. The Prince was defeated and taken prisoner, but later he escaped with the help of a slave. The poetic gems of the song are the lyric passages depicting the grief of Nature over the Prince's capture; the lament of Yaroslavona, hi-

consort, on hearing of his fate; and the escape of Igor. The original manuscript, discovered by Musin-Pushkin and published in 1800, was destroyed in the Moscow fire of 1812. The editing was very poor, and another copy found in 1864 among Catharine II.'s papers is hardly more satisfactory. It has been an object of bitter controversy, and a vast literature on the subject has grown up. A translation by Wolfsohn in *Schönwissenschaftliche Litteratur der Russen* (Leipzig, 1843), and one with introduction and notes by Paucker (Berlin, 1884), are very good.

IGRAINE, ē-grān'. See IGERNA.

IGUALADA, ē'gwä-lä'dä. A city in the Province of Barcelona, Spain, situated on the river Noya, in a mountainous but fertile district, 46 miles by rail northwest of Barcelona (Map: Spain, F 2). It was formerly a fortified town, but its walls are now in ruins. It has manufactures of cotton, linen, and other textiles. Population, in 1900, 10,476.

IGUANA, ig-wä'nä (Sp., from the Haitian name, *igoana, iuana, yuana*). A genus of tropical American lizards, representing the family Iguanidæ, of which there are about 55 genera and

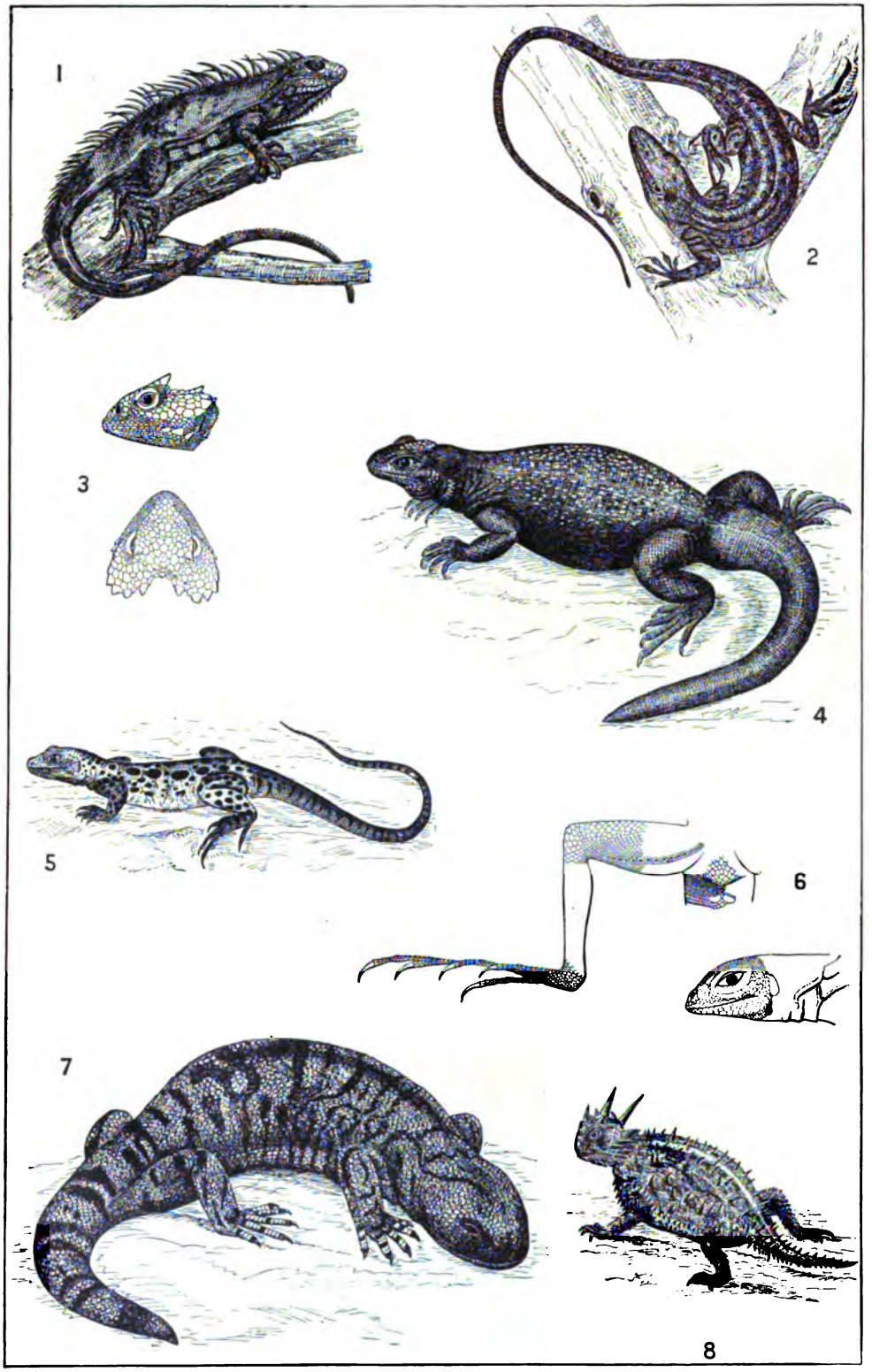
TEETH OF AN IGUANA.

235 or more species. In external and internal structure iguanas closely resemble the Agamidæ of the Old World and are distinguished mainly by the pleurodont dentition. The tongue is thick and villous. All the North American forms possess femoral pores, but few of the South American species have them. In habits also the Iguanidæ closely resemble the Agamidæ, save that there are no flying forms to correspond with the flying dragon of the Agamidæ, while in America some of the iguanas, such as Anolis, have digital expansions, and others are semi-marine, neither of which conditions is met with in the Old World family. The family contains several of the largest lizards. Most of the species are arboreal, but some of them live on the surface of the sand and stones of the desert, and have a depressed form. Several species live wholly, or almost wholly, on vegetable food—the blossoms and leaves of plants. For this reason the flesh of several of them, especially of the genus Iguana, is very palatable, is sought by the natives of Central and South America as food, and is sold in their markets in considerable quantity. One of the species most eaten is *Iguana tuberculata*, a repulsive looking lizard, with a high, dorsal, fringed ridge, and a large dewlap (see Plate). It basks on the limbs of trees during the warm hours, and while thus situated seems rather indifferent to the approach of man. It is fond of music, and of having the body stroked. The natives take advantage of these facts, and whistle a lively tune as they approach, and when near enough stroke the sides of the iguana with a stick until they succeed in getting a noose over its head. (Consult Belt, *Naturalist in Nicaragua*, London, 1888.) The natives also dig them out of their burrows or chase them into trees with dogs trained for the purpose. On the Galapagos Islands there is a semi-aquatic genus, Amblyrhynchus, whose species feed on seaweeds along shore. This lizard is described in detail by Darwin, in chapter 5 of his *Naturalist's Voyage* (London, 1860). There are other species of the same genus that live for months without water by feeding on the succulent cactus. The great iguana of Jamaica, with the prominent serrate crest, is *Cyclura lophoma*. In the Southwestern United States, from western Kansas to southern California and Mexico, dwell several genera of green, dark gray, or brown iguanid lizards, such as Uta, Holbrookia (qq.v.), Ctenosaura, and Crotaphytus. (See COLLARED LIZARD.) The large genus Sceloporus (see ALLIGATOR LIZARD) ranges not only over the western and central part of the United States, but in all the Eastern and Gulf States as far north as New Jersey and Indiana. Another widely distributed genus, Anolis, has two representatives in the South Atlantic States, popularly called 'chameleons.' (See ANOLIS.) These lizards possess mimicry of color in a remarkable degree, and have a considerable power of changing their color. They are insectivorous, and the wanton destruction of them is much to be deplored, for in their native habitats they are of considerable economic importance to agriculture. To this family belongs also the basiliak of Central and South America, so named on account of its fancied resemblance to the creature of fable. (See BASILISK.) It is a large, harmless lizard, found no further north than Southern Mexico. The family also includes those peculiar, spiny, short-tailed, flattened lizards, known as 'horned toads' (q.v.).

Consult: Boulenger, *Catalogue of Lizards of the British Museum* (London, 1885); Cope, *Crocodilians, Lizards, and Snakes* (Smithsonian Institution, Washington, 1900); Stejneger, *Death Valley Expedition* (Department of Agriculture, Washington, 1893); Kingsley (editor), *Standard Natural History*, vol. iii. (Boston, 1885); Gadow, *Amphibia and Reptiles* (New York, 1901). See LIZARD.

IGUANODON, ig-wän'ō-dŏn (Neo-Lat., from Eng. *iguana* + Gk. *ὀδούς, odous*, tooth). A genus of ornithopod dinosaurs, found fossil in Jurassic and Lower Cretaceous rocks of Europe. Iguanodon is perhaps the first dinosaur brought to light, for it was described by Mantell in 1825 from specimens found in Kent, England. The animal was 15 to 25 feet long; the head was large and narrow, the jaws heavy and furnished with numerous teeth of peculiar form that resemble those of the modern American lizard iguana. The anterior portions of the jaws are provided with strong, horny beaks like those of turtles. The fore limbs have four toes and a 'spur,' and are much shorter than the heavy three-toed hind limbs. The pelvis is elongated, and the tail heavy, and there is a ridge of strong vertebral spines extending along the dorsal surface from the neck to the middle of the tail. All the bones are hollow. Iguanodon was an herbivorous dinosaur that walked on its hind legs, and sat on a tripod formed by the hind legs and tail, after the manner of the kangaroo. It lived in great numbers in the swampy regions of England and Belgium, and other parts of Europe during Jurassic time, as indicated by the mode of occurrence of its fossil skeletons, twenty-nine of which were found at one time in Upper Jurassic sandstones of the coal regions at Bernissart, Belgium.

IGUANAS AND OTHER AMERICAN LIZARDS



1. IGUANA (Iguana tuberculata).
2. GREEN LIZARD (Anolis principalis).
3. NORTHERN HORNED TOAD (Phyrnosoma Douglassi); top of head and profile.
4. CHUCKWALLA (Sauromalus ater).
5. LEOPARD LIZARD (Crotaphytus Wislizeni).
6. DESERT LIZARD (Callisaurus draconoides); head and hind limb.
7. GILA MONSTER (Heloderma horridum).
8. COMMON HORNED TOAD (Phrynosoma cornutum).

Iguanodon has not been found in the Mesozoics of America, where it is represented by similar genera Camptosaurus, Laosaurus, and Thespesius. A very instructive account of the discovery and early history of Iguanodon, illustrating the method by which fragmentary material has after careful work yielded valuable results, is to be found in Mantell's *Petrifactions and Their Teachings* (London, 1851). See also Woodward, *Outlines of Vertebrate Palæontology for Students of Zoölogy* (Cambridge, 1898). See CAMPTOSAURUS; DINOSAURIA.

IHLANG-IHLANG, ē-lăng'-ē-lăng' (Malay, flower of flowers). A strong and rich perfume from a Malayan tree (*Cananga odorata*) of the custard-apple family (*Anoneæ*). The perfume is distilled from a volatile oil yielded by the flowers.

I. H. N. CLUBS. See LEND-A-HAND CLUBS.

IHNE, ē'ne, WILHELM (1821-1902). A German historian, born at Fürth, and educated at Bonn (1839-43). He was private tutor in England (1843-47), and returned to Liverpool, where he had charge of a school (1849-63), after two years' teaching at Elberfeld. In 1863 he went to Heidelberg, where he was made professor in 1873. He wrote: *Quæstiones Terentianæ* (1843); *Researches into the History of the Roman Constitution* (1853); *Plea for the Emperor Tiberius* (1856); a *History of Rome* (1871-82), of which the German edition was published later, and is partly the work of Zumpt, and *Early Rome* (1876).

IHRE, ē're, JOHAN (1707-80). A Swedish scholar of Scottish extraction. He was born at Lund, and educated at the University of Upsala, where he acquired a great reputation, and carried off the highest honors. He subsequently traveled in France and England, was appointed under-librarian to the Academy of Sciences on his return to Sweden, and rose through a variety of offices to be professor of belles-lettres and political economy (1748). Ihre's principal work is his *Glossarium Suiogothicum* (1769), which may be regarded as the foundation of Swedish philology. It was published at the cost of the State, which gave Ihre $10,000 to execute it. His numerous academical disputations, amounting to upward of 450, are still valuable, especially those on the Mœso-Gothic version of the Gospels by Ulfilas.

I. H. S. See ABBREVIATIONS.

II KAMON NO KAMI, ē-ē kä'môn nō kä'mē, or II NAOSUKÉ, Baron (1815-61). The Japanese statesman whose wise and vigorous statesmanship led to the opening of Japan to foreign nations, and the establishment of friendly relations with them. He was the fourteenth son of Baron Ii, of Hikone on Lake Biwa, and was born of a line of ancestors known honorably in the tenth century. At twenty-one, Ii went to Yedo, and had his mansion within the inclosure of Yedo Castle at Sakurada, or Cherry Field. In 1850 he was made heir to the baronetcy, assuming the highly honorable title of Kamon no Kami, which gave him standing at the Mikado's court. In 1853 the question of foreign intercourse, precipated by Commodore Perry, divided the opinions of the daimios. Although he shared with many a feeling of hatred toward foreigners, Ii drew a line of distinction between personal feelings and national interests, and declared himself to be in favor of intercourse with foreigners, and of a revival of the military spirit for national defense. The Shogun Iycsada being childless and in poor health, the question of appointing an heir added to the complication of the period. Pressed by Townsend Harris (q.v.) to sign the treaty which he had negotiated, and which the Court in Kioto opposed, the Shogun had to face a crisis which admitted of no delay. On June 4, 1858, two days after the Mikado's refusal to approve the treaty, the Shogun appointed Ii to be Tairo or Regent, and on the 5th he was publicly installed, as the virtual ruler of Japan, but acting in the name of the Shogun. The Shogun Iycsada died suddenly August 15th, leaving no heirs. Carrying out his master's wishes, Ii appointed Kikuchiyo, who subsequently took the name of Iyémochi, the Prince of Kishiu, then a child of twelve, to be his successor, and, taking the responsibility, in view of the rapid approach of the squadrons of the Russians, British, and French after their victorious campaign in China, he signed the liberal treaty drawn up by the United States Minister. The treaty with Great Britain followed on August 26th and that with France on October 9th.

The great daimios of Mito, Owari, and Echizen, however, opposed His nominee to the shogunate, the two former daimios wishing also to have Echizen made regent. On the outbreak of the long-gathering storm of opposition, Ii crushed his enemies with a strong hand, and dispatched an embassy to the United States to ratify the treaty. Among other triumphs he had the Princess Kazu, aunt of the present Emperor, betrothed in marriage to the young Shogun, and they were married in Yedo in 1861. Before this, on the 23d of March, 1861, a snowy day, while on his way in his palanquin with a large following of bodyguards to the palace in Yedo, they were attacked by a band of eighteen assassins, seventeen from Mito, one from Satsuma, all of them Ronins (q.v.). In the fight which ensued Baron Ii himself was stabbed, and his head cut off and carried away to the castle town of Mito, and there exposed on a pole. For years the name Ii rested under a cloud, but it has been cleansed by Shimada Saburo in his book *Kai Koku Shimatsü* ("Opening of the Country, Beginning and End"), which has been translated into English under the title of *Agitated Japan* (1896). The man and the episode of his assassination have given rise to a considerable body of native literature, and the episode is treated in fiction by A. C. Maclay in *Mito Yashiki* (3d ed., 1899).

IIWI, ē-ē'vē. The English spelling by many voyagers of the name of a Hawaiian bird, otherwise known as 'mamo' (q.v.), whose scarlet plumage was used for the native feather cloaks.

IKAO, ē-kä'ō. A famous summer resort of Japan, situated in the Province of Katsuke, about 20 miles by rail from Takasaki, and 88 miles from Tokio. It is built on the slopes of the Haruna Mountain, and is celebrated for the picturesqueness of its situation as much as for its two hot springs and rich vegetation. The mineral springs have a temperature of 113° F., and contain iron and sulphate of soda.

IK MAR'VEL. See MITCHELL, DONALD GRANT.

IKUNO, ē-kōō'nō. A mining town of Japan, situated at an altitude of 1200 feet, in the prefecture of Hiogo, about 35 miles northwest of Kobe, and 31 miles by rail from Himeji. Its

silver-mines, the second largest in Japan, are run by the Government. Over 1500 persons are employed, and the mines are worked day and night. Besides silver they also yield gold. Population, estimated at 3000.

ILAGAN, ē-lä'gän. The capital of the Province of Isabela in Luzon, Philippines (Map: Luzon, F 2). It is situated in the centre of the province at the confluence of several streams, about 330 miles northeast of Manila, and is one of the principal centres of the tobacco industry. Population, in 1898, over 13,800.

ILANO, ē-lä'nō, or **ILLANO**. A Moro tribe on Illano Bay, Southern Mindanao. See PHILIPPINE ISLANDS.

ILCHI, ēl'chē'. A city of the Chinese Empire. See KHOTAN.

ÎLE-DE-FRANCE, ēl-de-fräns. The former name of Mauritius (q.v.), an island in the Indian Ocean.

ÎLE-DE-FRANCE. One of the old provinces of France, having Paris as its capital, and now mostly comprised in the departments of Seine, Seine-et-Oise, Seine-et-Marne, Aisne, and Oise. During the last century of the Carolingian dynasty, the Ile-de-France was possessed by a race of powerful nobles who took the title of Dukes of France. One of the ablest of these was Hugo or Hugues, surnamed Le Blanc, or Le Grand, who for twenty years previous to his death (956) virtually wielded the sovereign power under the Carolingian kings Louis IV. and Lothair. His son Hugh Capet eventually became the actual sovereign. See CAPETIAN DYNASTY.

ILEO-CÆCAL (il'ē-ō-sē'kal) **VALVE.** A valvular constriction that guards the passage between the large and the small intestine, at the opening of the cæcum. It consists of a double fold of mucous membrane, and is present in all mammals except certain carnivors.

IL'EUM. See INTESTINE.

IL'EUS (Neo-Lat., from Lat. *ileos*, Gk. *εἰλεός, eileos*, ἰλεός, *ileos*, severe colic, from *εἰλεῖν, eilein*, to roll up; connected with Lat. *volvere*, to roll, Eng. *wallow*). A severe colic, due to intestinal obstruction. Its symptoms are pain, nausea, and vomiting—which latter may contain feculent matter—rapid and feeble heart, and collapse. The obstruction may relieve itself, or if of mechanical origin, it may require operative interference to save life.

I'LEX (Lat., holm-oak). A tree often named in the Latin classics, the evergreen oak or holm-oak (*Quercus Ilex*). It is a native of most parts of the south of Europe, and of the north of Africa, and often attains large dimensions. Its leaves are ovate-oblong, acute, leathery, hoary beneath; but they vary much in some respects, from the size of a sloe-leaf to that of a beech, and from being very spiny at the edge to perfect evenness. Its wood is very hard and heavy, tough, durable, and useful, particularly for axles, pulleys, screws, and whatever is to be subjected to much friction. The acorns are of various quality, sometimes bitter, and sometimes sweet and eatable. In modern botany Ilex is the generic name of the holly (q.v.).

ILFORD, il'fērd. A town in Essex, England, five miles southwest of Romford (Map: London, D 9). Its modern growth and importance are due to the photographic industry, the establishment of dry-plate works, and a paper-mill. The erection also of the London County Council's Claybury Hall Lunatic Asylum, holding 2000 persons, has been instrumental in adding to the population. The twelfth-century chapel of a mediæval hospital is of archæological interest. The British Museum contains fossil remains of mammoths discovered here. Population, in 1891, 10,900; in 1901, 41,250.

ILFRACOMBE, il'frā-kōōm. A market-town, seaport, and watering-place on the north coast of Devon, England, finely situated amid picturesque irregular hills, on an inlet of the British Channel, 11 miles northwest of Barnstaple (Map: England, B 5). The harbor is formed by ramparts of rock, and furnished with a lighthouse and a pier. It has excellent bathing facilities which, with its fine air, make it a popular summer resort. Fishing and an active coasting trade are carried on. It is an old town, and in the fourteenth century was of considerable commercial importance. Population, in 1891, 7692; in 1901, 8600.

ILGEN, ēl'gen, KARL DAVID (1763-1834). A German philologist and educator, born at Burgholzhausen in Saxony, and educated at Leipzig. In 1789 he became rector of the gymnasium at Naumburg; in 1794 professor of Oriental languages at Jena; and in 1802 rector of the Landesschule at Pforta, where he labored with conspicuous success for nearly thirty years. His main works are: *De Jobi Natura atque Virtutibus* (1788); *Urkunden des ersten Buches Mosis in ihrer Urgestalt* (1798); *Die Geschichte Tobis nach drei verschiedenen Originalen übersetzt* (1800); *Hymni Homerici* (1796); *Scolia Græcorum* (1798); *Opuscula Varia Philologica* (1797); and *Animadversiones ad Vergilii Copam* (1820). Consult Naumann, *Ilgeniana* (Leipzig, 1853).

ILI, ē'lē'. A river which rises, under the name of Tekes, in the Thian-Shan Mountains, on the borders of the Russian and Chinese empires, not far from Lake Issyk-kul, flows at first in a northeasterly and then in a westerly direction, passing the town of Kuldja, and falls into Lake Balkhash in the Russian Central Asiatic Province of Semirietchensk (Map: Asia, G 4). It is about 800 miles long, and is navigable from Kuldja.

IL'IAC ARTERIES. The two arteries formed by the bifurcation of the abdominal aorta. The aorta (q.v.) divides at its lowest point—which is usually on the left side of the body of the fourth lumbar vertebra—into the two common iliac arteries, which pass downward and outward on each side to the margin of the pelvis for about two and one-half inches, and then divide into the external and internal iliac artery of either side. The external iliac passes obliquely downward and outward to the femoral arch, when it enters the thigh and becomes the femoral artery. The internal iliac is a short vessel, about an inch and a half in length, which divides into an anterior and a posterior trunk. The anterior trunk divides into several branches, which supply the bladder, the rectum, the generative organs, and muscles both within and on the outside of the pelvis, with arterial blood; while the branches of the posterior trunk mainly supply muscles within and on the outside of the pelvis. The importance of the internal iliac artery

in carrying on the circulation in uterine life is noticed in the article FŒTUS.

IL'IAD. See HOMER.

ILIAD OF FRANCE, THE. A name sometimes given to the *Roman de la Rose*.

ILION, ĭl'ĭ-ŏn. A village in Herkimer County, N. Y., 12 miles east-southeast of Utica; on the Mohawk River, the Erie Canal, and the New York Central and Hudson River and the West Shore railroads (Map: New York, E 2). It has a fine public library, with about 11,000 volumes. The manufactures include firearms, typewriters, bicycles, knit goods, and cabinet and filing cases. The water-works and electric-light plants are owned by the municipality. One or two families seem to have moved to the site of Ilion about 1816, but there was properly no village here until about 1828. It was incorporated in 1852. Population, in 1890, 4057; in 1900, 5138.

ILI'ONA (Lat., from Gk. Ἰλιόνη, *Ilionē*). In Greek mythology the wife of Polymnestor, King of Thrace. She was the daughter of Priam and Hecuba, and according to one legend brought up her brother Polydorus, who had been committed to the care of Polymnestor. When the latter, instigated by the Greeks, who wished to exterminate the race of Priam, designed the murder of Polydorus, Iliona substituted his own son, Deipilus, who was put to death instead.

ILI'ONEUS (Lat., from Gk. Ἰλιονεύς). The son of Niobe, killed with all her other children. He was praying, and Apollo would have saved him if the arrow had not already been sent.

ILITHYIA, ĭl'ĭ-thĭ'yȧ (Lat., from Gk. Εἰλείθυια, *Eileithyia*). The Greek goddess who presided over childbirth. The plural form Ilithyiæ is used in the *Iliad*, but elsewhere only one goddess of the name is mentioned.

IL'IUM. See TROY.

ILIUM (Lat., flank). A portion of one of the bones of the pelvis, the os innominatum. In the undeveloped child it is a distinct portion, which afterwards becomes united to the pubis in front and to the ischium behind and below. It is the hip-bone or haunch-bone. See PELVIS.

ILKESTON, ĭl'kĕs-ton. A market-town in Derbyshire, England, 10 miles northeast of Derby, on an eminence in the valley of Erewash (Map: England, E 4). There are manufactures of hosiery and lace, and coal and iron works in the vicinity. The town possesses a valuable medicinal mineral spring and baths. It was known in 1084 as Tilchestune. It obtained a grant for a market and fair in 1251, but was not incorporated before 1887. It owns its gas, water, markets, and cemetery, and maintains a sewage farm. Population, in 1891, 19,744; in 1901, 25,400.

ILKHANS, ĕl-känz'. See MONGOL DYNASTIES.

ILLÆ'NUS (Neo-Lat., from Gk. εἰλεῖν, *eilein*, to roll closely). A fossil trilobite with smooth-surfaced elliptical or rounded carapace, found in the Ordovician and Silurian rocks of most parts of the world. See TRILOBITA.

ILLAMPU, ē-lyäm'pōō. A mountain of the Andes. See SORATA.

ILLA-TICSI, ē'lyȧ tĕk'sē (Quichua, Eternal Light). A name given to the supreme god of the Peruvians, Uiracocha.

ILLE-ET-VILAINE, ēl'ā'vē'lān'. A maritime department in the northwest of France, a portion of the old Province of Brittany, lying between the English Channel and the Department of Loire-Inférieure (Map: France, E 3). Area, 2699 square miles. Population, in 1896, 622,039; in 1901, 613,567. It is watered chiefly by the rivers from which it derives its name—the Vilaine, and its tributary, the Ille. The usual grain crops are raised in sufficient quantity to meet the wants of the population. Flax and hemp are extensively produced, and the cider of this district is esteemed the best produced in the country. Cattle are reared in great numbers, iron-mines are worked, and great varieties of linen and woolen fabrics are manufactured. Rennes is the capital, and Saint-Malo the principal seaport.

ILLEGITIMACY (from Lat. *in-*, not + *legitimus*, legal, from *lex*, law). According to the civil and statute law as found in many States, the status of children born out of wedlock. In England, children born out of wedlock have been held as illegitimate even upon subsequent intermarriage of the parents; also children of the deceased wife's sister have long been considered illegitimate. In Italy, much confusion has arisen as to legitimacy, owing to the strife between Church and State. It has been held that children resulting from marriages which had been solemnized by the Church only were illegitimate, a civil marriage being necessary to give legitimacy to offspring.

In New York the children of a man and woman cohabiting professedly as husband and wife have been held to be legitimate. In France, where informal unions are common, the same rule does not hold. Children of such a union are considered illegitimate. A great variety exists as to theory and practice in different lands, and reference must be made to special treatises on the subject. Illegitimacy has been much discussed from three distinct points of view—the moral, the economic, and the legal.

COUNTRY	1897		1898		1899		1900		Perct. Illegitimate, 1900
	Total births	Illegitimate	Total births	Illegitimate	Total births	Illegitimate	Total births	Illegitimate	
England and Wales	921,693	38,409	923,165	38,333	928,646	37.124	926,304	36,814	4.00
Ireland	106,664	2,802	105,457	2,873	103,900	2,674	101,459	2,702	2.7
Scotland	128,877	8,068	130,861	8,870	130,656	8,448	131,355	8,503	6.5 (1899)
Germany	1,991,126	184,084	2,029,890	185,220	2,045,286	183,504	.....	.....	8.9
France	859,107	75,989	843,933	74,586	847,627	74,970	827,297	73,121	8.8 (1899)
Belgium	190,987	15,885	190,921	15,052	194,268	14,919	.....	.....	7.68
Italy	1,101,848	70,199	1,070,074	67,262	1,068,558	67,262	1,067,376	63,406	6.00
Holland	161,441	4,407	160,765	4,205	163,289	4,290	162,611	4,247	2.6
Sweden	132,999	14,933	136,523	15,641					

For the student of morals and social reformer the causes and effects of illegitimacy form the leading points of observation. That the number of illegitimates justifies consideration, the preceding statistics on the general situation may give sufficient evidence.*

Of all subjects for statistical investigation, illegitimacy presents perhaps the most difficulties, owing to the lack of agreement among different legal authorities as to what constitutes illegitimacy, and to the fact that it is a phenomenon naturally subject to concealment. Complete figures up to date cannot be secured; it appears, however, that in civilized lands children born out of wedlock vary from 3 per cent. to 12 per cent. of all births. In most cases figures on illegitimacy exclude still-births. Of the latter the number equals about one-third of the illegitimates.

Attempts have been made to demonstrate statistically the causes of illegitimacy, but with little success. The study, for instance, of the fecundity of women throws very little light upon it. In Russia, in 1896, the number of births to 10 marriages was 65, while the number of illegitimates was only 31 to 1000 births. During the same period in France there were only 27 births to 10 marriages, with 88 illegitimate births per 1000. In Austria there were 44 births to 10 marriages, and 145 illegitimates per 1000 births, and England showed about 36 births to 10 marriages and 42 illegitimates to 1000. It seems evident that the apparent strong tendency to child-bearing cannot explain the phenomenon.

Equally uncertain is evidence gathered to show that climatic conditions have any large part to play. The following table (for 1896) presents some figures bearing upon the geographic distribution of illegitimacy. The division of cities is roughly made, those in the first column being north of latitude 52° N. and those in the second column south of latitude 49°:

ILLEGITIMATES PER 1000 BIRTHS

NORTHERN		SOUTHERN	
Rotterdam	70	Naples	86
Hamburg	138	Venice	189
Berlin	154	Milan	204
Saint Petersburg	276	Paris	268
Copenhagen	279	Rome	194
Stockholm	396	Vienna	449

As is seen by the table, the difference is scarcely worth considering. It certainly does not corroborate the view that the southern cities are less moral than the northern.

That the degree of illiteracy must exert some influence on the rate of illegitimate births can, perhaps, not be wholly denied. That its influence has been much overestimated seems equally certain. Along with any such general cause must be placed many other factors which complicate the problem. The table in the next column will illustrate this point.

It has long been believed that the moral conditions of the cities are lower than those of rural districts. Increased knowledge of rural conditions has tended to qualify this view. In general, it may be said that the rate of illegitimacy is higher in cities than in the country. This is due to a variety of causes. There is in the city less social restraint, less danger of detection of paternity, and a greater degree of abandonment on the part of the females. In some instances, however, as in Bavaria and in some other Continental countries, the greater freedom of marriage laws and better industrial opportunities in the city render family life more convenient and irregular relations less common than in country districts, where the conditions of holdings hinder marriages. The high degree of illegitimacy is often an indication of certain laws which affect the situation, as, for example, was the case in Bavaria. In former times the laws were extremely unfavorable to marriage, and a high rate of illegitimacy resulted. The rate of illegitimacy was as follows: 1865-69, 20.59 per cent.; 1871-80, 12.86 per cent.; 1887-91, 14.01 per cent. With the passing of more liberal marriage laws and the use of greater industrial freedom the number of marriages rapidly rose, and a corresponding fall in the number of illegitimates took place. The number of marriages increased in the period from 1840-70 from 65 per 10,000 population to 81 per 10,000 population; at the same time the rate of illegitimacy fell from 20.59 per 100 births to 12.86 per 100.

COUNTRY	Per cent. of literates in population	Illegitimates to 1000
England	96	40
Scotland	97	65
Ireland	85	27
France	95	88
Germany	99	89
Scandinavia	99	Sweden 107 Norway 71
Belgium	87	87
Russia	38	31
Austria	76	145
Italy	62	77

Laws instituting an inquiry as to parentage have so far had little effect in checking illegitimacy. The following table will serve to illustrate this feature of the case:

RATE PER 1000 CHILDREN BORN, PERIOD 1878-82. STILL-BIRTHS EXCLUDED

Countries where inquiry as to paternity is refused	Rate per 1000 births	Countries where inquiry is allowed	Rate per 1000 births
Belgium	77	Austria	144
France	74	Saxony	137
Italy	73	Bavaria	122
Holland	30	Sweden	101
Russia	28	Denmark	101
		Scotland	84
		England and Wales	48
		Switzerland	47
		Ireland	25

The presence in society of illegitimate children might be expected to involve serious economic and moral evils, since they are frequently deserted by their natural protectors, and since by heredity and environment they would naturally tend toward pauperism and crime. The greater death-rate among this class of children diminishes these social and economic effects. The following table shows the death-rate among infants under one year in each class, in the countries named:

* As the United States keeps no official record of births, no authentic statistics for that country can be given.

COUNTRY	Per cent. deaths among legitimates	Per cent. deaths among illegitimates
Austria	24.5	33.3
France	15.5	30.0
Belgium	16.1	26.2
Norway	9.9	12.16
Prussia	19.3	34.8
Bavaria	29.3	38.6
Württemburg	29.6	36.4
Berlin	25.0	32.8

It will be seen that the average rate of infant mortality is 25 per cent. higher among illegitimates than among legitimates. Even more difference is shown by the tables of François. According to these tables the death-rate is twice as high in Spain, Hungary, Sweden, and Denmark. Investigations undertaken to show the physical and moral development of illegitimates are inconclusive in results. This question has been studied in Germany, and more experiments seem to show that illegitimates do not differ greatly from the normal. For example, of 277 illegitimates examined for military service in Berlin in 1870, there were 90 accepted; of the same number of legitimates, 95 were accepted. Among criminals investigations have shown that the illegitimates furnish a large number of those arrested for theft and for begging.

An important question from the standpoint of the economist and public financier is the burden imposed by illegitimacy upon the public. It may work against the welfare of the State by unduly increasing the population, because it removes the feeling of responsibility felt by those who know they must support those whom they bring into the world. The more practical and immediate aspect of the problem, however, is the expense the State must meet in caring for the illegitimates. The importance of this item depends on three conditions: First, the actual number of those thrown on the public; second, the share of this burden borne by private charity; third, the degree of responsibility placed on the reputed parents as to the support of the illegitimate children. This leads to a detailed study of charity work, however, for which reference must be made to that head.

As to the support of illegitimates, the common-law rule is that the putative father of a bastard child is not liable for its support, this obligation falling legally on the mother.

By statute law, both in England and most of the United States, upon complaint of the mother or of certain designated public officers, an inquiry may be had as to the identity of the putative father, and upon sufficient proof an order of affiliation made whereby the father is adjudged to pay for the support of the child. Consult Lappingwell, *Illegitimacy* (New York and London, 1892).

Under common law, an illegitimate child can neither inherit nor transmit property. The exception to this rule is that to his own offspring he may will property of his own accumulation. Laws of the United States have modified this condition, and as a rule, allow inheritance and transmission of property through the mother.

The legitimation of children born out of wedlock by statute law in most of the States follows upon the intermarriage of the parents and acknowledgment of the children. The legitimation of illegitimates secures them, in general, all the privileges of children born in wedlock. It therefore carries with it the right of property and inheritance and the name of the father. In England the intermarriage of the parents at any time before the birth of the child legitimates the child. English law recognizes the status of the child in the place where the parents were domiciled. In the civil and canon law, the intermarriage of parents has always made the child legitimate. This is the law of Scotland, Holland, Germany, and France.

ILLICIUM, il-lish'i-ŭm (Neo-Lat., from Lat. *illicere*, to allure, from *in*, in + *lacere*, to entice). A genus of trees of the natural order Magnoliaceæ, the members of which have flowers with three or six petal-like sepals, numerous petals arranged in several rows, many stamens and pistils, capsules arranged in a star-like form, opening upward, and each containing a single seed. The species are few, but very widely distributed. The most important is *Illicium anisatum*, star or Chinese anise, the fruit of which is used in medicine and as a condiment. This tree is held in high esteem by the Japanese, and is planted near their temples. The star anise of commerce is now derived principally from Anam. Among the other species is *Illicium floridanum*, a shrub with pendent clusters of dark purple flowers, native of Florida and Louisiana, of which the leaves and capsules smell like anise, though more faintly than those of the Chinese tree. Similar in fragrance is *Illicium parviflorum*, another Floridian species. See ANISE.

ILLIGEN, êl'lê'zhăn', ANDRÉ (1638-70). A French buccaneer, native of Ixelles, near Brussels. From the merchant service of the Netherlands, he passed into that of the French filibuster Montbars, who had saved him from the Spaniards, and together they sacked cities and ships of the enemy. Illigen afterwards worked with the famous Welsh pirate Sir Henry Morgan, with whom he coöperated during some of the latter's noted expeditions against the possessions of Spain in the West Indies and South America.

ILLIMANI, êl'yê-mä'nê. A volcano in the Bolivian Andes, South America, situated about 25 miles southeast of the city of La Paz (Map: Bolivia, D 7). It is surmounted by four peaks, of which one, Condor Blanco, is over 20,800 feet high. It is covered with perpetual snow above 15,000 feet, whence its name, signifying 'snow mountain.' There is a lake in the mountain mass 15,900 feet above the sea, and glaciers on the north side at an altitude of 16,350 feet. The first ascent to the summit of the central peak was made in 1877 by Wiener, Grumbhow, and Ocampo.

ILLINOIS, il'i-noi' *or* -noiz' (American Indian, *Illini*, men). A group of North American Indian tribes belonging to the great Algonquian linguistic family (see ALGONQUIAN STOCK) and originally occupying the State that received their name. La Salle speaks of Lake Michigan as Lac des Illinois. Some of the separate tribes in this group were the Cahokias, after whom the gigantic pyramidal mound opposite Saint Louis was named, Kaskaskia, Michigami, Moingwena, Peoria, and Tamaroa. Most of them have left the record of their existence in place names here and there about the State.

A point of interest relating to the Illinois and other Algonquian tribes in the Ohio Valley is

the question of their connection with the people who erected the great truncated pyramidal earth mounds in the Mississippi bottoms, in the western part of the State.

The Illinois came early into relations with La Salle (1670-82) and the French traders. Through the influence of the Trappist monks these tribes were held loyal to the French in their wars with the neighboring tribes and afterwards with the English.

At the close of the Revolution the United States had great difficulty in subduing the Indians of this area. They now number 172, and are situated on a reservation in the Indian Territory.

ILLINOIS. 'The Prairie State.' A north-central State of the United States, lying between latitudes 36° 59′ and 42° 30′ N., and longitudes 87° 35′ and 91° 40′ W. It is bounded on the north by Wisconsin, on the northeast by Lake Michigan, on the east by Indiana, on the south by the Ohio River, separating it from Kentucky, and on the west by the Mississippi, flowing between it and Missouri and Iowa. Its greatest length is 385 miles; extreme width, 218 miles. Area, 56,650 square miles, of which 650 miles are water.

TOPOGRAPHY. The whole State lies within the great prairie region, and has the physical appearance of a broad plain sloping slightly toward the south and southwest. After Louisiana and Delaware, it is the most level State in the Union. The surface of the plain, however, is not so monotonous as it appears on the map, being broken by minor undulations in a series of low hills and broad hollows. In the extreme northwest there are hills rising to an altitude of more than 800 feet, but the average elevations range from 600 feet in the north to 300 feet in the south. The elevation of Chicago is 582 feet. With the Ohio, Mississippi, and Lake Michigan on its borders, the State is well favored as to navigable waterways. The minor streams, with the exception of a few in the northeastern part, flow into the Wabash, Ohio, and Mississippi. The largest of these, the Illinois, has a course of nearly 500 miles, and can be ascended by small boats for a distance of 250 miles from its mouth. It drains central Illinois, receiving as affluents the Kankakee, Des Plaines, Fox, Vermilion, Mackinaw, Spoon, and Sangamon. Among the other important rivers are Rock River in the north, and the Kaskaskia, Big Muddy, Little Wabash, and Embarras in the south. Lake Peoria, in the central part of the State, is formed by a widening of the Illinois River.

FLORA AND FAUNA. See paragraphs on these topics under UNITED STATES.

CLIMATE AND SOIL. The climate is typically temperate, the mean annual temperature ranging from 47° to 54° F. The winters are somewhat severe owing to the northerly winds, which have an unobstructed sweep over the prairies. Vegetation starts in April, and frosts occur about the middle of September. The average annual rainfall is thirty-eight inches. The soil consists of a rich, warm loam almost free from pebbles, and is mostly of glacial origin. An underlying stratum of hard clay prevents the seepage of moisture. On the river bluffs in the western part a fine, sandy deposit, called loess, occurs quite commonly, while the bottom lands have a surface of alluvial silt. The soils are remarkably fertile and require little artificial preparation to fit them for the growth of cereals.

GEOLOGY AND MINERAL RESOURCES. During the Glacial period the area of Illinois was overrun by the northern ice sheet, which spread out a mantle of drift over the surface, burying the preëxistent topography. Only where the rivers have eroded their channels through this glacial material do the underlying formations outcrop. Silurian strata predominate in the northern part, and Devonian and Carboniferous in the central and southern parts. The coal-fields cover an area of 37,000 square miles; the number of seams varies from 7 to 12, with a thickness of 2 to 8 feet. The coal is bituminous, of Carboniferous age, and is best adapted for steaming. The most productive mines are located in Sangamon, Saint Clair, Vermilion, Macoupin, La Salle, Grundy, Williamson, and Bureau counties.

MINING. This industry is of little importance when compared with agriculture and manufacturing. Nevertheless, the production of bituminous coal has assumed enormous proportions. Illinois ranks second among the States in the amount of coal mined, and the output amounts to nearly 10 per cent. of the total for the country. The value of the annual output has increased from $10,000,000 in 1886 to $28,163,937 in 1901. Limestone is extensively quarried, the product being used for building and road-making purposes. The value of the annual output for the last decade has averaged about $2,000,000. Both of the above products are procured from a number of widely scattered points. The discovery and the mining of lead in the northwest corner of the State played an important part in the early settlement of the commonwealth. It is still mined to a limited extent. Some zinc is also mined in the northern part of the State. Fine clay and other commercial clays are mined, and the manufacturing of lime and of cement are well-established industries. The mineral waters of the State are also of considerable commercial value.

FISHERIES. Many of the streams of the State abound in fish, which, though of little importance compared with the total food-supply, are yet worthy of consideration. German carp and buffalo-fish are commercially of most importance. Twenty shipping points on the Illinois River report the total value of fish caught for the year 1899 as $362,000. The protection and fostering of the fishing resources of the State are placed under the supervision of a State board of fish commissioners.

AGRICULTURE. For several years following 1870 Illinois exceeded all other States in the per cent. of its farm area, in the per cent. of farm land improved, and the acreage in crops, and at the end of the century was exceeded in these respects by only one State—Iowa. According to the census of 1900, 91.5 per cent. of the land area was included in farms, of which 84.5 per cent. was improved, each of these per cents. being the largest given in any Illinois census. In the greater part of the State the soil is a black loam of great fertility. The average size of farms decreased gradually until 1880; since then it has remained almost constant, being 124 acres in 1900. The per cent. of tenant-operated farms is rapidly increasing, amounting in 1900 to 39 per cent. of the total number. The share system of renting is most common. The products raised are of great variety, but corn has always

AREA AND POPULATION OF ILLINOIS BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Adams	A 4	Quincy	838	61,888	67,058
Alexander	E 6	Cairo	230	16,563	19,384
Bond	C 5	Greenville	372	14,550	16,078
Boone	D 1	Belvidere	288	12,208	15,791
Brown	B 4	Mount Sterling	306	11,951	11,557
Bureau	C 2	Princeton	877	35,014	41,112
Calhoun	B 4	Hardin	252	7,652	8,917
Carroll	B 1	Mount Carroll	462	18,320	18,963
Cass	B 4	Virginia	388	15,903	17,222
Champaign	B 3	Urbana	1,000	42,159	47,622
Christian	C 4	Taylorville	688	30,531	32,970
Clark	E 4	Marshall	515	21,899	24,033
Clay	D 5	Louisville	468	16,772	19,553
Clinton	C 5	Carlyle	496	17,411	19,824
Coles	D 4	Charleston	520	30,093	34,146
Cook	E 2	Chicago	993	1,191,922	1,838,735
Crawford	E 5	Robinson	450	17,283	19,240
Cumberland	D 4	Toledo	347	15,443	16,124
Dekalb	D 2	Sycamore	646	27,066	31,756
Dewitt	C 3	Clinton	406	17,011	18,972
Douglas	D 4	Tuscola	420	17,669	19,097
Dupage	D 2	Wheaton	347	22,551	28,196
Edgar	E 4	Paris	648	26,787	28,273
Edwards	D 5	Albion	222	9,444	10,345
Effingham	D 4	Effingham	486	19,389	20,465
Fayette	C 4	Vandalia	692	23,367	28,065
Ford	D 3	Paxton	480	17,085	18,359
Franklin	C 5	Benton	436	17,188	19,675
Fulton	B 3	Lewistown	828	43,110	46,201
Gallatin	D 6	Shawneetown	325	14,935	15,836
Greene	B 4	Carrollton	544	23,791	23,402
Grundy	D 2	Morris	432	21,024	24,136
Hamilton	D 5	McLeansboro	438	17,800	20,197
Hancock	A 3	Carthage	765	31,907	32,215
Hardin	D 6	Elizabethtown	194	7,234	7,448
Henderson	A 3	Oquawka	362	9,876	10,886
Henry	B 2	Cambridge	840	33,338	40,049
Iroquois	E 3	Watseka	123	35,167	38,014
Jackson	C 6	Murphysboro	558	27,809	33,871
Jasper	D 4	Newton	508	18,188	20,160
Jefferson	C 5	Mount Vernon	590	22,590	28,133
Jersey	B 4	Jerseyville	360	14,810	14,612
Jo Daviess	B 1	Galena	656	25,101	24,533
Johnson	D 6	Vienna	340	15,018	15,667
Kane	D 2	Geneva	540	65,061	78,792
Kankakee	E 2	Kankakee	692	28,732	37,154
Kendall	D 2	Yorkville	324	12,106	11,467
Knox	B 3	Galesburg	720	38,752	48,612


ILLINOIS
SCALE OF MILES
0 5 10 20 30 40 50 60 70 80
County Towns
Railroads
Canals
Longitude
West
from Greenwich
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AREA AND POPULATION OF ILLINOIS BY COUNTIES.

(Continued.)

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Lake	D 1	Waukegan	468	24,225	34,504
Lasalle	C 2	Ottawa	1,156	80,798	87,776
Lawrence	E 5	Lawrenceville	362	14,698	16,523
Lee	C 2	Dixon	738	26,187	29,894
Livingston	D 3	Pontiac	1,080	38,455	42,035
Logan	C 3	Lincoln	610	25,489	28,660
McDonough	B 3	Macomb	574	27,467	28,412
McHenry	D 1	Woodstock	609	26,114	29,759
McLean	C 3	Bloomington	1,166	63,086	67,843
Macon	C 4	Decatur	606	38,083	44,003
Macoupin	B 4	Carlinville	868	40,380	42,256
Madison	D 5	Edwardsville	748	51,585	64,694
Marion	C 5	Salem	570	24,341	30,446
Marshall	C 2	Lacon	390	13,658	16,370
Mason	C 3	Havana	570	16,067	17,491
Massac	D 6	Metropolis City	238	11,313	13,110
Menard	C 3	Petersburg	314	13,120	14,336
Mercer	B 2	Aledo	556	18,545	20,945
Monroe	B 5	Waterloo	385	12,948	13,847
Montgomery	C 4	Hillsboro	702	30,003	30,886
Morgan	B 4	Jacksonville	562	32,636	35,006
Moultrie	D 4	Sullivan	354	14,481	15,224
Ogle	C 1	Oregon	778	28,710	29,189
Peoria	C 3	Peoria	615	70,378	88,666
Perry	C 5	Pinckneyville	430	17,529	19,880
Piatt	D 4	Monticello	440	17,062	17,706
Pike	B 4	Pittsfield	815	31,000	31,595
Pope	D 6	Galconda	364	14,016	13,595
Pulaski	C 6	Mound City	192	11,355	14,554
Putnam	C 2	Hennepin	176	4,780	4,746
Randolph	C 5	Chester	580	25,049	28,001
Richland	D 5	Olney	360	15,019	16,391
Rock Island	B 2	Rock Island	440	41,917	55,249
St. Clair	B 5	Belleville	680	66,571	86,686
Seline	D 6	Harrisburg	380	19,342	21,685
Sangamon	C 4	Springfield	860	61,195	71,593
Schuyler	B 3	Rushville	430	16,013	16,129
Scott	B 4	Winchester	255	10,340	10,455
Shelby	D 4	Shelbyville	780	31,191	32,128
Stark	C 2	Toulon	292	9,982	10,186
Stepheson	C 1	Freeport	557	31,338	31,933
Tazewell	C 3	Peking	650	29,556	33,221
Union	C 6	Jonesboro	400	21,549	22,610
Vermilion	E 3	Danville	928	49,905	65,635
Wabash	E 5	Mount Carmel	226	11,866	12,583
Warren	B 3	Monmouth	540	21,281	23,168
Washington	C 5	Nashville	555	19,262	19,526
Wayne	D 5	Fairfield	725	23,806	27,626
White	D 5	Carmi	512	25,005	25,386
Whiteside	B 2	Fulton	700	30,854	34,710
Will	D 2	Joliet	835	62,007	74,764
Williamson	C 6	Marion	442	22,226	27,796
Winnebago	C 1	Rockford	540	39,938	47,845
Woodford	C 3	Eureka	536	21,429	21,822

corn State, but in recent years that place has been surrendered to Iowa, while Kansas and Nebraska have each in occasional years had a greater acreage. A very high point in the corn production in Illinois was reached in the late seventies, followed by a gradual falling off of more than one-third; it revived, however, in the decade 1890-1900, the figure for the latter year being the highest reached. In 1880 3,200,000 acres under wheat exceeded that for any other State; but for the last decade of the century it has averaged only a little over half that amount, but now giving the State about fifth rank. For two decades hogs have exceeded 5,000,000 head, Iowa being the only successful rival. Less attention has been given to sheep, which have decreased in number more than half since 1870. The State ranks next to Missouri in number of domestic fowls. The following tables, taken from the census returns for 1890 and 1900, show the relative importance of the different crops and varieties of farm animals, and the changes which have occurred during the decade:

YEAR	Corn (acres)	Oats (acres)	Wheat (acres)	Rye (acres)	Barley (acres)	Hay (acres)	Potatoes (acres)
1900	10,266,335	4,570,034	1,826,143	78,869	21,375	3,343,910	136,464
1890	7,863,025	3,870,702	2,240,932	165,598	41,390	3,522,884	170,726

YEAR	Dairy cows	Other neat cattle	Horses	Mules and asses	Sheep	Swine
1900	1,007,664	2,096,346	1,350,219	127,173	629,150	5,915,468
1890	1,087,886	1,975,233	1,335,289	107,875	922,631	5,924,818

giving the State a low rank. Oats show just the opposite tendency, the crop prior to 1880 having an annual acreage of less than 2,000,000 acres, but since 1885 averaging 3,500,000 acres, the State ranking next to Iowa. Hay, which for the decade 1880-90 had an annual acreage of over 3,000,000 acres, dropped below that figure in the succeeding ten-year period. Illinois is one of the most important potato-producing States with an average acreage of over 150,000 acres. All these crops are grown throughout the State, but the northern part is found especially adapted to hay, the north and central to corn, the eastern to oats, and the southwestern to wheat. Rye and barley are most extensively raised in the northern portion of the State, sorghum, tobacco, and castor beans in the southern, and broom-corn is grown in the central. In the production of the last, the State exceeds all others. Peaches and pears are raised chiefly in the southern part, while apples, grapes, and other fruits are common throughout the State. In 1900 the apple-trees numbered 13,430,000, or 74 per cent. of the total fruit-trees, having nearly doubled in number during the decade ending with that year. The per cent., however, of increase for all other varieties of fruit-trees was much greater than for apple-trees. In the vicinity of Chicago large quantites of small fruits and other products are grown for the Chicago markets. In most parts of Illinois expensive farm drainage systems need to be maintained.

STOCK-RAISING. There being an enormous production of corn and other kinds of stock feed, stock-raising naturally assumes great prominence. For many years the number of horses exceeded 1,000,000, giving the State first rank until 1900, when it was exceeded by Iowa. Large numbers of mules are also raised. The milch cows number about 1,000,000, only Iowa and New York exceeding this figure. Dairy products—milk and butter—constitute one of the leading sources of wealth, and are exceeded in importance in but two other States. In 1899 the dairy product was valued at $29,638,619. Of that sum 64.3 per cent. was actually realized from

MANUFACTURES. Illinois is the most important manufacturing State west of the Alleghany Mountains, and is outranked by only two of the Atlantic Coast States—New York and Pennsylvania. It is a natural collecting and distributing centre for a very large and prosperous area. To Chicago (q.v.) is accredited 70 per cent. of the total manufactured product for the State. From its beginning the city was an important stock market, and it soon far outclassed all other places as a slaughtering and meat-packing centre. From the table appended it will be seen that the value of the products of this industry constitutes over one-third of the total for the twenty-four leading industries of the State, and the greater part of this ($256,537,000) was in 1900 accredited to Chicago. The entire slaughtered animal is utilized, and this gives rise to a large number of subsidiary industries, some of which attain a large magnitude in themselves. Thus the value of soap and candles manufactured exceeds $9,000,000, and the products of the tanning, currying, and finishing of leather are almost as important. The forests to the north and the iron-mines of the Lake Superior region together afford the raw products for a large number of important industries. The manufactures of iron are only possible where an abundant supply of fuel is attainable, and the extensive coal-mining industry of the State abundantly meets this requirement. Only two States exceed Illinois in the manufacture of iron and steel. Chicago is the largest producer of these products among all the lake cities. Joliet has become another important centre for the production of iron and steel. The value of the product for Chicago and Joliet in 1900 was respectively $31,461,000 and $13,380,000. The manufactures of foundry and machine-shop products are even greater in value than is the product of iron and steel. Over two-thirds of the total product is accredited to Chicago. The value of agricultural implements manufactured is more than three times that of any other State, and Pennsylvania alone exceeds Illinois in the production of cars and other railroad supplies. The manufacture of carriages and wagons is also

ly increased at all during the decade, the production of bicycles and tricycles increased 82.3 per cent. during that decade, and has become almost as important. The production of bicycles and tricycles in 1900 was about double that of any other State. Of the manufactures dependent more wholly upon wood, the most important is furniture, confined almost exclusively to Chicago, while planing-mill products and other lumber and timber products are more generally distributed throughout the State. There are important manufactures depending largely upon agriculture for raw materials. The most important of these are manufactures of liquor, flouring and grist-mill products, glucose, cheese, butter, and condensed milk. About two-thirds of the total manufactures of liquors represent distilled liquors. Peoria leads in the industry, and is the largest producer of fine high wines in the United States. The glucose plants of the State

the State. Chicago has become an important centre for the manufacture of men's and women's factory-made clothing as well as of boots and shoes, and has a very large printing and publishing business. The manufacture of electrical apparatus and supplies, although almost wholly the development of the last decade, has become an industry of first rank. The manufacture of musical instruments also experienced a very significant gain during the decade. The greatest absolute increase in the manufactures of the State was made in the decade 1880-90. During the last census (1900), however, the percentage of the entire population engaged as wage-earners in the industry was greater than in any previous census, being 8.2 per cent., or 395,110 persons. It will be seen from the table that the per cent. of increase for the number of establishments is greater than the per cent. of increase for the value of products; but in a number of the more important in-

INDUSTRIES	Year	Number of establishments	Average number	Value of products, including custom work and repairing
Total for selected industries for State	1900	8,209	219,415	$810,477,419
	1890	5,459	159,281	621,123,759
Increase, 1890 to 1900	.....	2,750	60,134	$189,353,660
Per cent. of increase	.....	50.4	37.8	30.5
Per cent. of total of all industries in State	1900	21.4	55.5	64.4
	1890	26.7	56.8	68.4
Slaughtering: Total	1900	64	27,861	$267,922,277
	1890	61	17,932	212,291,383
Slaughtering and meat-packing, wholesale	1900	51	27,626	279,842,835
	1890	60	17,240	200,414,531
Slaughtering, wholesale, not including meat-packing	1900	13	235	8,079,442
	1890	21	692	11,876,851
Soap and candles	1900	39	1,556	9,436,430
	1890	35	1,026	9,857,550
Leather, tanned, curried, and finished	1900	27	2,263	7,847,635
	1890	30	1,864	8,240,803
Iron and steel	1900	26	16,642	60,144,061
	1890	24	8,695	29,011,051
Foundry and machine-shop products	1900	758	31,851	63,878,382
	1890	408	17,200	32,898,114
Cars and general shop construction and repairs by steam railroad companies	1900	98	13,803	16,580,424
	1890	70	10,277	12,208,617
Cars (steam railroad), not including operations of railroad companies	1900	17	9,314	24,845,606
	1890	9	6,879	17,117,223
Agricultural implements	1900	94	18,231	42,033,796
	1890	100	9,502	24,609,660
Carriages and wagons	1900	407	4,355	9,210,379
	1890	559	4,912	9,041,736
Bicycles and tricycles	1900	60	4,388	8,960,421
	1890	5	653	970,000
Furniture, factory product	1900	148	9,757	15,285,475
	1890	169	8,504	14,406,835
Lumber and timber products	1900	837	3,526	7,652,118
	1890	363	4,089	5,135,155
Lumber, planing-mill products, including sash, doors, and blinds	1900	240	5,122	11,141,771
	1890	206	8,929	20,468,903
Liquors: Total	1900	114	3,607	57,941,897
	1890	95	3,621	65,660,783
Flouring and grist-mill products	1900	871	2,111	31,006,294
	1890	647	3,550	37,974,895
Cheese, butter, and condensed milk, factory product	1900	527	1,483	12,879,299
	1890	262	1,344	8,004,991
Glucose	1900	6	2,680	18,122,814
	1890	4	878	4,370,322
Clothing, men's, factory product	1900	900	14,977	37,378,717
	1890	199	16,004	33,636,441
Clothing, women's, factory product	1900	169	4,402	9,774,774
	1890	71	2,513	6,422,451
Boots and shoes, factory product	1900	55	5,553	11,494,843
	1890	56	3,992	8,756,834
Printing and publishing: Total	1900	2,006	17,986	39,449,033
	1890	1,386	14,226	32,060,913
Musical instruments and materials: Total	1900	45	4,670	8,156,445
	1890	25	1,843	3,546,339
Electrical apparatus and supplies	1900	82	6,042	12,169,425
	1890	11	260	486,739
Clay products: Total	1900	619	7,229	7,226,915
	1890	644	10,596	7,956,083

census period.

Transportation and Commerce. The State has water communication with the Mississippi Valley and a southern outlet to the Atlantic. Lake Michigan, which touches the State at the northeast corner, gives water communication with Canada and the Lake States, and an eastern outlet to the Atlantic. The Illinois and Michigan Canal, constructed from the lake to the head of navigation on the Illinois River, connects the two water systems. The railroads are more numerous and have a greater extent of track than those of any other State. This is owing in part to the favorable situation for commerce and travel, and partly to the almost level surface of the land, which reduces the cost of construction to the lowest point. Chicago and Saint Louis are the two focal points for the railroads of the State; indeed, most of the grand trunk lines of the continent converge at the former place. The Illinois Central, through the encouragement of extensive land grants by the Government, was constructed in 1850-56, and was the first line in the State. The line still pays into the State treasury 7 per cent. of its gross earnings, being otherwise exempt from taxation. The railway mileage by decades is as follows: 1860, 2790; 1870, 4283; 1880, 10,165; 1900, 10,814. There are about 20 miles for every 100 square miles of territory, and about 23 miles for every 10,000 inhabitants. In 1900 there were 116 railroad corporations having lines within the State. The number of passengers carried during the year mentioned was 42,153,000, the average distance being 24.12 miles. The tons of freight hauled amounted to 88,307,000, the average distance being 116.65 miles. Thus the great natural resources of the State, together with its admirable land and water facilities for transportation, and its central location, give it a high rank in commercial importance. Chicago is the great collecting and distributing centre of the Middle West. Recent improvement in the navigation of the Saint Lawrence makes it possible for the smaller ocean vessels to reach the Chicago port, and though this is not yet considered commercially practicable, it is confidently expected that further improvements will result in the development of a large foreign traffic directly with the Chicago port. See Chicago.

Banks. In 1902 there were 276 national banks in the State with a capital stock of $44,930,000; deposits, $238,459,000; cash, etc., $53,537,000; and loans, $282,007,000. The State banks numbered 190, with a capital of $29,840,000; deposits, $232,723,525; cash, etc., $30,534,988; and loans, $171,201,512. The savings banks had deposits of $80,251,287, the average deposit being $309.95. In 1902 the private banks numbered 178, with loans (approximately), $12,386,236; cash, $1,231,918; capital, $3,407,825; and deposits, $23,174,163.

Finance. On October 1, 1900, the outstanding bonded debt of the State was only $18,500. The balance of all funds in the State treasury amounted to $2,617,900. Constitutional limitations prevent the State and the local governmental units from appropriating money to aid railroads and canals. There are also other rigid constitutional

given by a vote of the people. The local governments are limited in their debt-contracting power to 5 per cent. of the value of taxable property.

Constitution and Government. The present Constitution, which is the third for the State, was ratified by a vote of the people in July, 1870. To secure either an amendment or a constitutional convention requires a two-thirds vote of each House and a majority of the votes cast at a popular election, while the Constitution drawn up in convention must again be submitted to a popular vote of the people. Voters must have resided in the State one year, in the county ninety days, and in the election district thirty days next preceding an election. The General Assembly is given power to exclude from the right of suffrage persons convicted of infamous crimes.

Legislative. The Senate of 51 members is elected for four years, the House of Representatives for two years. Three Representatives are elected from each of the 51 Senatorial districts, and each voter is allowed three ballots, which, if he sees fit, may be cast for one man, or one and a half votes for each of two men, or one vote for each of three candidates. The three candidates having the highest number of votes are elected. This works to the advantage of the minority. Legislators receive $5 per day mileage, and $50 for incidental expenses. The legislative session begins on the first Wednesday after the first Monday in January of odd years. The capital of the State is Springfield.

Executive. A Governor, Lieutenant-Governor, Secretary, Auditor, Superintendent of Instruction, and an Attorney-General are elected for terms of four years each. A Treasurer is elected for two years, and cannot be reëlected for the next succeeding term. The Governor exercises the usual pardoning power, subject to legal regulations. Any bill or item of an appropriation bill may be vetoed by the Governor, but a two-thirds vote of each House may override the veto. The Lieutenant-Governor, President of the Senate, and Speaker of the House are in line of succession to the Governorship in case of vacancy.

Judicial. The State is divided into seven districts, in each of which a judge of the Supreme Court is elected who serves for nine years. Inferior appellate courts are also established by law. Circuit Court judges are elected for terms of six years, and two or more terms of the Circuit Court must be held each year in each county. A county judge and a clerk of court and a State's attorney are elected for four years in each county. Probate courts may be established in counties exceeding 50,000 inhabitants. Justices of the peace, police magistrates, and constables are elected as provided by law.

Local Government. Each county elects three (Cook County 15) county commissioners, who serve for three years. A county sheriff, treasurer, coroner, are elected for four years, but the sheriff and treasurer are not eligible to reëlection for the next succeeding term.

The State has 25 Representatives in the National House of Representatives.

Militia. In 1900 there were 1,091,472 males of militia age. In 1898 the National Guard of the State aggregated 8,490 men and officers.

POPULATION. The Territory of Illinois in 1810 had 12,282 inhabitants. The population of the State by decades is as follows: In 1820, 55,211; 1830, 157,445; 1840, 476,183; 1850, 851,470; 1860, 1,711,951; 1870, 2,539,891; 1880, 3,077,871; 1890, 3,816,351; 1900, 4,821,550. The rank of the State advanced from eleventh in 1850 to fourth in 1860 and third in 1890, which position it still holds. In 1890 it surpassed Ohio for the first time, and became the most populous State west of the Alleghany Mountains. The greatest absolute gain was made in the last decade of the century, the per cent. of increase being 26.0, as compared with 20.7 for the United States. The earlier movements of population into the State were largely composed of Southerners, who crossed the Ohio River into southern Illinois, or were attracted up the Mississippi River to the lead-mining districts in the northwestern part of the State. These, however, were soon greatly outnumbered by immigrants from the Eastern States. Some of the public lands were still unoccupied when the great German migration to America began, and consequently a large number of Germans found homes within the State, and Chicago has continued to be a German centre. The German born are considerably more than twice as numerous as any other foreign nationality, and constitute over one-third of the total foreign-born population. The Scandinavians came a little later, yet in time to secure a firm foothold in the northern part of the State. The Irish element is much less prominent than in the Atlantic Coast States, but is about equal to the Scandinavians in numbers. The more recent immigrants include a large number who are of the Slav or Latin race. The total foreign-born population in 1900 numbered 966,747. The colored population numbered 86,677, of whom 1503 were Chinese. The urban population equals half the total for the State, and the gain during the last decade has been wholly in the towns and cities, the per cent. of gain in these being 53.2. Sixty-six places exceed 4000 in number of inhabitants. The density of population is 86 per square mile, or more than three times that of the nation as a whole. The male sex outnumbers the females by 125,000.

CITIES. According to the census of 1900, the cities having a population exceeding 25,000 are as follows: Chicago, 1,698,575; Peoria, 56,100; Quincy, 36,252; Springfield, 34,159; Rockford, 31,051; East Saint Louis, 29,655; Joliet, 29,353.

RELIGION. Estimated upon the reported number of church communicants, the Methodists about equal the Catholics in their adherents. The Baptists, Disciples of Christ, Presbyterians, German Evangelicals, Congregationalists, Lutherans (General Council), and Protestant Episcopalians follow in importance in the order named.

EDUCATION. In 1900 only 4.2 per cent. of the population over ten years of age were illiterate, as compared with 10.7 for the whole country. The free-school system dates from 1855. Rapid progress has been made in perfecting the system, especially in lengthening the school year, the average for recent years having exceeded 150 days. The power of the county superintendent has been increased so that he can supervise the schools without restriction by the county boards. Great inequalities, however, exist throughout the State, due to the inadequacy of local taxes in many of the rural communities, and to lack of centralization. Over 350 schools enroll fewer than 10 pupils each. Lack of funds necessitates short terms and leads to the employment of mediocre teachers. More than one-third of the pupils of the State are enrolled in ungraded schools. The lack of high schools in the rural communities, or any provision for the payment of their tuition in schools outside their district, prevents many from securing the advantages of a secondary education. In 1900 there were 1,588,000 persons between the ages of six and twenty-one. Of these, 958,900 were enrolled in the public schools, the average attendance being 737,576. The per cent. of the children in daily attendance increased from 61 in 1880 to 76.9 in 1900; and the average number of days attendance increased during the period from 91.9 to 123.3. There were also 142,496 children enrolled in 965 private schools. The private secondary schools numbered 65, and the public high schools 321. The public-school teachers numbered 26,303, of whom 6950 were male. The average monthly salary of the male teacher was $60.34, and of the female teacher $52.45.

The total cost to the State of the public schools and educational institutions was, in 1900, $19,919,000. The income from the township school funds amounted to $900,000, while that from the county and State funds approximated $100,000. The average cost per enrolled child was $18.94. The total permanent school fund now amounts to $17,420,000. The largest items are, first, school lands unsold and other lands of an estimated value of $9,571,000, and, second, the township funds, being the net proceeds of the sale of the sixteenth section in each Congressional township, amounting to $5,923,000. The State educational system comprehends higher institutions of learning, of which there are five normal schools, located respectively at Charleston, De Kalb, Macomb, Carbondale, and Normal; an agriculture and mechanic-arts school at Urbana; and a university also at Urbana. In few States has private initiative been more active in establishing higher schools of learning. Thirty-one institutions have assumed the name of 'college' or 'university.' Besides these there are a large number of professional and technical institutions, more modest in name, but equally well known. Cook County Normal School is one of the best known in the whole country, and the University of Chicago (q.v.) has attracted wide attention by its original features and the eminence of the scholars who have been called to fill its chairs. Among the best known of the other institutions are the Northwestern University, the Armour Institute of Technology, and the Rush Medical College, situated at Chicago; Knox College, at Galesburg; and Illinois Wesleyan University, at Bloomington. Most of the higher institutions are coeducational.

CHARITABLE AND PENAL INSTITUTIONS. The following is a list of the correctional and charitable institutions of the State, with their situations.

Correctional	*Situation*
Penitentiary (Northern)	Joliet
Penitentiary (Southern)	Chester
State Reformatory	Pontiac
State Home for Juvenile Female Offenders	Geneva
Charitable	
Institution for the Education of the Deaf and Dumb	Jacksonville
Institution for the Education of the Blind	Jacksonville
Central Hospital for the Insane	Jacksonville
Soldiers' Orphans' Home	Normal
Asylum for Feeble-Minded Children	Lincoln

Charitable Eye and Ear Infirmary	Chicago
Northern Hospital for the Insane	Elgin
Southern Hospital for the Insane	Anna
Eastern Hospital for the Insane	Kankakee
Soldiers' and Sailors' Home	Quincy
Industrial Home for the Blind	Chicago
Asylum for Insane Criminals	Chester
Soldiers' Widows' Home	Wilmington
Western Hospital for the Insane	Watertown
Asylum for Incurable Insane	Peoria

The average number of inmates in the charitable institutions for the two years ending in June, 1900, was 9615. The ordinary expense to the State for the last year was $1,416,000, being an average per capita cost (gross) of $158.71. The above charitable institutions, together with the county jails and almshouses, and every association receiving dependent, neglected, and delinquent children, are subject to inspection by the State Board of Charities, consisting of five unsalaried members. While the board exercises a great influence its power is merely advisory, and not executive. The paupers in the almshouses of the State in 1900 numbered nearly 9000. Of these, 3100 were insane. The county system of outdoor relief is in vogue, and as a result the township officer distributes alms with rather more generosity than judgment, making an average county expenditure of 20 cents per capita, while in several counties the combined outdoor and indoor relief consumes half the total county tax. In some respects the State has been exceptionally progressive. Especially noteworthy is the establishment of a juvenile court in counties exceeding 500,000 population, and a system of unsalaried parole officers, the working of which has resulted in a large number of children being cared for outside of prisons or institutions to which they would otherwise have been doomed. Reform methods have also been introduced in the penal institutions, supplemented by a wise parole system.

History. In 1673 Father Marquette ascended the Illinois River, and two years later established a Jesuit mission at the Indian village of Kaskaskia. La Salle entered the river in 1679, named it Illinois from the tribes inhabiting the region, and built Fort Crèvecœur at the foot of what is now called Lake Peoria. His explorations were continued by Tonty, whom he left behind in 1680 when he returned to Canada. Fort Saint Louis on Starved Rock was built in 1682, and between 1683 and 1690 French traders established themselves at Kaskaskia, Cahokia, and other Indian villages, though the actual settlement of Kaskaskia, the oldest town in Illinois, probably did not occur before 1700. By 1751 there were six important settlements within the present limits of the State. The French showed a remarkable aptitude for controlling the Indians and adapting themselves to their mode of life. Intermarriage between French and Indians was common, and ties of friendship were established which lasted after the power of France had passed away. Pontiac's rising prevented the English for two years from taking possession of the Illinois country ceded to them in 1763. In general, conditions remained unaltered after the English occupation, but many prominent French settlers fled from English rule to Saint Louis, Natchez, and other towns in the valley of the Mississippi. In 1778-79 a force of Virginians under George Rogers Clark (q.v.) captured Kaskaskia and subdued the province. Virginia ceded its claims to the southern part of the region in 1784, Massachusetts and Connecticut gave up their rights in the following year, and in 1787 the region became a part of the Northwest Territory. Ohio was set off in 1800, Indiana in 1802, and Michigan in 1805; what remained was organized as Illinois Territory on February 3, 1809. The hostility of the Indians prevented rapid settlement in the north. On August 15, 1812, the garrison at Fort Dearborn (Chicago) was massacred. On August 18, 1818, the first Constitution was adopted. On December 3 Illinois was admitted into the Union with boundaries so extended to the north as to include the port of Chicago. By 1805 most of the Indian titles to land within the Territory had been extinguished. There ensued a period of wild land speculation, marked by stupendous frauds. The early immigrants, who came chiefly from the South, brought with them a decided predilection for slavery. The first Legislature passed stringent laws to protect the few slaveholders in the State, and from 1818 to 1865 a harsh code of anti-negro laws, known as the 'Black Laws,' was in force. In 1824 an attempt was made to call a convention for the purpose of legalizing slavery in spite of the ordinance of 1787, but the project was quickly and definitely defeated. The murder of Elijah P. Lovejoy (q.v.), at Alton, in 1837, however, showed the persistence of a strong pro-slavery sentiment. After 1820 the people were hurried into an unhealthy state of precarious prosperity. Banks were established at Edwardsville and Shawneetown, entirely on paper credit, and an elaborate system of internal improvements was begun. As the northern part of the State, after the Black Hawk War (q.v.), commenced to fill up with immigrants from New England and the Middle States, the process of economic development was accelerated. The Illinois and Michigan Canal was begun in 1834, and was built with the proceeds of the sale of public lands granted by Congress. The inception of other public improvements was followed by a panic in 1842, when the State bank suspended specie payments. The people, however, recovered quickly, and in 1850 Congress made an extensive cession of public lands to aid in the construction of the Illinois Central Railroad, an enterprise which contributed greatly to the development of the State. In 1840 the Mormons, who had immigrated from Missouri and founded Nauvoo, began to figure in the politics of Illinois. Welcomed at first, they became in the course of a very few years obnoxious to the mass of the inhabitants. Acting as a unit, under autocratic direction, they succeeded in obtaining exclusive privileges from the Legislature. Their religious practices jarred with the feelings of their neighbors; they were inclined to look upon Gentiles with superciliousness; they were prosperous. Bitter feelings led to hostile action in 1844, when Joseph Smith, founder of the sect, while in prison at Carthage on the charge of treason, was murdered by a mob. In the following year the Mormons left Illinois. In 1858 occurred the great contest for the United States Senatorship between Abraham Lincoln and Stephen A. Douglas. At the outbreak of the Civil War Illinois was in an extremely prosperous condition. It produced three-fifths of all the grain exported to Europe, and was the second State in the Union in railway mileage. During the war the State readily furnished its quota of troops, sending

260,000 men into the field. In peace, its prosperous development continued. In 1865 Chicago had become the leading stock market of the world, and a great grain centre. Legislation between 1865 and 1885 was largely concerned with corporations, and especially with the railroad companies. The Constitution of 1870, replacing the one adopted in 1849, forbade the creation of corporations by special law. A State board of railroad commissioners was created to protect the interests of the State against the railway companies, and the Legislature frequently attempted to fix a maximum for transportation, and to prevent discrimination in rates. Between 1872 and 1875 the farmers of Illinois participated in the widespread Granger movement of the time. (See GRANGE.) On October 8-10, 1871, a fire laid waste a large part of Chicago and rendered 100,000 people homeless. The loss to the city was estimated at nearly $300,000,000. The action of the Mayor in calling in the Federal troops to preserve order during the excitement following the calamity occasioned a bitter dispute between that official and the Governor of the State, who showed himself jealous for the honor of the civil authority. A general feeling of unrest found expression in 1885 and 1886 in bitter strikes and bloody riots; in Chicago an Anarchist crowd attacked the police with pistols and dynamite. In 1893 the Columbian Exposition was held in Chicago. In 1894 a strike of the employees of the Pullman Palace Car Company developed into a general strike of railway men. Traffic in Illinois was almost suspended, and in June lawlessness broke out. Interference with the United States mails led to the intervention of the Federal Government. Chicago was occupied by the Federal troops; the leaders of the strikers were arrested on civil process, and sentenced to short terms of imprisonment for contempt of court. The backbone of the strike was thus broken. In national politics Illinois was Democratic before 1860. In that year it cast its vote for Lincoln, and since that time it has been consistently Republican with the exception of the year 1892, when it voted for Grover Cleveland. In State politics the year 1857 is the line of demarcation between Democratic and Republican ascendency.

The Governors of the State have been as follows:

TERRITORIAL		
Ninian Edwards		1809-1818
STATE		
Shadrach Bond	Democrat	1818-1822
Edward Coles	"	1822-1826
Ninian Edwards	"	1826-1830
John Reynolds	"	1830-1834
Joseph Duncan	"	1834-1838
Thomas Carlin	"	1838-1842
Thomas Ford	"	1842-1846
Augustus C. French	"	1846-1853
Joel A. Matteson	"	1853-1857
William H. Bissell	Republican	1857-1860
John Wood	"	1860-1861
Richard Yates	"	1861-1865
Richard J. Oglesby	"	1865-1869
John M. Palmer	"	1869-1873
Richard J. Oglesby	"	1873
John L. Beveridge	"	1873-1877
Shelby M. Cullom	"	1877-1883
John M. Hamilton	"	1883-1885
Richard J. Oglesby	"	1885-1889
Joseph W. Fifer	"	1889-1893
John Peter Altgeld	Democrat	1893-1897
John Riley Tanner	Republican	1897-1901
Richard Yates	"	1901—

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ILLINOIS, UNIVERSITY OF. The State University of Illinois, occupying a site of 600 acres, between the cities of Urbana and Champaign. It was chartered in 1867 as the Illinois Industrial University, and assumed its present name in 1885. In 1870 women were admitted as students, and now form about one-sixth of the whole attendance. The university is divided into six colleges: Literature and arts, science, engineering, agriculture, law and medicine, including schools of library and science, art and design, music, military science, and pedagogy, and preparatory and graduate departments. The State laboratory of natural history and the United States agricultural experiment station for Illinois are departments of the university, but have separate financial support. The schools of pharmacy, medicine, and dentistry are situated in Chicago. The university owns valuable collections in zoölogy, geology, and other departments, an art gallery, and an excellent collection of historical portraits. The library contains about 60,000 volumes, exclusive of special departmental libraries. The university holds a summer session of nine weeks designed primarily for teachers. It maintains close relations with the high schools of the State through a careful system of inspection and accrediting. It has developed rapidly, and is constantly engaged in scientific investigations bearing upon the interests of the State. In 1902 it had 21 buildings, 300 instructors, and over 3200 students, of whom about 1000 were in attendance at the undergraduate college. At the same time its endowment amounted to $645,000, its buildings and grounds were valued at $1,175,000, and its annual income, mainly derived from legislative appropriations, was $780,000.

ILLINOIS AND MICHIGAN CANAL. See CANAL.

ILLINOIS COLLEGE. The oldest collegiate institution of Illinois, founded in 1829 at Jacksonville, Ill., in part through the efforts of the Eastern organization known as the 'Yale Band.' The curriculum is arranged on the group system, with elective courses after the freshman year, and leads to the bachelor's and master's degrees. The college had, in 1902, 65 collegiate and 42 preparatory students and 18 instructors. At the same time the value of its grounds and buildings was $150,000, and its endowment $155,000. The college library contains about 11,000 volumes, supplemented by about 4000 volumes in the libraries of the literary societies.

ILLINOIS RIVER. An important tributary of the Mississippi, traversing the State of Illinois (Map: Illinois, C 3). It is formed by the junction of the Des Plaines and the Kankakee, 45 miles southwest of Chicago. It flows generally southwest, joining the Mississippi near the mouth of the Missouri. Its length is 500 miles, and it is broad and deep, and navigable for steamers 250 miles to La Salle, whence a ship-

canal connects it with the south branch of the Chicago River (q.v.), thus affording uninterrupted water communication between the Great Lakes and the Mississippi. The chief cities on the river are Ottawa and Peoria.

ILLINOIS WESLEYAN UNIVERSITY. A Methodist Episcopal college at Bloomington, Ill. It was founded in 1850, and comprises a preparatory school, a college of letters, with four parallel courses, embodying the elective system, and schools of law, music, and oratory. The degrees conferred in course are B.A., B.S., Ph.B., LL.B., M.A., Ph.D., and the honorary degrees of D.D. and LL.D. The total number of students enrolled in the university in 1902 was 1407, of whom 141 were collegiate and 478 non-resident students. At the same time the faculty numbered 36 instructors. The library contains some 10,000 volumes. The university has an endowment of $200,000, an income of $36,000, and grounds and buildings valued at $150,000.

ILLITERACY (from Lat. *illiteratus*, uneducated, from *in-*, not + *literatus*, educated, from *litera*, *littera*, letter). The condition of one who cannot read and write his own language. As used in the United States Census, the term includes also those who can read but not write.

There are several methods of determining the percentage of illiterates, and unfortunately the various nations follow different plans. Some statisticians prefer to base their estimates on the number of applicants for marriage licenses who cannot sign their names. Most of the European countries find the percentage from the examinations of the recruits for the army and navy, thus confining the test to men of a certain age. In the United States the census makes inquiry of each person, and takes his or her word, there being no test of any sort. In all countries, children under a certain age are not included, as it is not expected that they should know how to read and write. The age taken naturally affects the percentage. The United States does not count children under ten; Italy fixes the age at six. Naturally, the country which best enforces compulsory school attendance will show the lowest percentage.

The report of the United States Commissioner of Education for 1900 contains the following table for the different countries:

	Per cent.		Per cent.
Germany	0.11	Hungary	28.10
Switzerland	0.30	Greece	30.00
Scotland	3.57	Italy	38.30
Holland	4.00	Russia	61.70
France	4.90	Spain	68.10
England	5.80	Portugal	79.00
Belgium	12.80	Servia	86.00
Ireland	17.00	Rumania	89.00
Austria	23.80		

It is a matter of regret that the United States cannot stand at the head of this list, but the census gives the percentage as 10.7, thus placing the country between England and Belgium. The situation, however, is improving. The census of 1900 says: "Not only has there been an absolute decrease in the number of illiterates since 1880, although a much larger Indian population is comprehended by the figures of the present census than heretofore, but the illiterate population now represents less than one-ninth of the entire population considered as compared with a little more than one-sixth in 1880." That much remains to be done is evident from the fact that 10.9 per cent. of the voters are illiterate. Of the total number of illiterates, 15.5 per cent. could read, but not write. The illiteracy of the whites was 6.2 per cent., as compared with 44.5 per cent. of the negroes. The native whites have a percentage of 6.2, as against 12.9 per cent. of the foreign-born whites. It may seem curious that whites of native parents show a percentage of 5.7 to 1.6 for whites born of foreign parents, but the explanation is that a very large proportion of the native born are living in country districts, while whites of foreign parents are largely in the towns and cities and have better school facilities. This fact suggests a comparison of city and country. The rate of illiteracy among white males over twenty-one years of age in cities of 25,000 and over, and for those outside the cities, is shown for various parts of the country by the following table:

	In cities of 25,000 and over	Outside the cities
North Atlantic division	5.8	7.3
South Atlantic division	3.0	12.8
South Central division	3.4	12.6
North Central division	3.3	4.6
Western division	1.7	5.0

The high average in the Southern States is to be explained by the lack of proper school facilities in the rural districts. The illiteracy of the negroes is very large, but is steadily decreasing. The Indians show a percentage of 56.2.

Within the various States there is also great divergency in the percentages, showing unequal conditions. Taking one State from each division of the country and showing the average illiteracy of the white males of voting age, and also the highest percentage in any county in the State, gives the following:

Average outside cities of 25,000		Given county showing highest percentage	
Massachusetts	6.6%	Dukes County	8.8%
Delaware	10.8%	Sussex County	15.2%
Alabama	14.1%	Cleburne County	22.5%
Iowa	2.6%	Mills County	4.1%
Montana	3.5%	Missoula County	8.5%

Comparing the sexes, the males constitute 48.7 per cent. of the illiterates, the females 51.3 per cent. Consult: *Census of the United States*, 1900, vol. ii.; *Annual Reports of the Commissioner of Education* (Washington); Reports of Ministers and Departments of Education of various European countries.

ILLUMINATED DOCTOR, THE (Lat. *Doctor Illuminatus*). A title given to Raymond Lully and to Johann Tauler (qq.v.).

ILLU'MINA'TI (Lat. nom. pl., enlightened). A name which has been borne by four different societies. (1) The earliest was that of the *Alombrados* in Spain, followers of a seductive mysticism, curiously compounded of Gnosticism, Lutheranism, and Buddhism. It spread rapidly through Spain about the middle of the sixteenth century, though vigorously combated by the apostle of Andalusia, John of Avila, and by Ignatius Loyola. It was finally suppressed by the Inquisition, though it lingered until the middle of the seventeenth century, and had a few scattered followers even at the beginning of the eighteenth. Consult Pelayo, *Historia de los*

heterodoxos españoles (Madrid, 1880). (2) A group of enthusiasts and visionaries, known as *Guérinets*, in France about 1684. (3) An association of mystics in Belgium in the latter half of the eighteenth century. (4) A society to which the name is now most commonly applied, the *Order of the Illuminati*, which was founded at Ingolstadt on May 1, 1776, and soon spread over almost all the Roman Catholic parts of Germany. Its founder at first called it the 'Order of the Perfectibilists.' It owed its existence to Adam Weishaupt, professor of canon law at Ingolstadt, a man of superior abilities and much benevolence, but deficient in practical knowledge of mankind. Impatient of restraints imposed on the human mind, he conceived the idea of forming an association which should consist of the choicest spirits, labor for the establishment of the dominion of reason, and promote religious and political enlightenment and emancipation. Religious dogmas and forms of worship were to be rejected, a system of deism was to be propagated together with republican opinions. The accession of Baron von Knigge to the new Order, and the support which it received from the Freemasons, led to its rapid extension. Weishaupt's knowledge of the Order of the Jesuits, whose pupil he had been, led him to borrow some of their methods for the accomplishment of what he regarded as the most opposite ends; and the Illuminati were soon involved in a system of mutual espionage, confession, and the like, essentially inconsistent with true freedom, but calculated to place the threads all in one hand by which the holy legion was to be led on, as it was imagined, to the benefaction of mankind. But, from this cause, the dissolution of the Order soon ensued. Weishaupt and Knigge, its two leaders, quarreled with one another. The Order began to be openly denounced as dangerous, and on June 22, 1784, an edict was issued by the Elector of Bavaria for its suppression, which was followed by others March 2, 1785, of a more drastic character, and under the prosecution ensuing the Order was suppressed. Weishaupt was removed from his professorship. He returned to Gotha, where he was received and died as Court Councilor, in 1830, at the age of 82. Various other members were severely punished, and the form of justice was not strictly observed in the proceedings against them. Great importance was at one time attached to the Order of the Illuminati, whose secret influence was regarded as a principal cause of many of the political events of the time of the French Revolution. Consult Kloss, *Bibliographie der Freimaurerei und der mit ihr in Verbindung gesetzten geheimen Gesellschaften* (Frankfort, 1844).

ILLUMINATING. See MANUSCRIPTS, ILLUMINATED.

ILLUPI, il'lū-pī (East Indian name), **ILLUPIE, ELLOOPA** (*Bassia longifolia*). An East Indian evergreen tree. The bark is prescribed in cases of itch; the gummy juice is employed as a remedy for rheumatism; the leaves and the milky juice of the immature fruit are also used in medicine; the flowers, roasted or boiled, furnish an article of food, and the seeds yield a greenish fixed oil, known as illupi-oil.

ILLUSION (from Lat. *illusio*, mockery, from *illudere*, to mock, from *in*, in + *ludere*, to play). In general, a distorted or abnormal perception (q.v.). The word is used in English psychology in two principal senses: (1) As the counterpart of hallucination (q.v.), "an assimilation of an hallucinatory character" (Wundt), a distortion or misinterpretation of the contents of perception, due to an abnormal irritability of the sensory centres of the brain-cortex. The distortion

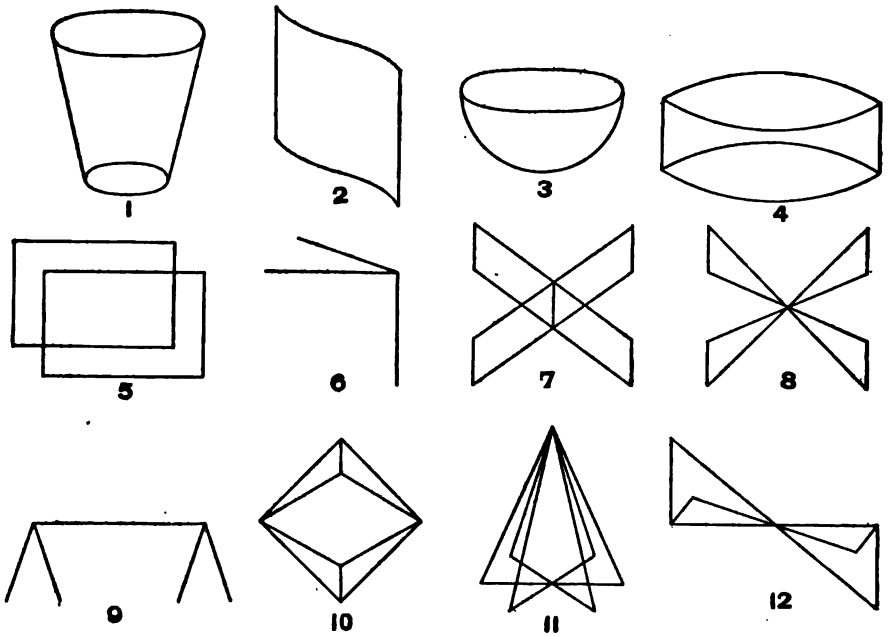

FIG. 1. ILLUSIONS OF REVERSIBLE PERSPECTIVE (from Titchener, *Experimental Psychology*).
Notice that even while you look at the figures, without changing the position of the book, the tops of the figures appear now away from and now toward you.

may take the form of subjective enhancement of the intensity of stimulus, as when a gentle knocking at the door is taken for the growl of thunder; it may involve a qualitative alteration of the stimulus, as when the monotonous sighing of the wind is heard as angelic music; or it may consist in a fantastic modeling and grouping of the forms of perceived objects, as when a dimly

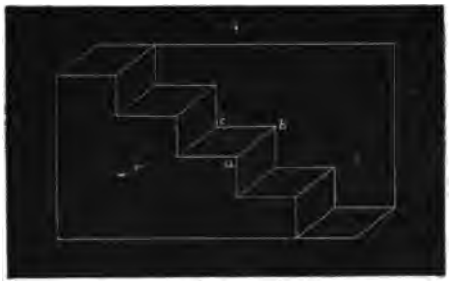

FIG. 2. SCHROEDER'S REVERSIBLE STAIR FIGURE.

The figure fluctuates as you look at it. If at first you seem to be looking at the top of the treads, the appearance soon changes, so that you seem to see the under side of the stairs.

seen stone or tree-stump is regarded as a ghost. Sane persons of imaginative disposition are liable to illusion, more especially at times of mental stress or overwork; and, indeed, the readiness with which we can find faces in the fire and monsters in the clouds shows how short is the path from normal to abnormal assimilation. We reach the stage of unquestioned abnormality with patients who interpret the half-heard conversation of passers-by as threats directed against their life, and see on the face of every stranger an expression of disgust or contempt or menace.

(2) In its second meaning, illusion is a perversion of the contents of perception due to structural or functional peculiarities of the

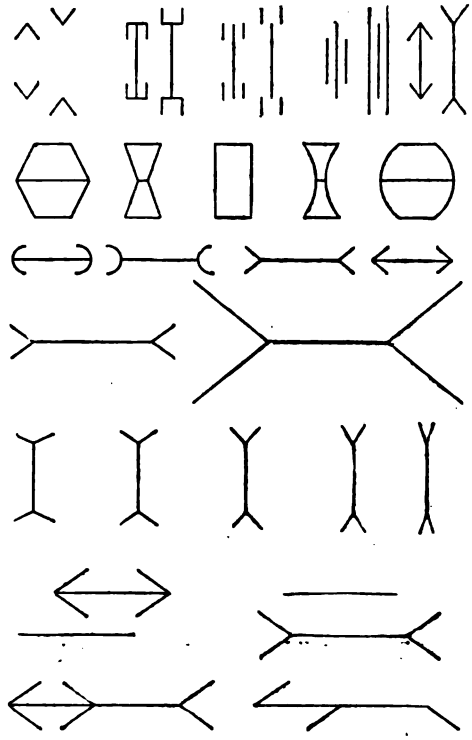

FIG. 4. THE ARROW-HEAD AND FEATHER ILLUSION (from Sanford, *Course in Experimental Psychology*).

In the first row, the distances between the points of the angles are equal, and the 1st, 2d, 4th, 6th, 8th, and 10th to 11th and 12th vertical lines are all equal in length to the distance between the points of the arrows, though they do not appear so. In the second row of figures the top and bottom lines are all equal; in the third and fourth rows the horizontal, in the fifth row the vertical, and in the sixth and seventh rows the horizontal lines are all equal in length. In the last row the parts of the horizontal lines marked off by the points of the angles are all equal.

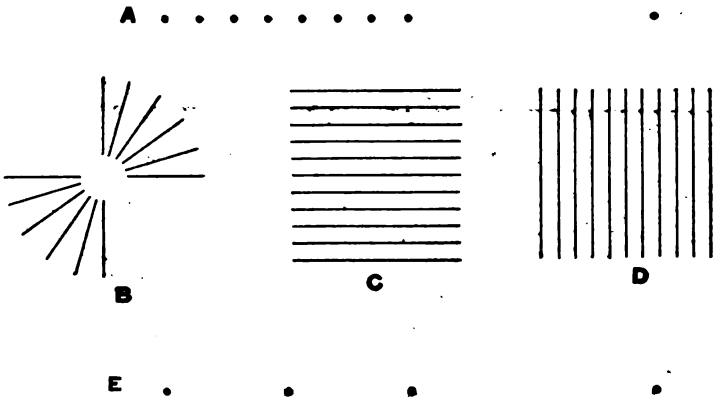

FIG. 3. VARIABLE ILLUSIONS OF EXTENT (from Sanford, *Course in Experimental Psychology*).

In A the space covered by the 8 dots at the left seems greater than that between the 8 and the one at the extreme right. In B the quadrants with inscribed radii appear greater than those that are empty. The figures C and D (Helmholtz's Squares) have a slightly oblong appearance. Figure E is a variant of A, the illusion being the reverse of that in A.

sense-organs. So far from being abnormal, this form of illusion is both natural and necessary. We speak of the perceptions as 'illusory' simply because they are of a character different from that which our previous knowledge of the stimuli, or our experience under other conditions, would lead us to expect. For instance, we know that all four sides of a square are equal. We expect, therefore, that a square will look as high as it is broad. As a matter of fact, the perfect square always looks like a rectangle whose vertical dimension is somewhat greater than the horizontal. Again, we are extremely familiar with the appearance of the circle, which we have seen in all sorts of figures and under the most varied conditions. When, then, we inscribe a square in a given circle, we do not expect that the appearance of circularity will be affected. In actual fact, the circle seems to be pinched in, at the points where its circumference is touched by

the angles of the square, so that we perceive not a circle at all, but four arcs apparently belonging to circles of less radius than the circle which should include the square. No one whose vision is normal can escape these illusions; their occurrence is, as we shall see, intrinsic to the

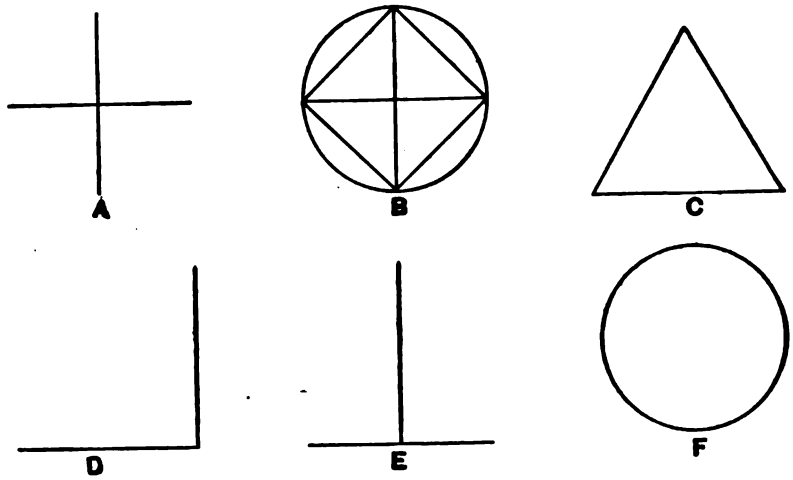

FIG. 5. CONSTANT ILLUSIONS OF EXTENT (from Titchener, *Experimental Psychology*).
The vertical dimensions appear to be greater than the horizontal dimensions of all the figures.

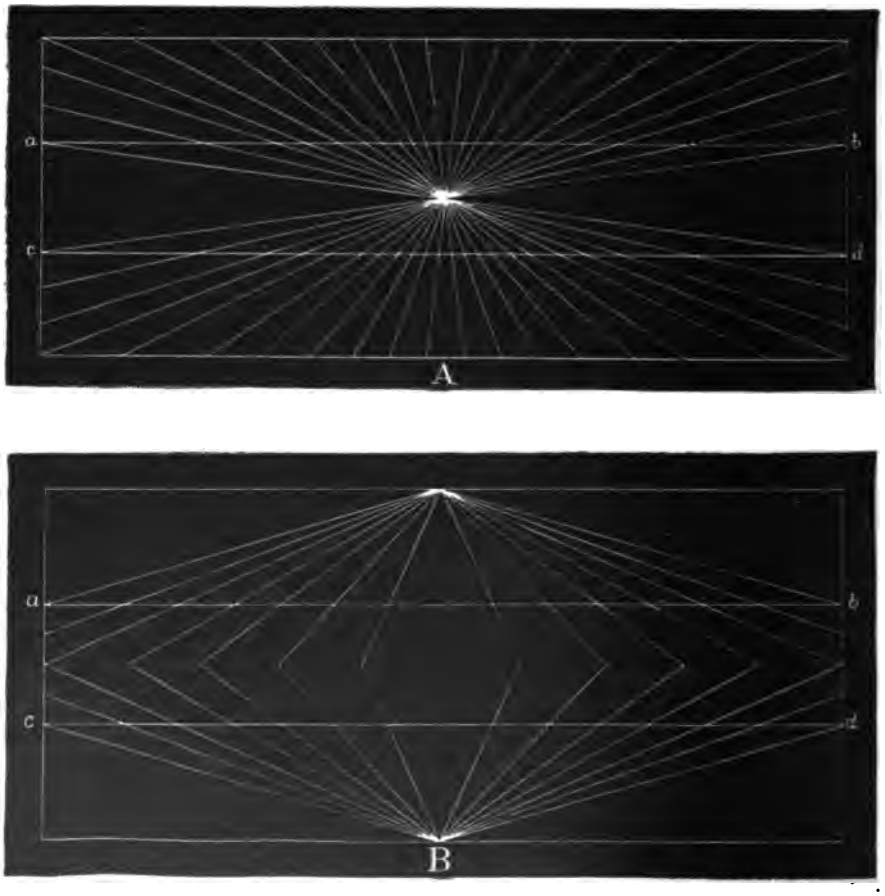

FIG. 6. VARIABLE ILLUSIONS OF DIRECTION (A the Hering figure, B Wundt's figure).
The parallel lines *ab* and *cd* in A seem to be nearer together at the ends than in the middle. In B the opposite is the case.

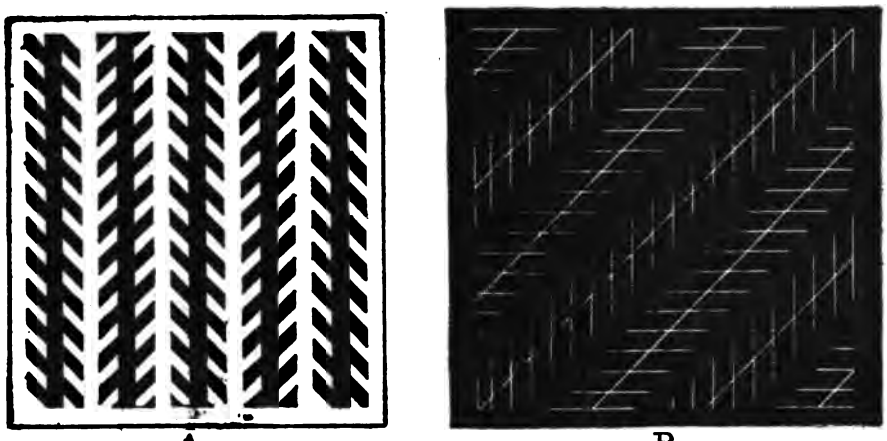

FIG. 7. VARIABLE ILLUSIONS OF DIRECTIONS (Zöllner's Figures).
In A the vertical lines and in B the diagonal lines in the square do not appear parallel, though they are.

working of the eye as a 'space organ'; the perceptions are illusory only in the sense that they conflict with our other knowledge, i.e. with the verdict of the 'mathematical' or 'measuring' eye.

The most important of these 'normal' illusions

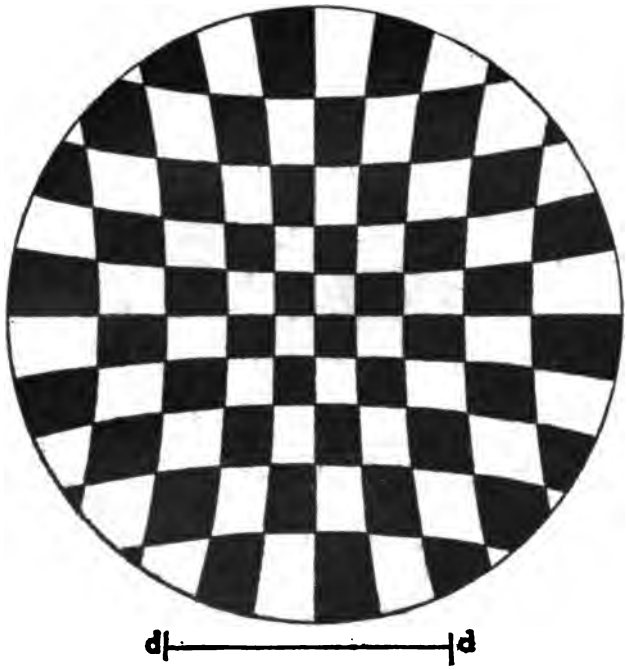

FIG. 8. CONSTANT ILLUSION OF DIRECTION (Von Recklinghausen).
Look at the centre of the figure with one eye, and the lines will appear to be perpendicular to each other and make squares.

are the spatial illusions of touch and sight. The latter, which were first demonstrated by J. Oppel (1815-94) in certain simple geometrical figures, have been termed collectively, the *geometrical optical illusions*. They are exceedingly numerous, and explanations have been almost as plentiful as illusions. Two attempts at systematic treatment have, however, been made by later investigators; the one by Wundt (q.v.), who seeks, so far as possible, to account for the illusions in physiological terms (fixation and eye-movement); the other by Lipps (q.v.), who offers a 'mechanical æsthetic' principle of explanation. Lipps's theory is, in brief, that we read into the lines and figures in question forces and counterforces, strivings and resistances, akin to those which we experience in ourselves; so that the column 'seeks' or 'strives' to rise, the horizontal line to stretch itself, the circle to 'hold itself together,' etc. We shall here give Wundt's classification and explanation, on the ground that, in matters of perception, physiological conditions must always have the priority over psychological.

The first group of geometrical optical illusions contains (a) the illusions of reversible perspective. It is a familiar fact that many outline figures—a bowl, an open book, a cube, a stairway—will 'turn inside out' in the most perplexing way as one looks at them. Even two crossed lines, drawn X-wise upon a sheet of paper, may be made to take on the appearance of a right-angled cross, seen in perspective, with either the lower or the higher point of the line which forms the horizontal arms nearer to the observer. Very little practice suffices to show that the direction of perspective depends here upon the point fixated and the course along which the eye moves; the point of fixation is the point nearer the observer, and movement of the eye toward a given point brings that, in its turn, to the front of the figure. (b) Next follow the illusions of extent, variable and constant. A dotted line looks longer than a drawn line of equal objective length, for the reason that it offers more halting places as the eye moves along it. Draw an outline square;

then a group of horizontal lines, filling the same area as the square; and then a similar group of vertical lines. The horizontal group looks

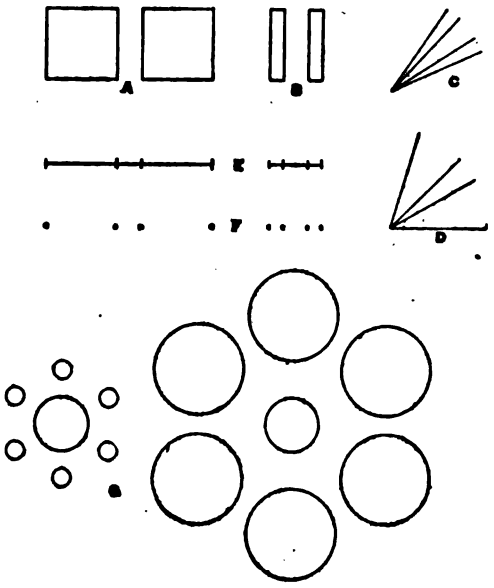

FIG. 9. ASSOCIATIVE ILLUSIONS (from Sanford, *Course in Experimental Psychology*).

For A and B see text. C and D show the same angle differently estimated. E and F are the same kind of illusion as A and B. In G the circle surrounded by small circles is the same in size as that surrounded by large circles, though it appears larger.

higher, the vertical group broader, than the objectively equal square, for the reason, again, that the grouped lines offer more obstacles to the passage of the eye over the area of the figure. One of the most disputed figures of this class is the illusion of Müller-Lyer, or the arrow-head and feather illusion. Draw two vertical or horizontal lines of equal length. Tip the two ends

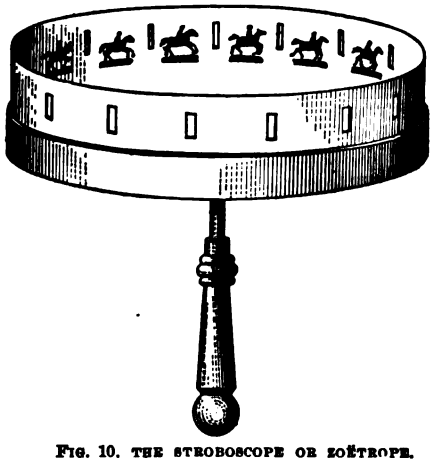

FIG. 10. THE STROBOSCOPE OR ZOËTROPE.

Looking at the figures through the slits in the rim, you get, when the instrument is rotated, an effect similar to and depending on the same causes as that of the kinetoscope.

of the one with oblique lines directed inward (arrow-heads), and the two ends of the other with oblique lines of the same length directed outward (arrow feathers); the latter appears considerably the longer of the two. Wundt's explanation is that the inward-going obliques offer a check to the passage of the eye along the principal line, while the outward-going obliques favor a continuance of eye-movement. The constant illusions of extent (due to asymmetries of muscular action about the eyeball) are summed up in a right-angled and equal-armed cross. The vertical line in this figure seems to be longer than the horizontal; the upper vertical arm longer than the lower; and, in monocular vision, the outer horizontal arm looks longer than the inner. (c) Thirdly, we have variable and constant illusions of direction. Draw a large outline square, marking in one of the diagonals, and three or four lines parallel to the diagonal, at equal distances on either side of it. Now proceed to cross-hatch the oblique lines, cutting the diagonal with short vertical pieces, the two adjoining obliques with short horizontal pieces, the two oblique lines next beyond these with verticals again, the two next with horizontals, and so forth. Notice that the parallel obliques no longer look parallel, but appear to converge and diverge alternately. The explanation of this and similar illusions is that small angles are overestimated, and large angles relatively underestimated; and the reason for such overestimation, again, is that it takes more muscular effort and energy to start a movement of the eye than it does to continue a movement already begun. The constant illusion of direction is that, under certain conditions of fixation, hyperbolas are perceived as straight lines, owing to the concavity of the retina. (d) There remains a group of illusions which Wundt classes as 'associative,' i.e. as psychological, not physiological, in origin.

FIG. 11. AN ILLUSION OF MOVEMENT.

Move the figure around in a circle in its own plane, and observe the apparent motion of the six outer disks and the central cog-wheel. (From Sanford, *Course in Experimental Psychology*.)

If equal short horizontal lines are drawn, some grouped closely together, and some widely spaced, the latter appear longer than the former; the length of the line is 'assimilated' to the size of the interspaces. In the same way, if two broad

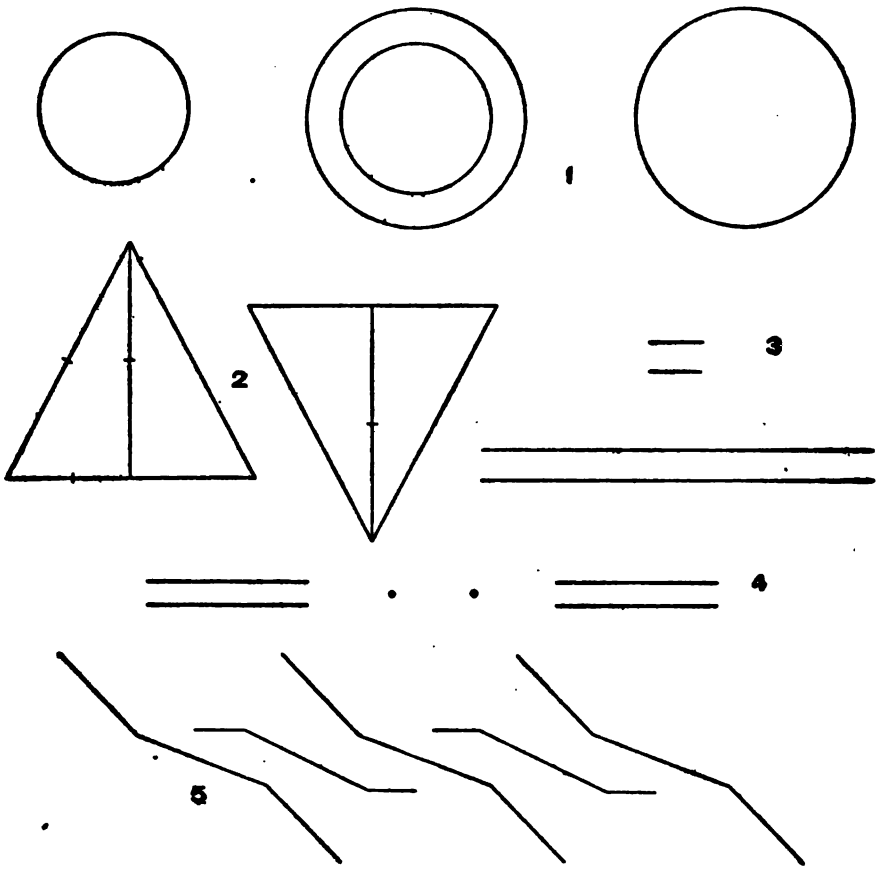

FIG. 12. MIXED ILLUSIONS (from Titchener, *Experimental Psychology*).

In 1 compare the size of left-hand circle with inner circle in middle figure, also outer circle of middle figure with right-hand circle. In 2 the half of the altitude of an equilateral triangle that is nearer the vertex looks shorter than the other half. In 3 the shorter parallel lines seem farther apart than the longer parallels do (Wundt). In 4 "the dots are really at the level of the lower line, but seem a little too high, especially when the figure is held so as to make the lines oblique" (Sanford). In 5 the middle sections of the five broken lines are all parallel, though they appear to be otherwise.

and two narrow rectangles are drawn, of equal height and separated by equal spaces, the space between the larger rectangles will look smaller than the space between the narrower; the interspaces are differently estimated by 'contrast' with the adjacent figures. (See CONTRAST.) (e) Finally, we may, of course, have figures in which several of the above-mentioned motives, physiological and psychological, coöperate to produce the illusion.

We may further include under the general heading of optical illusions: (1) the physical illusions produced by mirrors, lenses, prisms, etc. (see MIRAGE; REFLECTION; REFRACTION); (2) the physiological illusions of color (see AFTER-IMAGE; CONTRAST); (3) illusions of movement, such as, e.g. the apparent movement of the moon when viewed through drifting clouds; and (4) illusions of distance. Under the latter category falls the apparent enlargement of sun and moon when seen near the horizon. The distance between the observing eye and the horizon seems to be longer (owing to the haziness of the air, the number of intervening objects, etc.) than the distance between the eye and the zenith. But if two objects subtend the same visual angle (give the same retinal image) at different distances, the one which is farther off must be larger than the other.

Touch, no less than sight, is subject to spatial illusion. (a) If two compass points are set down upon the skin, first on an area of greater and then on an area of less sensitivity, the distance between them will seem to be greater in the former case than in the latter. Give the points, e.g. a separation that enables them to be clearly perceived as distinct impressions when they are set crosswise upon the skin of the upper arm. Now draw the compasses down the inner surface of the arm, to forearm, wrist, and fingertips. The two parallel lines which they describe will appear to converge and diverge upon the regions of less and greater sensitivity. Or set the points down, vertically, upon the upper and lower lips, and draw the compasses outward, toward the ear. The points seem to converge as they travel over the skin. (b) Cross the tip of the second over that of the third finger, and place a marble or other small object between the crossed tips. Since the two surfaces now stimulated are never affected, in ordinary life, by one and the same object, but only by two different

objects, the single marble is 'felt' as two. This illusion of localization is described by Aristotle, in his tract *On Dreams*. (c) Draw a given length of coarse thread between the finger and thumb, at first slowly, and then more quickly. The thread appears to be much longer in the former case; the separate pressure sensations have a longer time in which to run their course undisturbed by subsequent pressures, and fullness of sensation is interpreted as length of thread. (d) If a point be moved over the skin at a uniform rate, it will seem to travel more quickly as it crosses areas of greater sensitivity, and to become slow again as it enters regions of less sensitivity.

A striking illusion of temperature is described by the English philosopher Locke (q.v.). Hold the one hand in a bowl of heated, the other in a bowl of cold water. After a short time, plunge both hands into a bowl of lukewarm water. This will appear hot to the cooled, and cold to the heated hand. The illusion is due to the preceding adaptation of the temperature-organs of the skin. (See CUTANEOUS SENSATION.) An equally striking illusion in the sphere of kinæsthetic sensation is afforded by the fact that a small weight always appears heavier than a larger weight of the same objective heaviness. The smaller weight stimulates intensively a limited cutaneous area, with its underlying tissues; the larger weight stimulates lightly a large area of skin, and leaves the underlying tissues practically unaffected. These instances, which could be multiplied almost indefinitely, show clearly that the term 'illusion' implies nothing more than a discrepancy between perception and objective measurement.

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ILLUSION COMIQUE, ē'lü'zyôn' kō'mēk', L' (Fr., the comic illusion). A complicated and improbable play by Corneille (1636) embracing a comedy and a tragedy.

ILLUSIONS, OPTICAL. See ILLUSION.

ILLUSIONS PERDUES, ē'lü'zyôn' pâr'dü', LES (Fr., The Lost Illusions). A work in three parts by Balzac (1837-43), which earned the hostility of the press by reason of its picture of the feuilletonists.

ILLUSTRATED LONDON NEWS. The oldest illustrated weekly, founded in 1842, by Herbert Ingram.

ILLUSTRATION. A term generally used in reference to the pictorial decoration and illustration of books. In the more usual sense, book illustration is the addition to a book of pictures (and indirectly of maps and plans) which may aid in the right understanding of the text. This service they may render in a serious and almost scientific way by giving views of buildings, accurate drawings or other reproductions of dress, portraits of individuals, copies of works of art named, and the like, these being things which are impossible to describe in words, and of which a clear presentation to the reader is desired. On the other hand, the illustrations may also be merely extensions of the text; thus, when Cruikshank or Leech illustrates *Oliver Twist* or *Mr. Jorrock's Hunt*, the description or narrative passage of the text is in a sense repeated by the artist—a part of the story is retold in line and light and shade.

A book consisting almost entirely of pictures, or having those for its principal subject, cannot be said to be an illustrated book. Thus the volumes of the Paris *Salon*, with large photogravures of the paintings and statuary of the year with a text which is rather perfunctory, or that little volume which made the delight of schoolboys fifty years ago, *Mr. Jonathan Oldbuck*, or in more recent times, the albums of Caran D'Ache and Forain, or Howard Pyle's or T. S. Sullivant's "Fables" are of this class. In the one case the pictures are the book, and the text is not absolutely needed; in the other case the pictures and the brief legends or the re-written Æsop Fable a hundred words long, form together a humorous study of which the picture is much the more important part. This is hardly illustration. And in like manner when the pictures drawn for a book are large, and few in number, and are printed on separate plates and bound in, they have less the air of illustration, and indeed, serve less well their purpose as illustration, than those which, being smaller, are inserted in the text. The very admirable pictures by Albert Lynch given with the quarto edition of Maupassant's *Pierre et Jean*, although spoken of with great respect by excellent judges, and although admirable compositions, are yet less effective as illustrations than the less pretentious and really less able drawings by Merbach, and others which are scattered through the duodecimo volumes of Daudet's *L'Immortel* or Bourget's *Mensonges*, and immeasurably inferior to the roughly cut headpieces by Meissonier in *Les Contes Kémois*. From this point of view the famous 'vignettes' of the eighteenth century illustrated books are the least satisfactory of illustrations. They render, indeed, a single scene or incident of the story, but they are wholly unrealistic in character, the figures being posed without general truth of attitude or truth of gesture, and while they are attractive and instructive as works of the draughtsman and of the engraver's art, they are also models of all that is to be avoided in book illustration.

HISTORY. The history of illustration is hard to treat as a continuous narrative. The Egyptian manuscript *Books of the Dead* contain numbers of delicate and very ornamental paintings, usually of small size and combined with the text in an admirable way; and the paintings in the Ani Papyrus in the British Museum, and a few other recently discovered manuscripts, have larger drawings. On the other hand, we are without any knowledge of Greek manuscripts with drawings accompanying them. Of Roman Imperial manuscripts with illustrations there is nothing known prior to the Christian epoch; but the paintings which accompany the famous *Genesis* of the Vienna Museum and a very few contemporary books remain to us. It is the opinion of excellent critics that these monuments of a decadent epoch will mislead us, if we try to

sculpture had declined; but mosaic was just beginning its magnificent development, and the most startling examples of Roman vaulted construction in solid mortar masonry date also from that time. Moreover, the antique look and the pagan spirit are still to be found in the Christian illustrations of the fourth and fifth centuries, whereas the Church has had its own way with the mediæval manuscripts of the eleventh and twelfth centuries; and those of much earlier date, like the Irish and the Anglo-Saxon, are too barbaric to have any relation to this inquiry in their paintings—whatever the illuminated page may have of decorative effectiveness.

The mediæval manuscripts combine illustration by means of miniatures with the decoration of the page in a very wonderful way. (See MANUSCRIPTS, ILLUMINATION OF.) With the revival of learning in Italy, the painting of miniatures became very much more elaborate as an art, and some of these miniatures of early time are finished pictures with background, distance, and everything that a modern landscape or genre picture has, except cast shadows. Even the shadows appear toward the close of the fifteenth century, and with the shadows comes the end of illumination considered as a separate art. The famous *Breviario Grimani* is, however, without shadows, and yet is dated at the very close of the fifteenth century; and the borders which Albert Dürer drew for the margins of the printed book called *Maximilian's Prayer Book*, and which were executed in 1515, have their elaborate groups of busy little figures drawn without traceable or outlined shadows, although the figures may be partly relieved on a dark shading.

With the earliest printed books come the earliest wood-engravings, which are of exclusively artistic character. The *Hypnerotomachia* of the so-called Poliphilo (Francisco Colonna), printed in 1499, has large and very open drawings, sometimes filling nearly the whole of a small folio page. The *Epistles of Saint Jerome*, of 1497, has a great number of small illustrations, not larger than a lady's visiting card; but full of character and containing sometimes a dozen figures boldly drawn and skillfully grouped. The several illustrated editions of the *Divine Comedy* of Dante, of which perhaps the earliest is of 1497, have woodcuts and illustrations also in outline. During the next century this same tendency to simple and rather formal illustration, in outline except for some arbitrary shading, continues; and it is not to be doubted that the expectation was that hand coloring would be called in to complete these designs. Books, with their pictures elaborately colored by hand, remain to us from this epoch. In the National Library in Paris a special permanent exhibition of these is maintained. The constant reprinting of the early books tended to preserve the abstract and simple character of illustration, and it is not until the middle of the sixteenth century, with the copper engraved plates illustrating the different manuals of sword-play, and the delicate little woodcuts illustrating the Old Testament, and the "Dance of Death" ascribed to Holbein, that a freer style is introduced. Entire freedom in drawing for wood-engraving came slowly; even Albert quarter of the sixteenth century complete light and shade is sought for, as in the woodcuts ascribed to Jost Amman, published by Feyerabend of Frankfort, and those of Vecellia, dated 1590. In the seventeenth century were published curious books of history and topography, sometimes adorned with crowded battle pieces, or, like the curious history of the wars between England, France, and the United Provinces, with views of sea-fights, minutely engraved on copper, and effective enough in a black and crowded way. One of these pictures shows the great fire of London in 1666, the book being printed two years later. The books published by Matthäus Merian of Frankfort with the admirable views of German cities are of this time: and Wenceslaus Hollar began his wonderful career of simple and perfect work as an engraver in Merian's employ. Book illustration was, however, feeble during the hundred years from 1650 to 1750, and the French *Livres à Vignette* mentioned above are remarkable in spite of their inadequacy as helping to restore the art. Wood-engraving was revived in the course of the eighteenth century, and as early as 1775 Thomas Bewick produced his illustrations of *Æsop's Fables*, and his natural history books, the *Quadrupeds* and the *Birds;* the little narrative drawings serving as tail-pieces to the chapters of the quadrupeds forming the most important step in book illustration which had been made for a century.

The great modern movement in book illustration begins about 1830 with the woodcuts made for French classics, such as Molière and Bernardin de Saint-Pierre; and in England with the earliest books illustrated by Cruikshank. The work of Rowlandson, ending as Cruikshank began, must have influenced him greatly at first, but Cruikshank soon worked out of the exaggerated and purely farcical manner which the earlier artist retained to his death, and became an excellent illustrator of books, keeping up his full power until an advanced age. His work exists in great abundance in woodcut, and also in a simple kind of etching, in which last process he was followed and surpassed as to technical excellence by John Leech.

For the important influence of the humorous journals, see CARICATURE. The foundation of *Punch* led to the creation of a whole school of illustrations, and Leech, as a draughtsman for wood-engraving, was the chief of Englishmen of his time, keeping up his power till his death in 1864. Richard Doyle and Hablot K. Browne were his contemporaries; Du Maurier and Charles Keene, the latter one of the greatest artists in black and white, were his successors. All these men did much work in illustrating separate books. The Frenchmen Jean François, Gigoux, Tony Johannot, Sulpice Chevallier (Gavarni) were their contemporaries in the French world of books. Adolph Menzel, as being mainly a lithographer, is less obviously an illustrator of books; he is rather a painter who has made many designs to a single general theme, like the *Life of Frederick the Great*—designs which have to be published in large folios.

The book illustrations of the years since 1850 are remarkable for the introduction of photo-

graphic process prints (see PHOTO-ENGRAVING); but there has been also a notable rise and decline of wood-engraving (q.v.). Colored illustrations can be produced now at reasonable cost, and some of them are of great beauty. (See THREE-COLOR PROCESS; LITHOGRAPHY.) Of decisive influence upon the development of illustration of the present day are the numerous illustrated magazines and newspapers in America and Europe. See PERIODICALS; NEWSPAPERS.

That form of illustration which is sometimes called Extra Illustration or Grangerism (from James Granger, died 1776, a celebrated print collector) is the insertion into a book of pictures which did not originally belong to it. Thus, a history or an historical novel may be illustrated by collecting portraits of men famous at the time dealt with in the book, and scenes of historical interest previously drawn and engraved, and these prints may be bound into the book or simply laid between its leaves. In this way a book of one volume may be extended to a dozen, and as some of the plates will be large, the smaller ones are perhaps 'inlaid,' that is, their edges fitted into a hole cut in a larger sheet of paper while the printed leaves are treated in the same way, so that all the leaves of the enlarged book may be of the same size. This proceeding has been the cause of the destruction of many valuable books, for a whole volume will be sacrificed for the sake of its frontispiece or its illustrated title-page, or marred by the extraction from it of one or two portraits.

ILLUSTRATION, ē'lu'strā'syŏN', L'. An illustrated Paris weekly founded in 1843, modeled on the *London Illustrated News*.

ILLUSTRIERTE ZEITUNG, ēl'lōōs'trēr'tə tsī'tōōng (Ger., illustrated news). The oldest German illustrated weekly, founded in Leipzig, by J. J. Weber, in 1843.

ILLYRIANS (Lat. *Illyria*, from Gk. Ἰλλυριοί, *Illyrioi*, from Ἰλλυρις, *Illyris*, Ἰλλυρία, *Illyria*, Illyria). A people of doubtful ethnic kinship, who at the dawn of history inhabited the northern and eastern shores of the Adriatic and the northwestern part of modern Greece. From this latter region a migration took place at a very early period across the Ionian Sea to the southeastern corner of Italy. It seems on the whole plausible to regard the modern Albanians as the representatives of the Illyrians, both in ethnology and in language. See ALBANIA; ALBANIAN LANGUAGE.

ILLYRICUM (Lat., from Gk. Ἰλλυρικόν, *Illyrikon*, from Ἰλλυρίς, *Illyris*, Ἰλλυρία, *Illyria*, Illyria). The Roman name of a country whose limits in ancient times varied very considerably. In the fourth century B.C. the Illyrians inhabited the eastern coast of the Adriatic Sea and adjacent islands, with the western parts of Macedonia as far south as Epirus. Philip of Macedon conquered the country as far as the river Drilon (modern Drino), and thence arose the division into *Illyris Græca* and *Illyris Barbara*, afterwards *Romana*. The former, now Albania (q.v.), was incorporated with Macedonia. *Illyris Barbara* or *Romana* was divided into Iapydia, Liburnia, and Dalmatia. The Illyrians were much addicted to piracy, which soon brought them into collision with the Romans, who waged a successful war against the Illyrian Queen, Teuta, in B.C. 229. About B.C. 168 the southern Illyrians became subject to Rome, but the subjugation of the northern Illyrians was not effected until the time of Augustus. Under the Roman Empire the country of the Illyrians, under the name of Dalmatia (in the wider sense), formed the southern part of the diocese of Illyricum, which extended as far north as the Danube. It is represented in modern times by part of Croatia, nearly all of Bosnia, Dalmatia, Herzegovina, Montenegro, and a part of Albania. Under Constantine the prefecture of Illyricum embraced a great part of the Roman dominions in Europe east of the Adriatic. A decree of Napoleon, October 14, 1809, organized the dominion known as the Illyrian Provinces, erected out of territories taken from Austria. It comprised Carniola, part of Carinthia, most of Croatia, Dalmatia, Istria, Fiume, etc. At his fall these provinces were united as a kingdom to the Austrian Empire, and some alterations were made in its boundaries. The kingdom was divided into the two governments of Laibach and Triest, Laibach being the capital, which arrangement subsisted till 1849, when it was subdivided, for administrative purposes, into the duchies of Carinthia and Carniola, and the coast district, containing Görz and Gradisca, Istria and Triest.

ILMEN, il'mĕn *or* ē'ly'-mā-ny'. A lake in the Russian Government of Novgorod, situated about 60 feet above the level of the Gulf of Finland (Map: Russia, D 3). Area, over 350 square miles. The banks are mostly low, and in some parts marshy. Ilmen receives many streams, and discharges its superfluous water into Lake Ladoga through the Volkhov. The fisheries of the lake are extensive, and exploited largely by artels (q.v.). There is steam navigation during the summer between Novgorod and Staraia Russa.

ILMENITE (so called from the *Ilmen* mountains in the southern Urals), or MENACCANITE. A mineral with the composition $(FeTi)_2O_3$, possessing a semi-metallic lustre, and a color ranging from brown to iron-black. It occurs in scattered grains and crystals as an abundant constituent of certain igneous rocks, including basalt, diabase, and gabbro, and of magnetic iron ore. The proportion of titanium, which varies within wide limits, gives rise to a number of varieties of ilmenite, such as *kibdelophane*, *crichtonite*, *hystalite*, *mohsite*, etc. When mixed with magnetite (titaniferous iron ore) in any considerable amount it greatly lessens the value of the latter for smelting purposes. Ilmenite is found at various localities in Russia, Norway, France, in the Adirondacks of New York, in Connecticut, Massachusetts, and in Canada.

ILMENIUM (Neo-Lat., from the *Ilmen* mountains in the southern Urals). A name given to a mixture of columbium and tantalum, which was at one time mistaken for an element.

ILOCANO, ē'lō-kä'nō. A Malay people widely spread in Northwestern Luzon, having distinctive speech, alphabet, and culture. See PHILIPPINE ISLANDS.

ILOCOS NORTE, ē-lō'kŏs nōr'tā. A Philippine province occupying the northwestern corner of the island of Luzon. It is bounded on the west and north by the China Sea, on the east by the provinces of Cagayán and Abra, and on the south by the latter and Ilocos Sur. Its area is 1873 square miles. It is traversed from north to south by a chain of mountains rising in Mount

Burnay to a height of 6300 feet, and covered with forests producing rich cabinet woods. As the province is exposed in winter to the north winds, its climate is more tempered, and more agreeable to foreigners than that of other parts of the island. The province is well watered, the principal river being the Pagsan or Laoag, and the valleys are very fertile, producing, besides the grains and fruits of the temperate zone, a fine quality of rice, good cotton and tobacco, and sugar. Iron ore is abundant. The *carabaos*, a species of ox or buffalo peculiar to the Philippines, is very numerous. The fisheries on the coast are also very lucrative, and on the whole the province is one of the best developed on the island. Communications are good; a high road leads through the province from Manila, and a railroad is projected from that city to Laoag (q.v.), the capital. Ilocos Norte was united with Ilocos Sur previous to 1818, when they were separated on account of their growing importance and population. Population, in 1900, 156,700.

ILOCOS SUR, sōōr. A Philippine province, situated in the northwestern part of the island of Luzon. It is bounded on the north by Ilocos Norte, on the east by Abra and Lepanto, on the south by Union, and on the west by the China Sea. It is a narrow strip of rather low and flat coastland with an area of 644 square miles. It is crossed by the large river Agra, and a number of smaller streams; the soil is very fertile, producing indigo, sugar, and cocoanuts, all of which are exported. There are manufactures of furniture and carriages, and the weaving of cotton textiles by the women in their homes is practiced all over the province. The towns are connected by good roads, though most of the rivers have to be forded, as there are few bridges. The high road and projected railroad from Manila to Laoag passes through the province. The population in 1900 was 172,836. The capital is Vigan (q.v.). See ILOCOS NORTE.

ILOILO, ē'lō-ē'lō. A province comprising the southern half of the island of Panay in the Philippines and about thirty, mostly small, outlying islands, one of which, however, Guimaras, is 30 miles long by 10 miles wide. The area of the province is 2600 square miles, and its population in 1900 was 472,798. It has a coast-line of 270 miles with numerous safe harbors and anchoring grounds, among which those of Iloilo and Concepcion are the most notable. The province is separated from those of Capiz and Antique on the north by a chain of rugged mountains covered with forests, from which numerous rivers and torrents flow to the sea, often bringing destructive floods. The climate, tempered by the constant monsoons, is much more moderate and far more healthful than that of Manila. The level lands, which constitute the greater part of the area of the province, are very productive, all kinds of tropical fruits flourishing; but the inhabitants are chiefly given to the cultivation of sugar and tobacco. The chief manufacturing industry is that of textiles such as homespun fabrics of sinamay, piña, jusi, etc. Commercial communication between the cities is easy and regular, the roads being generally in good condition. The greater part of the inhabitants consist of tribes of Bisayas, with many European and Chinese *Mestizos*, or half-breeds, in the cities, and a few Negritos in the mountains. The Bisayas were first converted to Christianity by the Augustine Fathers in the middle of the sixteenth century. The province suffered for a long time from the piratical Moros, and forts were built here by the Spaniards as early as 1581. In 1616 an unsuccessful attempt was made by the Dutch to capture Panay. At the end of the Spanish-American War in 1898 the natives were in complete possession of the island, and showed determined resistance to American authority. Capital, Iloilo (q.v.).

ILOILO. The capital of the Province of Iloilo (q.v.), situated on the southeastern shore of the island of Panay, on the strait separating Guimaras Island from the mainland (Map: Philippine Islands, F 7). It has an excellent harbor, and is, next to Manila, the chief commercial centre of the Philippines. Its chief exports are sugar, tobacco, rice, coffee, and dyewoods, and it supports several industrial establishments, among which are a machine-shop and a foundry. It is irregularly built, but has a number of prominent buildings, among them a cathedral, a seminary, and several Government buildings. Population, in 1898, 10,400. In February, 1899, it was bombarded and occupied by United States troops.

ILONGOS, ē-lōn'gōs. A town of the Philippine Islands. See HILONGOS.

ILONGOTE, ē'lōn-gō'tā. A wild Malay people, of Mongoloid type, in Middle Luzon. See PHILIPPINE ISLANDS.

ILOPANGO, ē'lō-pāŋ'gō. A lake in the Central American Republic of Salvador, situated in a fertile and beautiful plain surrounded by high hills, a short distance east of the capital (Map: Central America, C 4). Its water is saline and sulphurous and unfit to drink, though it abounds in fish. It is 10 miles long by 6 broad, and contains a number of islets, of which one was raised to about 400 feet by an eruption in 1879-80, and remains in the form of a volcanic cone.

ILORIN, ē-lō'rēn, or **ALORI**, ā-lō'rē. The capital of a British province of Northern Nigeria, West Africa, on the Asa, a tributary of the Niger, 170 miles northeast of Lagos (Map: Africa, E 4). Like Abeokeuta (q.v.), it was a municipal confederation of the Kingdom of Yoruba, established for mutual protection. The town is surrounded by a mud wall 12 miles in circumference, and has several mosques, Mohammedans predominating among the heterogeneous population of natives. It has an extensive caravan trade with Central Africa, and numerous local industries, including wood-carving, pottery, and leather manufactures. Population (estimated), in 1901, 50,000.

ILOW, ē'lō, CHRISTIAN, Baron (c.1585-1634). An Imperial general in the Thirty Years' War, born at Neumark. He fought bravely under Tilly at Stadtlohn (1623), and soon after was transferred to Wallenstein's army. He easily won the confidence of his general, and took part in the intrigues which resulted in the break between Wallenstein and the Emperor. He was assassinated at the banquet of Eger.

ILSE, ēl'zĕ, PRINCESS. In German legend, the daughter of the giant of the Ilsenstein, who threw herself into the flood when parted from her lover, and was changed into a water spirit.

I'LUS (Lat., from Gk. Ἴλος). In Greek mythology, the reputed founder of Troy. He was

born in Dardania, on Mount Ida, and was the son of Tros, great-grandson of Dardanus, and father of Laomedon. In an athletic contest in Phrygia he received, as the prize of victory, fifty youths and fifty maidens. In addition, at the command of the oracle, a spotted cow was given to him, and he was directed to follow her until she should lie down, and on that spot to establish a city. This spot was the hill of the Phrygian Ate, where he founded the town which from his name was called Ilios, and from the name of his father Troy. The Palladium came to him there as a sign from Zeus.

ILYA MUROMETS, ē-lyä' mōō'rō-mĕts (Russ., Elijah of Murom). The favorite hero of the Russian *bylina* (q.v.), a representative of the peasant class. The strongest of the 'younger paladins,' he spent his life in guarding his country against her enemies and in protecting widows and orphans. In extreme cases only did he shed blood. Usually the foe was frightened away by the exhibition of Ilya's strength in turning some mighty oak into splinters or some similar display of prowess.

IMAGE-WORSHIP. The use, in public or private religious services, of graven or painted representations of sacred persons or things, and especially the exhibition of honor, reverence, or worship to such representations. Under the old law, because the Jews were constantly tempted by the example of the surrounding idolatrous nations, the strictures with regard to the worship of images were very severe. There were images of the cherubim placed in the Holy of Holies, however, so that such representations were not entirely forbidden. There is no mention of the use of images in public or private worship in the New Testament, nor in the chronicles of the first century of Christianity. They seem to have been introduced very early, however, for Tertullian at the beginning of the third century mentions the image of the Good Shepherd as engraved upon chalices quite as if this were and had been for a long time a common practice. Crucifixes seem to have been introduced very early; this is proved by a graffito, often supposed to be a pagan caricature of Christianity, probably of the end of the second century, scratched upon the wall of a room in the palace of the Cæsars. (See GRAFFITTI.) It is a rude representation of a man standing in the attitude of prayer, with outstretched hands, before a grotesque caricature of the crucifixion, bearing the legend 'Alexamenus worships God.' The tombs of the Christians in the Roman catacombs, many of which are of a date anterior to Constantine, frequently have graven representations of the dove, of the cross, of the symbolical fish, of the ship, of Adam and Eve, of Moses striking the rock, of Jonah, of Daniel in the lion's den, of the Apostles Peter and Paul, and above all of the Good Shepherd. The chapels of the catacombs are profusely decorated with sacred representations, the age of which it is not easy to determine with accuracy, though some of them seem to come at least from the second century. After the condemnation of the Nestorian heresy in 430, statues and pictures of Christ, of the Virgin Mary, and the saints were very commonly used in public and private religious services and in churches and religious edifices. As the mass of the people became more ignorant in the sixth and seventh centuries, certain abuses with regard to the veneration of images in religious worship crept in. These led to a reaction against image-worship in the East, which culminated in the movement known as iconoclasm, because it commanded the breaking of images. The formal beginning of iconoclasm was an edict by the Emperor Leo III. (717-741), known in history as the Isaurian. The exact terms, as well as the exact date, of the edict are unknown, though Hefele places it in 726. It commanded the destruction of all pious images in public places. The removal of a famous image of Christ over the palace door caused a popular uprising in Constantinople. In Greece and Lower Italy the opposition to the edict was pronounced. The Patriarch of Constantinople refused to allow it to be put into force, and Pope Gregory II. (715-731) condemned it. Leo persisted, however, apparently influenced by the Caliph Yezid II., who set the example of destroying images in accordance with the Mohammedan religion. Saint John of Damascus (died about 760), who lived under the Caliph, wrote three discourses in defense of the use of images for religious purposes. Under Leo's successor, Constantine Copronymus, a council confirmed the Imperial edict. Leo IV. also upheld iconoclasm. Under his widow, Irene, however, the second Council of Nicæa (787) reaffirmed the orthodox views as to image-worship; but succeeding emperors, except Michael the Stammerer (820-829), who tried to effect a compromise, were iconoclasts. On February 19, 842, Theodora, widow of Theophilus (829-842), brought back the images in triumph to the Cathedral of Constantinople. This date is kept as the feast of orthodoxy. By an error the acts of the Nicene Council were sent in a garbled translation to Charlemagne. He objected to their publication in his realm in the *Libri Carolini*, now generally considered authentic, sent to Pope Hadrian I. (772-795) about 793. The Nicene Council solemnly declared that the worship to be paid to images is not true adoration, *latreia*, which is to be given to God alone, but *douleia*, or veneration. While the Greek verb Προσκυνεῖν, 'to worship,' is used, it is explained that it is only in the sense of honoring because they represent God or His saints, and because the honor which is given to images is referred to their prototypes. When the error of translation was explained, the misunderstanding ceased to exist. The Council of Trent reaffirmed the declarations and distinctions of the second Nicene Council as to image-worship, adding that there is "no virtue in images themselves on account of which they are to be worshiped; that no petition can be addressed to them; and that no trust is to be placed in them." The council advocates the true use of images, however, contending that they are of great advantage especially for the rude and unlearned, for whom they serve as memorials of the sufferings and of the mercy of Christ, as instructive records of the virtues of the saints, and exhortations to the imitation of their example and as incentives to the love of God and to the practice of piety. In certain parts of the world there are in Roman Catholic churches images for which there is a special veneration. It is well understood that it is not because any virtue resides in the image itself that it is believed that prayers are more frequently heard when said before it, but because of the special faith and fervor awakened by the traditions attached to it, and

the recorded examples of the effect of the mercy of God with which it is associated in the minds of the faithful. In the Eastern churches, especially the Russian, great reverence is paid to printed pictures of the saints, or representations in relief, called icons. Every house has one or more; and in the churches the iconostasis or screen which separates the sanctuary from the body of the church is covered with them. Statues, except of the angels, are not used.

The Reformers generally rejected the use of images as an unscriptural novelty, and stigmatized the Catholic practice as superstitious, or even idolatrous. The Zwinglian and subsequently the Calvinistic churches absolutely and entirely repudiated all use of images for the purpose of worship. Luther, on the contrary, while he condemned the Roman worship of images, regarded the simple use of them, even in the church for the purpose of instruction and as incentive to faith and devotion, as one of those indifferent things which may be permitted, although not of necessary institution. In the Lutheran churches of Germany and the northern kingdoms, pictures, crucifixes, and religious emblems are still freely retained. In all wholly Protestant communions images are entirely unknown, although their use has been freely revived in the Anglican communion of late years. Consult: Lüdtke, *Die Bilderverehrung und bildlichen Darstellungen in den ersten christlichen Jahrhunderten* (Freiburg, 1874); Hefele, *Conciliengeschichte* (7 vols., ib., 1854-71); Kraus, *Roma sotterranea* (ib., 1879).

IMAGINARY POINTS AND LINES. In analytic geometry, a point is said to be imaginary if one or more of its coördinates are imaginary. E.g. the points of intersection of the straight line $x = 6$ and the circle $x^2 + y^2 = 4$, found by solving the two equations, are $x = 6$, $y = 4\sqrt{-2}$, and $x = 6$, $y = -4\sqrt{-2}$, the two values of y (i.e. the ordinates of the points) being imaginary, the points of intersection of the given line and circle are said to be imaginary. Similarly, the conjugate axis of the hyperbola (q.v.) cuts the hyperbola in two imaginary points. A line whose equation contains imaginary coefficients is called an imaginary line. E.g. the asymptotes of an ellipse or circle are imaginary lines. Their equations may be obtained from the equations of the curves thus: Let $x^2 + y^2 = 0$, then $(x + yi)(x - yi) = 0$, and $x + yi = 0$, $x - yi = 0$ are the imaginary asymptotes to the circle. Similarly,

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 0,$$

then

$$\left(\frac{x}{a} + \frac{y}{b}i\right)\left(\frac{x}{a} - \frac{y}{b}i\right) = 0;$$

and

$$\frac{x}{a} + \frac{y}{b}i = 0, \frac{x}{a} - \frac{y}{b}i = 0,$$

are the imaginary asymptotes to the ellipse. All of these imaginary lines have the real point $x = 0$, $y = 0$. See CONTINUITY.

IMAGINARY QUANTITY. See COMPLEX NUMBER.

IMAGINATION (from Lat. *imaginatio*, from *imaginari*, to imagine, from *imago*, image). Taken in its broadest significance, thinking in images. In this sense it is synonymous with phantasy. Thus one may imagine a mountain, the sound of flowing water, the fatigue of a long journey, the rhythmic march of an army, or the articulatory 'feel' of a word in the throat. The power to image, to imagine, is dependent, first of all, upon past experience. An individual born blind never has visual images; one born deaf never hears words 'ringing in his head.' Moreover, the ability to image varies greatly from individual to individual. Visual images predominate in one mind, auditory in another, tactual or motor in a third. See MEMORY.

In a more restricted sense, imagination covers a single class of mental images. In this significance, 'an imagination' is coördinate with a 'memory image' or an 'expectation image.' Taken as clusters of sensations, these three classes of images are identical. They differ only in their reference and in their setting. A memory image refers to some part of one's past experience (one has a visual image of one's childhood home, or an auditory image of a familiar piece of music). Its function is to 'reproduce' the past. Similarly, expectation images are set within the individual's experience, but within the part that exists only in anticipation. Their function is to connect the present with the future. Finally, an imagination has no direct connection with the course of one's personal experience. As one reads a volume of fiction, one may imagine scenes, voices, movements, situations. The whole narrative is held together by a succession of imaginations, or 'imagination images,' as they might be called. This is passive or reproductive imagination. Over against it stands active or constructive imagination, an instance of which is furnished by the artistic productions of the painter and the sculptor. Between passive and active imagination there exists the same difference as between musing and 'hard thinking.' In the passive type there is a nucleus—e.g. the text of the novel—about which are clustered various near-lying associations; in the active type, images, more or less discrete and unrelated, are brought together and wrought into a systematic whole. The difference is rather one of degree than of kind. Active imaginations show greater selectiveness; a disjunction of elements succeeded by an aggregation of those most fit to express some feeling or idea. This is evident in a painting of natural scenery, where the artist has modified nature to suit his purposes.

James Mill and Bain confine imagination to those constructions which are produced under the influence of emotion—e.g. ghosts and hobgoblins evoked by terror, or the creations of the poet and the musician. Sully, on the other hand, makes it cover three distinct forms of mental construction — cognitive imagination, practical imagination (or invention), and æsthetic (or poetic) imagination.

Consult: Bain, *The Senses and the Intellect* (London, 1888); James, *Principles of Psychology*, vol. ii. (New York, 1890); Sully, *Outlines of Psychology* (New York, 1891); Ambrosi, *Psicologia dell' immaginazione* (Rome, 1898); Hoefler, *Psychologie* (Vienna, 1897).

IMA'GO. The adult, sexually mature form of an insect which passes through metamorphoses. See INSECT; METAMORPHOSIS.

IMAM, ē-mäm' (Ar. *'imām*, leader, from *'amma*, to lead, set an example). The appellation

given in general to teachers among the Mohammedans, as leaders whose example is to be followed. It is commonly employed to designate any of the persons belonging to the Mohammedan ulema (q.v.) or 'learned' body. They are distinguished from the laity by a turban somewhat higher than usual, and are held in great reverence by the people. Besides this general use, there are also certain specific applications of the term. Among the Shiites (i.e. the followers of Ali) the term imam is applied to the twelve legitimate successors of Ali. Among the orthodox Mohammedans the imam is properly the caliph, or leader of the entire body of Mohammedans, but the name is also extended to any authority whose views on theology and law are followed. In the course of time every Mohammedan community came to have its imam, whose chief function it was to lead the congregation in prayer. He takes his stand in front of the group of worshipers, who take up a position behind him arranged in fixed rows and imitate the genuflections and attitudes assumed by the leader in the course of the prescribed prayers.

IMAMITES, ĕ-măm'īts. A Mohammedan sect whose members recognize the twelve imams, descendants of Mohammed's son-in-law Ali, whom they consider the first real imam or caliph. They are commonly known as Shiites.

IMAZIGHEN, ĕ'mä'zĕ'gän'. The designation of all the Berber tribes of the Atlas Mountains, in Algeria and Morocco, comprising the Kabyles, Shulluhs, and Haratin. The Kabyles, who call themselves Imazighen, are furthest north, and more mixed with Semitic and Europeans; the Shulluhs (Shluhs) are to be found on the northward sloping valleys of the Atlas Mountains, while the Haratin Berbers are on the southern slopes and mixed with negroes. (See KABYLE; SHULLUHS; HARATIN.) They are Hamites fundamentally in blood, but have long been accultured with Arab speech and religion. Their mountain retreats have enabled the Imazighen Berbers to preserve their ancient patriarchal mode of life, so that many hundreds of clans and families keep up their small organizations at the same time that they are united into larger nations. A similar social structure existed in America, where, within the powerful confederacies and nations of Indians, were innumerable minor divisions.

IMBATTLED. See EMBATTLED.

IMBECILITY (from Lat. *imbecillitas*, weakness, from *imbecillus*, weak). (1) Mental weakness or defect. Imbecility and idiocy are comparative terms. They are both states due to similar processes, consisting of imperfect development of the brain, and due to congenital influences or acquired injury or disease. (See IDIOCY.) Thus it is almost impossible to determine the dividing line that separates an idiot from an imbecile, and such differentiation may entail much study and careful following of the mental development. In general understanding, an idiot is unable to attend to the simple primary affairs of his organization. An imbecile is able to attend to these. At the older end of the scale the imbecile shades into the normal average human mind by imperceptible gradations, and it may be just as difficult to separate the imbecile from weak-minded, dull, and stupid individuals as it is to separate the idiots from imbeciles. There are large numbers of weak-minded, useless persons in every community who differ from the more robust intellects solely in degree. But the more marked and recognizable imbecility is characterized by many of the following signs: The vacant expression, dull senses, small head, deformed body, vacillating and restless gait; pendent, thrown back, or agitated head; escaping saliva, limited and infantile language. The ideas may be few, and consist of mere sensuous impressions; the temper, timid, facile, and vain; and the passions are little susceptible of control. The affection has been regarded as general, or involving the whole mind; or as partial, when the intellect only, or the sentiments only, or a particular faculty, may be feeble and ineducable.

(2) As a generic legal term, a weakness of mind falling short of idiocy (q.v.) on the one hand and full mental capacity to contract or to distinguish between right and wrong on the other. The victim of imbecility, using the word in this sense, is not absolutely incapable of binding himself by contract or of committing crime. If his weakness is taken advantage of by another, any contract or conveyance so secured may be set aside, but the mere fact that a man is of weak understanding, or that his intellectual capacity is below the average of mankind, if no fraud, or no undue advantage be taken, is not of itself an adequate ground to set aside a transaction. It should be added that a lower degree of intelligence is required for a valid will than a business contract or conveyance. In various jurisdictions imbeciles are more or less protected against the fraud of others or their own acts of indiscretion by placing them more or less under the control of others, as in Scotland by interdiction, or by the appointment of a committee or guardian. See INTERDICTION; COMMITTEE; GUARDIAN; also see IDIOCY; INSANITY; LUNACY; and the authorities there referred to.

IMBER, NAPHTALI HERZ (1856—). A Hebrew poet and Cabbalist, born of poor parentage at Flochow in Galicia. He received a thorough training in the Talmud, and after the age of fourteen led the life of a wandering scholar, visiting in turn Constantinople, Egypt, and Palestine. There he studied the Oriental languages, and especially Hebrew. From Palestine he went to England, where he worked for some time in collaboration with Israel Zangwill. In 1892 he came to America, and made his home at different times in New York City, Boston, Chicago, San Francisco, and Los Angeles. In addition to many volumes of poetry and Cabbalistic lore, he wrote extensively for the Hebrew press. In his mastery of the ancient language of the Bible he takes rank with the leading scholars of Europe and America. His poetical works in form and thought are modeled to a great extent upon the songs of Juda Halevy (q.v.), whose fervent love for and hope in Zion Imber more than echoes. Among his works are: *Austria*, a poem; *The Mystery of the Golden Calf*; *The Keynote to Mystic Science*; *The Treasures of Ancient Jerusalem*; *The Letters of Rabbi Akibah*; *The Education of the Talmud*, printed by the United States Government; *Music of the Psalms*. His "Hope of Zion" has become the hymn of the Zionist party the world over.

IMBERT DE SAINT-AMAND, ăN'bâr' de săN'tä'măN', ARTHUR LÉON, Baron (1834-1900).

educated, studied law, and after being admitted to practice entered the Government service in the Department of Foreign Affairs. Here he rose through the several ranks to the grade of Minister Plenipotentiary of the first class in 1882, and was assigned to special service in the central offices of the department in Paris. He is best known as the author of an interesting and popular series of biographical and social studies of the women of the French courts. The first of these, entitled *Les femmes de Versailles* (5 vols., 1875-79), covered the period from Louis XIV. to the close of the *ancien régime;* the second, *Les femmes des Tuileries* (37 vols., 1880-99), began with the last days of Marie Antoinette and concluded with the women of the Second Empire. The series has been translated into English under the title of *Women of the French Court.* Among his other published works, some of which have also been translated into English, are: *Portraits de femmes françaises du XVIII. et du XIX. siècle* (1869); *Les femmes de la cour des derniers Valois* (1872); *Madame de Girardin* (1874); *Portraits de grandes dames* (1875); *La cour de Louis XVIII.* (1891); *La cour de Charles X.* (1891).

IMBIBITION (from Lat. *imbibere,* to drink in, from *in,* in + *bibere,* for **pibere,* to drink, Skt. *pā,* to drink, OIr. *ibim,* I drink). The physical process of swelling of solids by the absorption of liquid. It is exhibited most freely by organized bodies; i.e. those formed by living beings, which have therefore a characteristic structure, but is not confined to them. The swelling depends on a separation of the structural units of the body, which are believed to be not its molecules, but rather molecular complexes. Imbibition, therefore, differs from solution in that the separation of the particles is not so extensive, and when the water is removed by evaporation or otherwise they return to their original relations, so that the body regains its previous form and structure. After solution, on the contrary, the separated molecules may rearrange themselves completely. In a normal condition all parts of plants hold large quantities of water imbibed in their substance. Even in the walls of wood-cells, the least watery material, there is usually 50 per cent. of water, while in the protoplasm there may be as much as 95 per cent. Indeed, the plant may be considered as a mass of water held between the structural particles of the cells composing it and exceeding in volume the material by which it is so held. This condition alone makes it possible for plants to obtain materials from the water and air about them. See ABSORPTION.

The force of imbibition depends upon the surface tension of the water and upon the relation between the molecules of water and those particles of the swelling body whose cohesion is thereby overcome. When a dry starch-grain imbibes water, heat is developed (on account of the compression of the water) to an amount which indicates (according to Rodewald) a pressure of over 2500 atmospheres. The force exerted by a confined swelling body is at first enormous, but becomes rapidly weaker as the particles are separated farther and farther. Correspondingly, water is held loosely when abundant, but more and more tenaciously when only a little is imbibed. Thus, when a bit of laminaria is completely swollen, water can be removed from it by water it requires a pressure of 16 atmospheres to extract water; when only 93 per cent. is present a pressure of 200 atmospheres is needed. Applications of the force of swelling are made in splitting stone by wooden wedges driven in and then wetted; in shortening ropes by wetting; in the use of laminaria for surgical distension, etc. The phenomena of imbibition afford the chief basis for theories concerning the molecular structure of organized bodies. See COLLOIDS.

IMBRIANI, ēm'brē-ä'nē, VITTORIO (1840-86). An Italian poet and critic, born in Naples. He pursued studies in the universities of Naples, Zürich, and Berlin, and took part in the campaigns of 1859 and 1866. In 1884 he was appointed to the chair of æsthetics at the university of his native city, but was then too ill to assume the duties of this post. His political life was a troublous one by reason of his excessively passionate nature, which was ever exciting the bitterest antagonism. As a littérateur he is best known for his collections of popular tales and verse, such as *Canti populari delle provincie meridionali* (1871-72); *Dodici canti pomiglianesi* (1876); *La novellaja fiorentina* (1877), etc. A number of his poems are to be found in a collection entitled *Esercizj di prosodia* (1874). Among his critical works are some monographs on Dante and the *Fame usurpate* (1877), in which he seeks to demonstrate that Goethe's *Faust* is a production devoid of all merit.

IMBRICATED SNOUT-BEETLE. A very injurious weevil (*Epicærus imbricatus*), which damages many different kinds of garden vegetables and fruits, such as onions, radishes, cabbages, beans, watermelons, cucumbers, corn, beets, and strawberries, by sucking the juices of the leaves, stems, roots, or fruit. It also punctures the leaves and twigs of the apple and pear. The life-history is not thoroughly known, although the eggs and young larvæ found on the leaves of the strawberry have been described by Chittenden. The best remedy consists in spraying with a Paris green or some other standard mixture.

IMBROS, ēm'brŏs. A Turkish island in the Ægean Sea, situated about 13 miles northeast of Lemnos. Area, about 100 square miles. It is of volcanic origin, rocky and mostly barren, only a small part of its area being cultivable. Population, over 9000, mostly Greeks, engaged in fishing. The chief town is Kastron (Castro), the seat of a Greek metropolitan.

IMER, ē'mâr', EDOUARD (1820-81). A French painter, born at Avignon. Though he received no regular instruction, he became an excellent landscape painter, particularly of scenery in Middle France. His Eastern pictures are also well known. Among his works are: "Sycamores at Gizeh;" "Island of Philæ" (1857); "Ruins of Crozant;" and "Oak Tree of Vouliers" (1873).

IMERITIA, ē'mē-rĭsh'ĭ-ȧ. Formerly an independent kingdom in Georgia (q.v.), now constituting a part of the Government of Kutais (q.v.) in Russian Transcaucasia. Its history as an independent country begins toward the end of the fifteenth century. About 1750 it was occupied by the Turks, who were expelled by the Russians in 1769. In 1810 it was annexed to Russia. The Imers, or Imeritians, who number less than half

a million, are one of the tribes belonging to the southern or Georgian group of peoples of the Caucasus. They are considered by Pantiukhoff to be the purest representatives of the primitive Georgian type. See GEORGIANS.

IMHOFF, ĭm'hŏf, AMALIE VON. See HELVIG.

IMHOFFER, ĭm'hŏf-ĕr, GUSTAV MELCHIOR (1593-1651). An Austrian Jesuit, famed as a South American explorer. He was born near Gratz, Styria, and went to Peru as a missionary in 1624. Twelve years afterwards he crossed the Andes to the source of the Amazon, and was the first European to leave upon record his exploration of that stream to its mouth. His account was published in two volumes in Madrid (1640) and in London (1689), the latter edition called *A Relation of a Journey Along the River Amazon.* Father Imhoffer was head of the Jesuit College at Bahia, and the author of several treatises upon the language, history, and customs of his adopted country that were published by the Society of Jesus twenty years after his death.

IMHOOF-BLUMER, ĭm'hŏf blōō'mĕr, FRIEDRICH (1838—). A German numismatist, known as an authority on Greek coins. He was born at Winterthur, became interested in numismatics when he was a boy, gave up the business career planned for him, received a classical education, and amassed a valuable collection of more than twenty thousand ancient Greek coins, bought in 1900 by the Royal Numismatic Cabinet in Berlin. The great work of the Prussian Academy of Science, *Die antiken Münzen Nordgriechenlands* (1899 sqq.), was undertaken at his instance; and in 1901 he gave to the Academy the sum of one hundred thousand francs for the promotion of the science. He wrote: *Zur Münzkunde und Paläographie Böotiens* (1871); *Die Münzen Akarnaniens* (1878); *Porträtköpfe auf römischen Münzen* (2d ed. 1893); *Porträtköpfe auf antiken Münzen hellenischer und hellenisierter Völker* (1885); *Zur Münzkunde Grossgriechenlands* (1886); *Tier- und Pflanzenbilder auf Münzen und Gemmen*, with Keller (1889); *Lydische Stadtmünzen* (1897); and *Kleinasiatische Münzen* (1901 sqq.), as well as the great illustrated works, *Monnaies grecques* (1883) and *Griechische Münzen* (1890).

IMHOTEP, ĭm-hō'tĕp. An Egyptian divinity, identified with Æsculapius; the son of Ptah and Sekhmet, who with Imhotep formed the triad chiefly honored at Memphis.

IMITATION (Lat. *imitatio*, from *imitari*, to imitate). The repetition of any thought or act, or the copying of any example or model. The example or model is a stimulus which sets up nervous reactions that result in more or less nearly perfect repetition or duplication. The repetition may be by one's self of one's own thoughts or acts, as when a child, having learned to pronounce a new word, says it over and over; or it may be repetition by one person of the example or copy set by any other person. Imitation may further be subconscious, and due largely to suggestion, as it sometimes is in the behavior of crowds, or it may be clearly conscious, as it is in learning to write or to draw. The phenomena of imitation are of great importance in education, in the theory of art, in ethnology, and in sociology. Froebel and Preyer especially have treated of the educational aspects. The discussion of imitation in art dates from Aristotle. In ethnology imitation is the key to an understanding of magic and primitive religion. The savage believes that he can reproduce or control desirable conditions by imitating them. In fishing he puts a bit of wood cut in imitation of a fish into the stream, to attract the fish that he would catch. In hunting he dresses in imitation of his prey. To his enemy he aims to bring death by sticking an image of him full of thorns, or by filling it with poison. The whole investigation and literature of this subject the reader will find opened to him in Skeat's *Malay Magic* and Frazer's *The Golden Bough.* Imitation as a social fact was shrewdly commented on by Bacon in the essays, but the first writer to deal with it in a systematic way was Bagehot in his most thoughtful and suggestive *Physics and Politics.* The 'crust of custom,' which characterizes primitive and unprogressive communities, was shown to be the product of imitation. The most profound study of imitation, however, is Gabriel Tarde's great work, *Les lois de l'imitation.* Tarde finds in imitation the elementary and fundamental social fact, and he makes it therefore the basis of a system of sociology. Imitations he classes as 'custom' imitations, in which the copy is ancient or even immemorial, and 'mode' or fashion imitations, in which the copy is new. Imitations extend from above (the higher social or intellectual ranks) downward, and all imitations tend to spread in a geometrical progression. One imitation may, however, interfere with another. In the resulting duel, if one does not extinguish the other, they combine, each modifying the other, and so creating a new model to be imitated. All 'inventions' Tarde thus explains as a product of the conflict of imitations. Thus by imitations and their product, inventions, he tries to account for all the phenomena of language, manners, costume, amusement, art, religion, science, economy, morals, law, and politics. All modern civilization, he avers, is but the continuing imitation of Greece and Rome. The chief criticism to be made of Tarde's theory is that it fails to take account of original similarities of activity in the universe. Not all resembling phenomena are alike merely because they form a sequence. They may be simultaneously alike, as a part of coexistence. Therefore, another system of sociology is possible, which builds upon the simultaneous like responses of like organisms to the same stimulus. See SOCIOLOGY.

IMITATION. In the science of musical composition, the repetition of the same passage, or the following of a passage with a similar one, in one or more of the other parts or voices. It may be either strict or free. When the imitated passage is repeated note for note, and every interval is the same, it is called strict, and it may take place in the unison or octave, or in any other of the degrees of the scale, either above or below the original passage. The progression of a passage may also be imitated by an inversion, or by reversing the movement of the original; also by notes of a greater or of a lesser value. (See CANON; COUNTERPOINT; FUGUE.) Imitation in composition is one of the most important means of producing unity and animation in the progression of the parts, and is used in a strict, and also in a free manner, in the instrumental works of Haydn and Beethoven, and also by Mozart in his earlier operatic works. Many composers,

however, resort to imitation improperly, either from poverty of musical ideas or from pedantry. In the works of the contrapuntal writers of the Netherlands examples of retrograde imitation are found. This is hardly legitimate art.

IMITATION OF CHRIST (Lat. *De Imitatione Christi*). The most widely read, after the Bible, of all spiritual books. It is a series of counsels for the attainment of perfection, written in a spirit of sincere and humble piety, interspersed with prayers and colloquies between Christ and the devout soul. It is strange that the authorship of a book so popular and comparatively so recent should have been the subject of one of the most curious controversies in literary history. Following his own counsels of humility, the author concealed his name. The oldest certainly dated manuscripts—the Wolfenbüttel (1424), the Gaesdonck (1427), and the Roolf (1431)—are all anonymous. The book was attributed with more or less positiveness to as many as thirty-five different authors, including Saint Bernard, Innocent III., and John Scotus Erigena. The choice finally narrowed to three—Thomas a Kempis, the great Chancellor Gerson (q.v.), and a person of the name of John Gersen, a Benedictine abbot of Vercelli. Most of the fifteenth century printed copies bear the Chancellor's name; but the proportion alters in the sixteenth, and the claimant Gersen or Gesen appears for the first time in 1604. The controversy raged acrimoniously in religious orders, universities, and even the Parliament of Paris. Between 1615 and 1837 no less than 150 works devoted to the question appeared in France alone. The weight of evidence, both internal and external, has for a long time been considered to rest on the side of Thomas a Kempis (q.v.). The book was finished in 1421, and first printed at Augsburg probably between 1470 and 1472. The best critical edition of the text is by C. Hirsche (Berlin, 1874; 2d ed. 1891). Consult: Kettlewell, *The Authorship of the De Imitatione Christi* (London, 1777); Malou, *Recherches historiques et critiques sur le véritable auteur du livre de l'Imitation* (3d ed., Louvain, 1858); Wheatley, *The Story of the Imitatio Christi* (London, 1891); and an excellent bibliography by a learned modern defender of the Gersen theory, Wolfsgruber, in *Giovanni Gersen, sein Leben und sein Werk De Imitatione Christi* (Augsburg, 1880).

IMITATIVE INSANITY, Induced Mania, Insanity by Imitation. These old terms were adopted upon a mistaken notion. It has been supposed that sane people became insane through imitation of maniacs, through too constant intercourse with them, or through the efforts of a strong imagination in the sane. This is untrue. The physicians or nurses who become insane while living in institutions for those of unsound mind are affected because of stress of over-work or alcoholism, or other debilitating cause which would have been operative had they been engaged in other vocations. Insane people are imitative. Frequently cases occur in a family in which a sister, previously unsuspected of being insane, betrays the delusions and adopts the obsessions of an avowedly maniacal sister. This is called *folie à deux*, or 'communicated insanity.' The insanity exists first, and then the imitation occurs. Imitation of crimes upon reading of them or seeing them committed is due to idiocy (q.v.) or hysteria (q.v.) in most cases.

IM'LAC. A character in Dr. Johnson's *Rasselas*. He is the companion of Rasselas in his wanderings, and returns with him to the happy valley.

IMMACULATE CONCEPTION OF THE VIRGIN MARY. A dogma of the Roman Catholic Church, promulgated by Pope Pius IX. in 1854. It declares that the "doctrine which holds the blessed Virgin Mary, from the first instant of her conception, to have been kept free from all stain of original sin, by the singular grace and privilege of Almighty God, in view of the merits of Christ Jesus the Saviour of mankind, is revealed by God, and therefore firmly and constantly to be believed by all the faithful."

Previous to 1854 Roman Catholic theologians had commonly believed in the immaculate conception, but it was held only as a 'pious opinion,' not as a dogma. Its history may be traced from early times, and shows gradual enlargements. The New Testament is silent on the subject of Mary's conception. In the ancient Church many persons believed in her perpetual virginity, and this found expression in some of the apocryphal Gospels. Belief seems next to have advanced to her sinlessness after the birth of Christ, then to sinlessness from her own birth, and finally to the idea that she was sinless from her very conception; Roman Catholics believe that the modern definition involves its having been held, at least implicitly, from the first. The fact that Mohammed seems to have known of these Christian tenets (cf. *Koran*, Sura, iii.) is an indication that they were widespread among the Asiatic churches at an early date. The Eastern Church, however, has not formulated the dogma, and to this day the immaculate conception remains only a pious opinion in that great branch of Christendom. In the West the history of the doctrine is closely associated with that of the feast. An effort was made in Lyons, in 1139, to introduce the festival of the Immaculate Conception, but it met with pronounced opposition from Bernard of Clairvaux, who did not accept the doctrine exactly as generally explained, and urged that the feast had not received official sanction from Rome. A prolonged controversy broke out early in the fourteenth century, which rather involved a minute technical point of the exact moment of her sanctification than the absolute acceptance or rejection of the main doctrine. The Schoolmen took opposite sides, Duns Scotus and the Scotists maintaining the doctrine in its exactness, while the Thomists, following their leader, Thomas Aquinas, opposed it. The dispute extended to the two great mendicant orders. Scotus was a Franciscan, Thomas a Dominican. The Franciscans accordingly sided with the Scotists in supporting the doctrine; the Dominicans sided with the Thomists in opposing it. There were keen debates, and mutual charges of heresy. The influential University of Paris at first sided with the Dominicans and Thomists, but afterwards its position was reversed, and by the end of the fifteenth century it required from every candidate for its doctorate an oath to defend the truth of the immaculate conception wherever it was denied. Among many other forces which worked toward the same end, we may mention the favorable action of the Council of Basel (1439), the pronouncements of Pope Sixtus IV.

(especially his constitution *Grave nimis*, in 1483), the decrees of Trent, excepting Mary from the universal curse of original sin (Session V. 1546), and the strong support of the Society of Jesus (e.g. in the person of Bellarmine). In 1622 Pope Gregory XV. forbade any one (with the conspicuous exception of the Dominicans, and these only in discussions among themselves) to teach that the Virgin Mary was stained by original sin. About forty years later (1661) Alexander VII. set forth the belief of the Church in terms very like those of the decree of 1854. Yet in spite of the general acceptance of the doctrine, the most that could be said for it down to modern times was what Benedict XIV. cautiously affirmed, about the middle of the eighteenth century: "The Church inclines to the opinion of the immaculate conception."

Pius IX. was assiduously devoted to the cult of the Virgin. In 1849 he addressed a circular letter to the bishops, inviting their opinions on the advisability of defining the dogma of her immaculate conception. Out of some 600 replies, the great majority favored the proposed action. Four opposed it. Several influential bishops, especially in Germany and France, deemed it inopportune, inexpedient, and possibly injurious to the Church. In view of the generally favorable sentiment, however, the Pope proceeded to promulgate the dogma, as stated above. The decree was read in the presence of about 200 cardinals, archbishops, and bishops, assembled in Saint Peter's, on December 8, 1854, the Feast of the Immaculate Conception. Although not a conciliar decision, it has binding force for the whole Roman Catholic world.

In explanation of the dogma, Catholic writers sometimes quote from a sermon by Bossuet, delivered on a Feast of the Immaculate Conception, in which he thus addresses Christ: "Thou art innocent by nature, Mary only by grace; Thou by excellence, she only by privilege; Thou as Redeemer, she as the first of those whom Thy precious blood hath purified." The Catholic interpretation of the matter is clearly implied in these few words. For Roman theologians distinguish between 'active' and 'passive' conception. The former is the physical act of the parents, and so far as this is concerned, Mary is held to have been conceived like other mortals. The latter is the divine infusion of the rational soul (on the theory of creationism), and this, in the case of Mary, is held to have been accompanied by a special gift of grace, whereby she differs from all other mortals. She was sanctified, and therefore sinless, from the beginning. But this was through the merits of the Son who was to be born from her, not through independent merits of her own. In this way the Church believes that it solves the two main problems raised by the doctrine of the immaculate conception, first, how it affects the Virgin Mary in her relation to the rest of the human race, and, secondly, how it affects her in relation to Christ. See Gen. iii. 15; Luke i. 28, 42.

The Feast of the Immaculate Conception, in the Roman calendar, falls on December 8th; in the Greek calendar, on the day following.

Consult: Passaglia, *De Immaculato Deiparæ Semper Virginis Conceptu* (3 vols., Rome, 1854 seq.); Ullathorne, *The Immaculate Conception of the Mother of God* (London, 1855); Wetzer and Welte, *Kirchenlexikon*, iv. (Freiburg, 1886); Addis and Arnold, *Catholic Dictionary*, art. "Immaculate Conception" (London, 1884). On the Protestant side, consult: Schaff, *Creeds of Christendom* (New York, 1877), which gives the history of the doctrine, and the Latin and English text of the constitution *Ineffabilis Deus*.

IMMANUEL. See EMMANUEL.

IMMERMANN, KARL (1796-1840). A German dramatist, born in Magdeburg, April 24, 1796. From a school in Magdeburg Immermann went in 1813 to the University of Halle to study law, but he interrupted his studies in order to take part in the War of Liberation. Disabled by a nervous disorder, he left the field in 1815 and returned to Halle, where he was soon embroiled with other students on account of the terrorism exercised by the students' unions. He entered the Government service and in 1823 became a judge. He had become widely known as a dramatist when, in 1835, he took charge of the Düsseldorf theatre, which he developed artistically, but the theatre failed, and he became a judge again. Immermann died August 25, 1840. His plays were strongly influenced by Shakespeare. Among his best pieces are *Das Trauerspiel in Tirol* (1827) and *Merlin* (1831). Two representative novels are *Die Epigonen* (1835); an echo of *Wilhelm Meister*, and *Münchhausen* (1838-39), in which the village life of Westphalia is imaginatively described. In *Münchhausen* Poe may have found a hint for *The Fall of the House of Usher*. Immermann's *Collected Works* appeared at Düsseldorf in 1835-43, and a new edition, with *Biography and Introduction*, came out in twenty volumes at Berlin in 1883. Consult Putlitz, *Karl Immermann, sein Leben und Werke* (Berlin, 1870).

IMMERSION. See BAPTISM.

IMMIGRATION (from Lat. *immigrare*, to remove into, from *in*, in + *migrare*, to migrate). In its broadest sense, the transfer of residence from one country to another, viewed from the standpoint of the country in which the new residence is taken. The causes of this phenomenon have been discussed in the article devoted to emigration, which treated the movement at its source. We are concerned here with the effect of these movements on the countries which receive the newcomers. The invasion of the immigrant is the movement of the individual who seeks to improve his condition by a change of residence, who submits to the political institutions of the land of his adoption, and whose coming thither is frequently openly encouraged, or, at least, not actually opposed, by the country in which he settles.

Immigration and colonization are intimately related. When a new country is to be developed and its resources increased by human labor, immigration is encouraged by its authorities, and every gain in population is deemed an economic advantage. It has been in such countries in the past century into which the flow of emigration from Europe has been poured. They are Australia, South America, Canada, and the United States, in each of which immigration has raised diverse social and economic questions which must be individually studied and do not lend themselves to a general treatment. Before turning to the United States, where the immigration problem is perhaps the most acute, we may

briefly consider the facts connected with immigration in other countries.

AUSTRALIA. The Australian Commonwealth owes its origin to the penal settlement established there by Great Britain at the close of the eighteenth century, to which a considerable number of convicts were deported until the middle of the last century, when, at the earnest solicitation of the colonials, the system was abandoned. Efforts were made by the Government to send out free colonists to Australia, but, despite the liberal assistance of the Government, the total population by 1851 was only 430,596. Following the discovery of gold in 1850, the population increased three-fold in the next ten years, and considerable increments have been made to it at each subsequent census.

The following table gives the increase of population ascribed to the excess of immigration over emigration from 1851 to 1889 in four decennial periods and for the nine years ending in 1899:

1851-1860	613,253
1861-1870	291,342
1871-1880	336,297
1881-1890	386,018
1891-1899	61,824

The colonies showed great variations from year to year, as the discovery of gold in one colony after another attracted the fortune-seekers. The distance of Australia from Europe and the cost of passage have been an obstacle to immigration to that country compared with the more accessible Canada and the United States. The attractive force of the gold-mines has partially offset the difficulty, while the colonies have generally adopted a policy of aiding immigrants by paying a portion, if not all, of the passage money. This policy still prevails in Queensland and in Western Australia, and it is only within the last fifteen years that it has been abandoned by the other colonies. Up to 1896 there had been introduced into the colonies, either wholly or partially at the expense of the State, no less than 756,695 persons, of whom 578,559 came in the period prior to 1881.

Under these circumstances, the Australian colonies have to a large extent chosen their immigrants. It is not surprising, therefore, that the great bulk of the immigrants into Australia have been natives of the United Kingdom. According to the census of 1891, 68.58 per cent. of the population were Australian born, 14.76 per cent. born in England and Wales, 3.86 per cent. in Scotland, 7.13 per cent. in Ireland. In other words, 25.75 per cent. of the total population were natives of the United Kingdom, leaving only 5.72 per cent. aborigines, natives of other British colonies outside of New Zealand, and foreigners. Among the last Germans and Scandinavians predominate.

In the immigration to the South American countries, the States of Southern Europe are the largest contributors. Italy stands at the head of the list. In a foreign population of 866,983 in the Argentine Republic in 1895, the Italians numbered 492,636, the Spanish 198,685. The same races predominate in the immigration to Uruguay, while in that of Brazil the Portuguese take the second place, following the Italians, who constitute about one-half of the aggregate immigration.

CANADA. There is greater difficulty in determining the amount of immigration to Canada than to other countries, not only because a large number of persons land there whose destination is the United States, but because a considerable number whose original intention was to remain in Canada drift into the United States. So great is the difficulty of precisely ascertaining the number that a few years ago the Canadian authorities gave up the attempt. The most recent figures which are obtainable terminate with the year 1890, and these are put forward by the authorities with many cautions as to their accuracy. In five periods the figures are as follows:

ANNUAL AVERAGE IMMIGRATION TO CANADA

1871-1875	34,212
1876-1880	36,304
1881-1885	115,413
1886-1890	40,911

A computation by British authorities that from 1815-89, 12,481,708 persons emigrated from the United Kingdom, showed that of these 8,317,019 went to the United States, 1,987,247 to Canada, and 1,663,388 to Australasia.

The immigration into Canada is largely from the mother country. The census of 1891 showed that there were 647,362 foreign born in the population, of whom, after deducting natives of the United States, 566,444 had come from across the sea. Of these England and Wales furnished 219,685, Scotland 107,584, and Ireland 149,184, while the quota of foreign nations, among whom Germans predominated, was only 89,991.

UNITED STATES. The great bulk of those who have left Europe to seek new homes have come to the United States. Here the various phenomena connected with immigration can be

	Argentina		Uruguay		Brazil
	Immig.	Emig.	Immig.	Emig.	Immig.
1892	.....	.....	.....	.....	86,513
1893	.....	.....	.....	.....	84,143
1894	80,671	41,921	.....	.....	60,294
1895	80,988	36,820	.....	.....	164,371
1896	135,205	45,921	10,505	5,916	157,948
1897	105,143	57,457	9,140	6,779	112,495
1898	95,190	55,536	9,467	6,411	53,822
1899	111,083	62,241	9,006	5,830	.....
1900	.....	.....	8,892	6,705	.....

studied in their fullest development. Records of immigration to the United States begin in 1820. For the period before that time the chief sources of information as to immigration are the frequent newspaper allusions to the arrival of vessels bringing immigrants, of whom a certain number were 'foreigners,' i.e. those who spoke a language other than English. The record of arrivals since 1820 is shown in accompanying table.

In long periods the increase is marked, but year by year the fluctuation is considerable. It mirrors the economic conditions at home and abroad. Thus the panic of 1837 is reflected in the decline of immigration from 79,340 in that year to 38,914 in 1838. The wholesale emigration from Ireland after the potato famine is reflected in the rise of our immigration from 154,416 in 1846 to 234,968 in 1847, and before this influence and that of the political disturbances in Europe was spent came the discovery of gold and the rush to the mines, which culminated in an immigration of 427,833 in 1854, a figure not reached again until nearly twenty years later. After that year immigration fell off slightly, and received a sudden check after the panic of 1857, when it was reduced from 246,945 in 1857 to 119,501 in 1858. The year 1860 showed symptoms of a rising tide, but this was checked by the outbreak of the Civil War. The prosperous times which followed the close of the war increased immigration until, in 1873, it reached a figure of 459,803, higher than in 1854. Again economic distress brought a falling off, and in 1878 it was not more than 138,469. But the symptoms of returning prosperity in the early eighties reacted powerfully upon the volume of immigration, which in 1882 reached the enormous total of 788,992. By 1886 immigration had fallen to 334,203, but it soon recovered and maintained high figures until 1893. In the following year it dropped to 285,631, and reached its lowest point in recent years in 1898, when it was 229,299, but again there has been a rapid recovery, and in 1902 the total of 648,743 is exceeded by only two previous years, 1881 and 1882.

Influenced by temporary causes, as we have seen, the progress of immigration has been generally forward, with setbacks, apparently temporary, only in the decades 1860-70 and 1890-1900. In estimating the force of immigration it is well to take into account the concurrent growth of the population. The following table brings out the facts:

DECADE	Population at beginning	Immigrants	Immigrants in 10 years per 1000 of initial population
1821–1830	9,633,822	143,439	15
1831–1840	12,866,020	599,125	47
1841–1850	17,069,453	1,713,251	100
1851–1860	23,191,876	2,598,214	110
1861–1870	31,443,321	2,314,824	73
1871–1880	38,558,371	2,812,191	73
1881–1890	50,155,783	5,246,616	104
1891–1900	62,622,250	3,844,420	61

It appears in this table that the greatest relative immigration has been in the ten years ending 1860, closely followed by the decade 1881-90, and it is to be noted that in each of these periods the agitation against the policy of unrestricted immigration was widespread.

NUMBER OF IMMIGRANTS ARRIVING IN THE UNITED STATES EACH YEAR FROM 1820 TO 1902

PERIOD	Immigrants
Year ending September 30—	
1820	8,385
1821	9,127
1822	6,911
1823	6,354
1824	7,912
1825	10,199
1826	10,837
1827	18,875
1828	27,382
1829	22,520
1830	23,322
1831	22,633
October 1, 1831, to December 31, 1832	60,482
Year ending December 31—	
1833	58,640
1834	65,365
1835	45,374
1836	76,242
1837	79,340
1838	38,914
1839	68,069
1840	84,066
1841	80,289
1842	104,565
January 1 to September 30, 1843	52,496
Year ending September 30—	
1844	78,615
1845	114,371
1846	154,416
1847	234,968
1848	226,527
1849	297,024
1850	310,004
October 1 to December 31, 1850	59,976
Year ending December 31—	
1851	379,466
1852	371,603
1853	368,645
1854	427,833
1855	200,877
1856	195,857
January 1 to June 30, 1857	112,123
Year ending June 30—	
1858	191,942
1859	129,571
1860	133,143
1861	142,877
1862	72,183
1863	132,925
1864	191,114
1865	180,339
1866	332,577
1867	303,104
1868	282,189
1869	352,783
1870	387,260
1871	321,350
1872	404,806
1873	459,803
1874	313,339
1875	227,498
1876	169,986
1877	141,857
1878	138,469
1879	177,826
1880	457,257
1881	669,431
1882	788,992
1883	603,322
1884	518,592
1885	395,346
1886	334,203
1887	490,109
1888	546,889
1889	444,427
1890	455,302
1891	560,319
1892	479,663
1893	439,730
1894	285,631
1895	258,536
1896	343,267
1897	230,832
1898	229,299
1899	311,715
1900	448,572
1901	487,918
1902	648,743

YEAR	Population	Foreign born	Per cent. foreign born	Increase of foreign born over previous census	Immigration previous decade
1850	23,191,876	2,244,602	9.7		
1860	31,443,321	4,138,697	13.2	1,894,095	2,598,214
1870	38,558,371	5,567,229	14.4	1,428,532	2,314,824
1880	50,155,783	6,679,943	13.3	1,112,714	2,812,191
1890	63,069,756	9,308,104	14.8	2,628,161	5,246,613
1900	76,303,387	10,460,085	13.7	1,151,981	3,687,564

While the total number of the foreign born has increased at each census, the proportion to the total population has not materially changed since 1860. The increase in the foreign born for each decade falls far short of the total number of immigrants by reason of the following factors: (1) Deaths among the foreign born present at the beginning of the decade, and (2) emigration from among the same; (3) deaths among the immigrants during the decade, and (4) return of some of these latter to their native lands. The census of 1900 permits us to estimate some of these factors. There were present in the United States in 1900, 2,609,173 persons who had arrived since 1890, or 7.8 per cent. of the immigration in the period. These had not only made up the loss by emigration in the foreign-born population enumerated in 1890, but had, as shown in the table, increased the total number. There remained 1,078,391 persons who arrived in the period 1891-1900 not accounted for by the census of 1900. A certain proportion had died. Were the annual contingent 368,756, or one-tenth of the total, and the death-rate 15 per thousand, the deaths for each contingent would be 5531 annually. Disregarding the year of arrival, the first contingent was here nine years, and the ninth one year, or forty-five years for the first nine contingents, the tenth being disregarded. At this rate the deaths for the period would be 248,895, leaving a remainder of 829,496 immigrants not accounted for, who seemingly contributed nothing to our population. This remainder consists of two classes of persons: first, those who left the United States only to return again; and, second, those who arrived after the enumeration of 1890 and left before that of 1900. We have some data to estimate the relative magnitude of these elements, as we know from figures for the port of New York in 1896, and in the years 1897-1900 for the entire country, that 235,908 arriving immigrants had been in the country before. As this is 15.9 per cent. of the total arrivals, we may estimate that for the entire decade, 1891-1900, 586,223 persons arrived in the United States who had been here before, and so far as any addition to our population is concerned, represented simply a double counting. Some of tween 1891 and 1900, but were, of course, enumerated only once, at the census of 1900.

There remain of the immigrants of 1891-1900, 243,273 to be accounted for, and these would seem to represent the immigrants who, after a brief sojourn in the United States, returned to their own lands to stay. Fuller information on the whole subject could be obtained had we at our disposal figures for the passengers departing from our shores as well as those who arrive.

Enough has been said to show that immigration does not make the additions to our population which a cursory examination of the figures indicates. It is probable that the duplications, with the greater ease and cheapness of ocean travel, are more numerous of late years than formerly. These duplications do not rob the problem of its seriousness, but give it simply another aspect.

There has been of late years a change in the character of immigration which has been the cause of much concern, and much has been written of the 'undesirable' quality of recent immigration. The most desirable immigrant is doubtless he who promises most rapidly to be absorbed into the great mass of our population and lose his identity as a newcomer. Kinship in language and race is the prime mark of this desirability. Other things being equal, English-speaking immigrants are preferable to all others, those of allied race and language more to be desired than those allied by neither race nor language to the mass of the people.

The developments of recent years are shown in the following figures:

INHABITANTS	Per cent. of total immigration						
	1821–30	1851–60	1871–80	1881–90	1891–1900	1901	1902
United Kingdom	76.5	54.5	43.5	29.9	19.4	9.2	7.1
Germany	6.8	38.2	34.3	30.7	14.1	4.4	4.4
Sweden, Denmark, and Norway	0.2	1.0	11.2	16.0	9.9	8.0	8.3
Italy, Russia, Poland, and Austria-Hungary	0.3	0.4	8.1	19.4	49.3	68.6	70.5
All others	16.0	5.9	2.9	4.0	7.3	9.8	9.7

The last decade shows marked contrasts with the first. Then more than three-quarters of our immigrants spoke English, but now this element represents less than one-fifth of the total. This relative decline was at first made up by an influx of Germans and Scandinavians, peoples of a certain racial kinship, who as late as the decade 1881-90 comprised nearly one-half of the immigrants, while in the latter periods the nations of Southern and Eastern Europe have assumed the leadership. Equally instructive is the separation of the immigrants by race, which for the fiscal years 1901 and 1902 was as follows:

	Per cent. of total immigration	
	1901	1902
Italian	28	28
Polish	9	11
Hebrew	12	9
Scandinavian	8	8
German	7	8
Slovak	6	6
Croatian and Slovenian	3	5
Irish	6	4
Magyar	3	4
English	3	2
Japanese	15	2
Finnish		2
All others		11

That such a notable change in the character of immigration must affect the composition of the foreign born in the United States is obvious, and is disclosed in the following statement from the census of 1900:

	Males	Females	Per cent. males
English, Scotch, and Welsh	10,932	7,202	60.4
Irish	12,727	16,274	43.9
German	32,737	24,951	56.7
Scandinavian	36,431	19,349	65.3
Italian	146,961	33,574	81.4
Polish	50,368	19,252	72.3
Croatian and Slovenian	27,097	3,136	89.6
Slovak	29,197	9,737	79.1
Hebrew	32,737	24,951	56.7

It will be noted that in the case of the Irish the women even outnumbered the men, that the races named which show a less percentage of men than the average already quoted, 70.1, belong, with the exception of the Hebrews, to the older immigration. The Hebrews represent more largely than the other races immigration by families.

Among the immigrants the proportion of per-

FOREIGN-BORN POPULATION, 1900 AND 1890, BY NATIONALITIES

NATIVES OF	Foreign born 1900		Foreign born 1890		*Increase 1890 to 1900	Immigration 1891 to 1900
	Number	Per cent.	Number	Per cent.		
England, Scotland, and Wales	1,169,737	11.3	1,251,402	13.5	*81,665*	270,019
Ireland	1,618,567	15.6	1,871,509	20.2	*252,942*	390,179
Germany	2,666,990	25.8	2,784,894	30.1	*117,904*	505,152
Sweden, Norway and Denmark	1,064,309	10.3	933,249	10.1	131,060	371,512
	6,519,603	63.0	6,841,054	73.9	*321,451*	1,536,862
Austria-Hungary	579,042	5.6	303,812	3.3	275,230	592,707
Italy	484,207	4.7	182,580	2.0	301,627	651,899
Russia and Poland	807,606	7.8	330,084	3.6	477,522	602,010
	1,870,855	18.1	816,476	8.9	1,054,379	1,846,618
All other Countries	1,966,176	18.9	1,592,017	17.2	374,169	304,086
Total	†10,356,644	100.0	9,249,547	100.0	1,107,097	3,687,564

*Figures in italics show decrease.
†The total here given differs from that of a previous table, as this does not include Alaska and Hawaii.

These figures show that the older immigration, relatively stronger in the foreign born than in the new arrivals, is still losing ground. The arrivals in the past decade are insufficient, except among the Scandinavians, to maintain the absolute numbers of ten years ago. On the other hand, the absolute numbers of the foreign born from Eastern and Southern Europe have more than doubled. The apparently anomalous fact that the group 'Other Countries' has increased more rapidly than the aggregate immigration is explained by the entire absence in the immigration returns of any Canadians, who constitute more than one-half of the undistributed foreign born in the above table.

The reports of the Bureau of Immigration enable us to study many characteristics of the immigrants. That males predominate over females, inasmuch as the immigration embraces so many unmarried men, and so many married men who have left their families behind them, who come to seek fortune in the New World, is well known. It is, however, interesting to note that the proportion of males is increasing. In 1893 to 1895 it was 61.5 per cent. of the total; in 1896 to 1900, 63.5 per cent.; and in the last two fiscal years, 1901 and 1902, it averaged as much as 70.1 per cent. The older immigration was by families to a larger extent than at present, and this is seen by comparing some of the older and newer elements in our immigration.

In 1902 the figures for some of the prominent races were as follows:

sons in the prime of life is always considerable. The increase of the proportion indicates a falling off of family immigration. Figures for the entire period are not uniform, but the following statement shows this characteristic plainly:

PER CENT. OF TOTAL IMMIGRATION

FISCAL YEARS	Under 15 years	15–40 years
1893–95	18.8	71.1
1896–98	16.1	72.7

FISCAL YEARS	Under 14 years	14–45 years
1899–1900	13.0	81.4
1901–1902	12.0	82.3

Considering the same races as in the case of the sexes, we find the percentage of children under fourteen in 1902 to be as follows, the average being 11.4:

English, Scotch, and Welsh	16.0	Italian	10.6
Irish	4.1	Polish	8.6
German	16.6	Croatian and Slovenian	3.3
Scandinavian	7.8	Slovak	8.1
		Hebrew	26.5

Here again it appears that family immigration is especially prominent among the Hebrews, and plays a considerable rôle among Germans and natives of Great Britain. The low percentage of children among the Irish is a consequence of the large immigration of unmarried women,

and this is true, in some measure, of the Scandinavians. Among the newer races, children are very infrequent in the Croatian and Slovenian immigration.

Statistics of occupation among the immigrants show comparatively few in the professional class or that of skilled laborers. By far the greatest number are in the classes grouped as miscellaneous, in which laborers, farm laborers, and personal and domestic servants make up nearly the entire number (393,154 out of 412,879 in 1902). The general results are given in the following table:

OCCUPATIONS	Fiscal years 1881–90		Fiscal year 1902	
	Number	Per cent.	Number	Per cent.
Professional	27,006	1.0	2,937	0.6
Skilled Labor ...	540,411	19.6	79,768	16.1
Miscellaneous....	2,195,292	79.4	412,879	83.3
Total with occupation	2,780,709	100.0	495,584	100.0
No occupation ..	2,483,904		153,159	
Total	5,246,613		648,584	

The figures above given afford a comparison of the decade ending June 30, 1890, with the last fiscal year, and show that there has been a falling off of the proportion of skilled labor and a growth in that of unskilled labor. That this change is largely due to the newer elements can be seen from an examination of the figures for 1902. For certain races we find the following percentages:

	English	German	Italian	Croatian and Slovenian
Professional	6.2	0.9	0.3	
Skilled Labor ..	45.9	28.0	13.7	5.4
Miscellaneous...	47.9	71.1	86.0	94.6

Corresponding to the figures for occupations are those for illiteracy. The following instructive table is taken from the Report of the Industrial Commission (xv. p. 284):

ILLITERACY AMONG IMMIGRANTS 14 YEARS OF AGE AND OVER

Western Europe	1899	1900	Eastern and Southern Europe	1899	1900
Scandinavian	0.6	0.8	Magyar	10.0	16.9
English	1.7	2.0	Greek	23.8	17.5
Scotch	1.5	2.1	Hebrew	23.0	22.8
Finnish	1.2	2.7	Slovak	27.7	28.0
Bohemian and Moravian	3.4	3.0	Russian	13.5	28.8
Irish	4.0	3.2	Polish	31.3	31.6
French	3.5	4.1	Lithuanian	32.5	32.1
German	3.2	5.8	Croatian and Slovenian	24.9	37.4
Dutch and Flemish	9.3	9.9	Ruthenian	42.6	49.3
Northern Italian	11.4	11.8	Southern Italian	57.3	54.5
			Portuguese	65.6	60.2
Average	2.8	4.0	Average	38.4	36.6

The races here enumerated range themselves according to the general degree of education at home, though it should be noted that the proportion of illiterates is generally higher among immigrants than in the population at large of the countries whence they come.

EFFECT UPON THE POPULATION. The influence of immigration upon the population at large depends not only upon its volume, but also upon its diffusion. We have already seen that the foreign born in 1900 constituted 13.7 per cent. of the total population of the country; but it is to be noted that of the ten million foreign born enumerated, few more than half a million were found in the Southern States both of the Atlantic coast and the Mississippi Valley.

SECTIONS	Native born	Foreign born	Per cent. native born	Per cent. foreign born
United States	65,843,302	10,460,085	86.3	13.7
North Atlantic States	16,283,899	4,762,796	77.4	22.6
South Atlantic States	10,227,450	216,030	97.9	2.1
Northern Central States	22,174,530	4,158,474	84.2	15.8
Southern Central States	13,722,392	357,655	97.5	2.5
Western States	3,245,028	846,321	79.3	20.7

The figures for 1900 are in the table above.

It will be noted that the largest number of foreign born is in the North Atlantic division, and here, too, the proportion is the largest. In 1890 the largest proportion was in the Western division, the largest number in the North Central division. Of the aggregate increase of 1,151,891 in the number of the foreign born, 874,619 are credited to the North Atlantic States. Here the proportion of foreign born slightly exceeds 30 per cent. in Rhode Island and Massachusetts, and is greater than 25 per cent. in New York and Connecticut. In the Northwest these figures are paralleled by 35.4 per cent. in North Dakota, 28.9 in Minnesota, and 24.9 in Wisconsin. While not drawn from urban classes at home, the foreigners tend to concentrate in cities. In the principal cities of the nation (161 cities, having over 25,000 inhabitants), as much as 26.1 per cent. of the population is foreign born, while in the remainder of the country but 9.4 per cent. are foreign born.

This tendency to the cities is due not only to the fact that cities represent the most rapidly developing part of our population, and hence exercise the strongest attraction for the floating elements, but in part also to the fact that the immigrant finds in the cities groups of his own countrymen, upon whom he naturally relies to establish relations with the world into which he has come. Hence it occurs that in one place certain nationalities will predominate which are insignificant in numbers in other cities. The census report of 1900 gives in detail nationalities of nineteen cities having 200,000 inhabitants, and of ten other cities where the foreign born number

at least 30,000. In seventeen cities the Germans lead, their proportions varying from 28.8 per cent. of all foreign born in New York, to 65.9 per cent. in Cincinnati; in nine cities the Irish lead, with proportions between 17.3 in Paterson, N. J., and 36.9 in Cambridge, Mass.; in two cities, Fall River and Lowell, the French Canadians are most numerous, with proportions of 40.3 and 35.8 per cent. respectively; while Swedes, with 32.8 per cent., lead the foreign born in Minneapolis.

The cities having, on the one hand, the largest number of foreign born, and, on the other, the largest percentage of foreign born, were:

In the ten cities there are four only, Philadelphia, Boston, Saint Louis, and Buffalo, in which the number of foreign born potential voters does not exceed the number of the native born. This does not imply that the foreign born have anywhere a political majority, as there is among them a considerable proportion of unnaturalized persons, the average for the nation showing about one-fourth of the foreign born to be aliens.

The significance of this concentration is in its relation to the problem of assimilation. The evidences of assimilation cannot well be treated statistically, and we have only a few indications of it.

FOREIGN BORN IN CITIES, 1900

CITIES	Population	Foreign born	Per cent.	CITIES	Population	Foreign born	Per cent.
New York	3,437,202	1,270,080	37.0	Milwaukee	285,315	88,991	31.2
Chicago	1,698,575	587,112	34.6	Fall River	104,863	50,042	47.7
Philadelphia	1,293,697	295,340	22.8	Passaic	27,777	12,900	46.7
Boston	560,892	197,129	35.1	Lawrence	62,559	28,577	45.4
Cleveland	381,786	124,631	32.6	Woonsocket	28,204	12,518	44.4
San Francisco	342,782	116,885	34.1	Lowell	94,969	40,974	43.1
St. Louis	575,238	111,356	19.4	Manchester	56,987	24,257	42.6
Buffalo	352,387	104,252	29.6	Holyoke	45,712	18,921	41.4
Detroit	285,704	96,503	33.8	New Bedford	62,442	25,529	40.9

The natives of regions showing at least 25,000 persons in the three principal cities are shown in the following statement:

STATEMENT OF GROUPS EXCEEDING 25,000 OF FOREIGN RACES IN PRINCIPAL CITIES

NATIVES OF	New York	Chicago	Philadelphia
Bohemia	.....	36,362	
Canada (English)	.....	29,472	
England	68,836	29,308	36,752
Germany	322,343	170,738	71,319
Hungary	31,516		
Ireland	275,102	73,912	98,427
Italy	145,433		
Poland	32,893	59,723	
Russia	155,201	.....	28,951
Sweden	28,320	48,836	
Total foreign born	1,270,080	587,112	295,340

In the census report the Poles are distributed to Austria, Germany, and Russia. Those from Russia are most numerous in New York; those from Germany in Chicago.

Buffalo, Cincinnati, Cleveland, Detroit, Milwaukee, New York, Saint Louis, and San Francisco have German populations exceeding 25,000, while Boston has like groups of Irish and English Canadian, and Detroit such a group of her Canadian neighbors.

But these figures do not display the whole significance of the city concentration, for it will be remembered that immigrants are largely men and adults. The proportion of foreigners among males of voting age is perhaps a more forcible indication of their influence in the community. A few figures for the cities where the foreigners are numerous may be noted:

MALES OF VOTING AGE, 1900

CITIES	Total	Native born	Foreign born
New York	1,007,670	460,445	547,225
Chicago	511,048	237,688	273,360
Philadelphia	386,953	257,575	129,378
Boston	176,068	93,488	82,580
Cleveland	111,522	54,378	57,144
San Francisco	128,985	62,251	66,734
Saint Louis	171,798	116,218	55,580
Buffalo	97,938	52,917	45,021
Detroit	78,855	38,496	40,359
Milwaukee	75,020	34,535	40,485

One of these lies in naturalization. In 1900, 56.1 per cent. of the foreign born adult males had been naturalized, and 8.2 per cent. had taken out their first papers. The extent of naturalization depends upon the length of time which the foreigners have been in the country. Thus, of the 1,001,595 aliens enumerated in 1900, 599,917 had been in the United States less than ten years, while the much larger contingent of foreign born of longer residence showed only 441,678 aliens.

Another statistical evidence of assimilation is found in the acquisition of the English language. There were enumerated in 1900 1,217,280 foreign born persons over ten years of age, or 12.0 per cent. of the total, who could not speak English. But many of the foreign born from Great Britain and Ireland and Canada speak English as their mother tongue, as much as 24.5 per cent. of all. Allowing for these, the percentage of foreign born who had no English antecedents and who had not acquired English was 18.3. The census reports do not go sufficiently into details to give us any indication how far the inability to speak English was due to unwillingness to acquire it and how far to lack of opportunity, due to recent arrival in the United States. It has already been noted that 2,609,173 of the foreign born had arrived in the preceding decade, and that in the decade the non-English speaking elements, even allowing for immigration from Canada, approximated three-fourths of the arrivals. That the foreign element is not averse to learning English would seem to be indicated by the fact that among the native whites of foreign parentage the proportion who do not speak English is only 0.6 per cent.

If we turn now to consider the social effects of immigration we find our testimony chiefly in the statistics of illiteracy, crime, pauperism, and insanity. The effect of immigration can be seen in comparing the figures showing the proportion of illiterates in the population ten years of age and over in the United States, and in those sections where the foreign born are most strongly represented.

Native white, native parents	5.7	1.7	2.7	3.4
Native white, foreign parents	1.6	1.5	1.3	1.3
Foreign white	12.9	15.9	9.4	8.5
Colored	44.5	14.6	24.6	42.8
Total	10.7	5.9	4.2	6.3

In the United States at large the illiteracy among the foreign white is far greater than among the native white, and this discrepancy is still greater in the Northern and Western States. It is, however, interesting to note that in the second generation, the native white of foreign parents, the discrepancy disappears. On the face of the figures there is even a superiority over the natives of native parents; but this is probably due to the better school facilities in the cities and towns, where so large a proportion of the foreign element dwell.

CRIME. It is often claimed that the immigrants fill the jails and penitentiaries of the country; and the impression is widespread that, were it not for immigration, there would be little use for such institutions. This impression is entirely erroneous. While it is likely that the foreign born contribute somewhat more than their proportional quota to the army of law-breakers, the disproportion is by no means such as to change materially the amount of crime which would occur were there no foreigners in the population. The extent of their influence upon the volume of crime may be briefly studied.

No data are available for 1900, but in the census of 1890 we read that the ratio of prisoners to one million of the population is 898 for the native white and 1768 for the foreign white. As the foreign white are little more than one-eighth of the entire community, it is clear that these proportions would not attribute to them an absolute majority of the crimes committed. Nor is the relative proportion of crime among the foreign born as great as these figures would indicate. They relate to the entire population, while the adult population only contributes to the population of prisons. A comparison of the two elements by age classes, as shown by the following table, is more accurate:

MALE PRISONERS, 1890

AGES	Numbers		Ratio to 1,000,000 population	
	Native white	Foreign white	Native white	Foreign white
10–19	4,227	599	780	1,308
20–29	17,713	4,492	4,353	4,164
30–39	9,737	3,695	3,257	3,536
40–49	4,068	2,744	2,189	3,020
50–59	1,623	1,547	1,327	2,336
60–79	676	722	614	1,263
80 and over	15	22	161	638

The larger proportion of foreign born in the ages ten to nineteen is due to the fact that the foreign born increase in number as they approach twenty years of age, while among the native born the numbers decrease from ten years onward. In the characteristic ages of twenty to forty there is no substantial difference between prisons are not altogether satisfactory. They lay undue emphasis on the more serious crimes and minimize the lesser offenses, and thus fail to give an accurate picture of the amount of crime committed in a given year. The fact that the foreign born are more numerous among the prisoners with short sentences shows us that if the enormous volume of petty crime which is committed annually were adequately recorded the proportion of the foreigners would considerably increase. There is, moreover, evidence which cannot be recited here in detail that the native whites of foreign parents are less law-abiding than the foreign whites and contrast very unfavorably with the native whites of native parentage.

There are few subjects upon which the official records are more thoroughly unsatisfactory than in regard to crime, and all statements must be made in broad, general terms. It should, however, be remembered that a greater proportion of law-breaking among the foreign element might be adequately accounted for if we were able to divide the population into the social classes as respects wealth, education, and mode of living which actually exist in it. It is not improbable that in such a division it would appear that the foreign element showed no greater proportion of crime than the social strata to which they belong.

PAUPERISM. It is natural that the foreign born should contribute in larger measure than do the native to the population of the almshouses. They come here without property and are found generally among the poorer classes. Moreover, when age or incapacity overtakes them they have not the same relatives or friends to care for them as is frequently the case among the native population. It need not surprise us that the census of 1890, no figures for 1900 being available, showed that in every million of the population there were 829 native white paupers and 3131 foreign white paupers, or nearly four times as many. While this is due in part to the condition above described, the figures are again misleading, since the active ages in the population contribute little to the population of almshouses. This is brought out in the following table, showing the paupers by age classes, in which it is to be noted that nowhere is the disproportion nearly so great as in the figures for the aggregate population:

PAUPERS IN ALMSHOUSES, 1890

AGES	Numbers		Ratio to 1,000,000 population	
	Native born	Foreign born	Native born	Foreign born
Under 10	3,651	55	287	164
10–19	2,225	172	207	187
20–29	3,979	1,352	491	680
30–39	5,400	2,403	934	1,326
40–49	4,931	3,832	1,341	2,396
50–59	4,383	4,810	1,835	3,970
60–69	4,548	6,956	3,110	8,814
70–79	4,542	5,553	6,451	18,498
80 and over	2,543	2,199	12,515	31,196

INSANE. A greater tendency toward insanity has been noted among the foreign element of the population than among the native. No adequate

explanation has been given for this phenomenon. The figures usually quoted, to the effect that in 1890 there were 1405 native white insane and 3870 foreign white insane per million of their respective populations, like most of the figures relating to social conditions of the foreign born, exaggerate the situation. An examination of the ages of the insane shows that the greater number of those so afflicted are between the ages of twenty-five and fifty-five. A comparison for these ages of the foreign white and native white shows that the disproportion, while considerable, is by no means as large as in the general population.

INSANE, 1890

AGES	Numbers		Ratio to 1,000,000 population	
	Native born	Foreign born	Native born	Foreign born
25–40	17,293	7,569	1,850	2,658
40–55	13,787	10,848	2,725	4,602

INDUSTRIAL EFFECTS. Looking at the immigration problem from the economic side, we not infrequently hear a complaint that immigration lowers wages. In prosperous times little is heard of this, but when depression sets in complaint becomes general.

The difficulty here is to determine the facts. So complex are the conditions affecting wages that the Industrial Commission, after hearing the most conflicting evidence on both sides of the question, is forced to conclude that a positive effect of immigration on wages cannot be predicated.

The proposition can be supported by inference rather than by direct proof. If the numbers of the foreign born in a given industry are small, it is contrary to reason to suppose that they have a depressing effect upon wages. This raises the question of the amount of competition in a given industry. To this the answer can be found in the census statistics of occupations. The analysis of occupations by nativity has been reserved by the census authorities for a special volume, and we must therefore have recourse to the figures for 1890. The following table shows the percentage in each of the main branches of industry of the foreign born and of the native born in comparison with the population of ten years and over:

OCCUPATIONS OF MALES, 1890. PERCENTAGE OF FOREIGN BORN

	Foreign born
Agriculture, fisheries, and mining	15.54
Professional service	15.13
Domestic and personal service	36.21
Trade and transportation	22.25
Manufacturing and mechanical industries	34.04
All occupations	23.58
Population 15 years old and upward	22.05
SPECIAL OCCUPATIONS	
Gardeners, florists, nurserymen, and vine-growers	44.50
Restaurant and saloon-keepers	49.66
Hucksters and peddlers	53.13
Bakers	59.52
Boot and shoe makers and repairers	40.07
Cabinet-makers and upholsterers	46.17
Cotton, woolen, and other textile mill operators	46.05
Leather curriers, dressers, finishers, and tanners	47.62
Marble and stone cutters	46.28
Tailors	71.12

The concentration of the foreigners in industrial pursuits, as indicated by this table, is to be correlated with their tendency to gravitate toward the cities already discussed. They have gone to the cities because the latter furnish the opportunities of employment, and this was due to the development of mechanical and manufacturing industries. The proportion of the foreign born in these broad groups is not such as to lead us to infer that they exercise a dominating influence upon wages, even if it could be proved, which is extremely doubtful, that they are any more willing than the native laborer to work for low wages. It can therefore only be in certain specified industries, in which the proportion of the foreign born is very large and in which the pressure for work is considerable, that any appreciable influence upon wages will be exerted. Where they do not thus dominate an industry they conform to the current rate of wages. Investigations of the Commissioner of Labor into the cost of production in the iron and steel industries and in the textile industries amply prove this proposition.

On the other hand, where the foreign born crowd for employment and dominate a given industry, as in the clothing industry in New York and Philadelphia, they reduce the rate of wages, and such a permanent reduction is possible because the standard of living which they adopt is so much inferior to that which is customary among their American competitors. The contest with the sweatshop in our great cities leaves no doubt upon this point. The report of the industrial Commission furnishes cumulative evidence of this tendency in a few lines of activity to build up industries on a basis of starvation wages which themselves rest upon the ignorance, helplessness, and incapacity of the foreign-born population of the tenement-house districts.

The testimony which has been brought forward with respect to the political, social, and industrial effects of immigration is of necessity indefinite in character. The problem of immigration is a problem of assimilation; and this means conformity to modes of living, modes of thought, and modes of action in many different fields of activity. There may be incapacity, but undoubtedly there is no unwillingness on the part of those who permanently reside among us to share to the fullest extent possible in the life of the community, with its opportunities and privileges. With respect to the permanent additions to the population, the question which concerns us is as to how far it is desirable that we should continue to recruit what are economically the weakest and least promising classes in the community. The idea that there must always be some one to do rough work has no standing in court. Modern engineering devises mechanical appliances for these purposes, and we have no fear that progress will cease because the human race is unwilling to be mere hewers of wood and drawers of water. It remains to consider, therefore, how far legislation has attempted to cope with the problem, and what has been its success in such an effort.

LEGISLATION. It has already been pointed out that immigration into the United States was so much a matter of course that before 1820 it was not even recorded. While in that year records of the number of arrivals were introduced, nothing was done in the way of legislation, either to promote or to restrict immigration into the United States, until the year 1864.

We may disregard the brief period in which the famous Alien Law was in force, 1798 to 1801, which authorized the President to expel foreigners dangerous to the peace of the nation, for this law was passed to meet a supposed political danger, and not to avert a threatened economic injury. Nor did the agitation against the foreigner, which gained such force in the Know-nothing movement during the early part of the fifties, lead to legislation. It is doubtful if the question would have assumed so large an importance had it not been for popular discontent with the older political parties. Moreover, the agitation was quite as much anti-Catholic as it was anti-foreign, and no majority of the American people could be gained for an attitude savoring of religious persecution.

The police and sanitary regulations, including quarantine, affecting the immigrants upon their landing in the United States, were matters of State, and not Federal legislation.

When, in 1864, Congress finally took cognizance of the immigration question, it was with the idea of encouraging immigration into this country. Under the pressure of the demand for laborers in industrial pursuits, an act was passed to encourage immigration which offered to the immigrants freedom from compulsory military service, and the services, upon their arrival, of a Commissioner of Immigration, whose duty it was to assist immigrants in obtaining transportation to their destination, and to protect them from the impositions to which their ignorance exposed them. The act was repealed in 1868, and no further legislation to promote immigration was enacted. The general spirit of the times was, however, favorable to immigration, and certain special reports of the Bureau of Statistics, *Labor in Europe and America* (1870), for instance, were widely disseminated with a view to encouraging immigration. About the same time the States, particularly those of the West, established boards and commissioners of immigration, charged with the duty of promoting immigration into their respective States.

It soon became evident that encouragement was no longer needed, and the tide of public opinion began to turn toward restriction. This did not at first extend beyond the idea of preventing the introduction into the country of manifestly undesirable elements—the criminal, the pauper, the insane, and the vicious. Section 1 of the act of August 3, 1882, imposed a head tax of 50 cents (increased to $1 by the act approved August 18, 1894, and to $2 by act of March 3, 1903) on each passenger not a citizen of the United States, stipulating that the money collected shall be paid into the United States Treasury as a fund to defray the expenses of regulating immigration, of caring for immigrants, and relieving those in distress, and for the general purposes and expenses of carrying the act into effect. (This fund, it may be remarked, has been found ample for its purposes, and an annual surplus has been turned into the Treasury.)

Section 2 provided that the Secretary of the Treasury should be charged with the duty of executing the provisions of the act, and for that purpose empowered him to enter into contracts with the officials of the several States at their several ports. By the act of March 3, 1903, the Commissioner-General of Immigration is placed under the authority of the Secretary of the Treasury, although the Immigration Bureau is subordinate to the Department of Commerce.

Section 3 provided that the Secretary of the Treasury establish such rules and regulations, and issue, from time to time, such instructions, not inconsistent with law, as he should deem best calculated for the protection of immigrants from fraud and loss, and for carrying out the provisions of the act and the immigration laws of the United States, etc.

Section 4 treated of the exclusion and deportation of specified classes. It provided that foreign convicts, except those convicted of political offenses, lunatics, idiots, or any persons not able to take care of themselves without becoming public charges, should be sent back at the expense of the owners of the vessels on which they had come.

The act of 1882 is still in force in principle, though in minor points it was modified by a law of March 3, 1891, of which the following section is the most important:

"That the following classes of aliens shall be excluded from admission into the United States, in accordance with the existing acts regulating immigration, other than those concerning Chinese laborers: All idiots, insane persons, paupers, or persons likely to become a public charge, persons suffering from a loathsome or a dangerous contagious disease, persons who have been convicted of a felony or other infamous crime or misdemeanor involving moral turpitude, polygamists, and also any person whose ticket or passage is paid for with the money of another, or who is assisted by others to come, unless it is affirmatively and satisfactorily shown, on special inquiry, that such person does not belong to one of the foregoing excluded classes, or to the class of contract laborers excluded by the act of February 26, 1885; but this section shall not be held to exclude persons living in the United States from sending for a relative or a friend who is not of the excluded classes under such regulations as the Secretary of the Treasury may prescribe. *Provided*, That nothing in this act shall be construed to apply to or exclude persons convicted of a political offense, notwithstanding said political offense may be designated as a 'felony, crime, infamous crime, or misdemeanor involving moral turpitude' by the laws of the land whence he came, or by the court convicting."

The act was further amended by the law of March 3, 1903. By this law the Bureau of Immigration is given a right to deport epileptics, persons who have been insane within the five years preceding their arrival in America, and persons who advocate the overthrow of all governments or the assassination of public officials. Deportation may take place any time within two years after arrival.

The joint administration of immigration affairs by Federal and State officials which had been in vogue since the passage of the act of 1882 had not proved satisfactory, and by the act of 1891 the entire charge of the matter was assumed by the general Government. The statute of March 3, 1893, took a step in advance of previous legislation by requiring at least a preliminary inspection of immigrants at the point of departure. Each immigrant is provided with a number identifying him to the inspectors of

the United States. The medical inspection provided by the act has been a useful aid in preventing the introduction of disease.

Side by side with legislation to exclude persons morally and physically undesirable has gone the effort to exclude the contract laborer. The first law on this subject was passed February 26, 1885. It made it unlawful for any person, company, partnership, or corporation in any manner whatsoever to prepay the transportation or in any way assist or encourage the importation or migration of any alien or foreigner into the United States, under contract or agreement or parole, special, expressed or implied, made previous to the importation of such alien or foreigner to perform labor or service of any kind in the United States.

The object of this legislation was to prevent the agents of manufacturers from contracting in Europe with the laborers, oftentimes in herds, for the purpose of breaking strikes or introducing a supposedly more docile, because more ignorant, class of laborers. Moreover, it is plain that contracts made abroad would be made with reference to the scale of wages existing in foreign countries rather than those in force here, and would thus introduce a lower-priced competition, dangerous to the well-being of the working classes. The general spirit of the law has been commended by public opinion, though in its first form it presented some crudities which placed it in a ridiculous light, as where a clergyman was denied admission to the United States by reason of a contract made in England to assume charge of a parish in New York. Subsequent modifications distinctly eliminating the professional classes and bringing the operation of the law within the intention of the legislators have much improved the statute.

The general characteristic of the United States immigration laws is, that whoever enters in violation of the law is to be returned to the point of departure at the expense of the steamship company which brought him, and that this liability extends in all cases for a period of one year after arrival. The machinery for the enforcement of the law has been progressively improved. The number of immigrants who have been returned is as follows:

YEAR	No. returned	Per cent. of total immigration	YEAR	No. returned	Per cent. of total immigration
1890..	535	0.11	1896...	2,799	0.81
1891..	1,026	.19	1897...	1,880	0.81
1892..	3,732	.64	1898...	3,229	1.45
1893..	1,630	.36	1899...	4,061	1.30
1894..	2,806	.98	1900...	4,602	1.02
1895..	2,419	.93			

The main reason for the return of immigrants is pauperism.

One of the great difficulties in the way of the thorough administration of the law is the comparative ease with which persons of the undesirable classes obtain access to the United States through Canada. Arrangements have recently been perfected between the Canadian Government and the immigration service establishing an inspection in Canada. The effort is made to inspect not only the immigrants who give the United States as their destination, though arriving at Canadian ports, but also those who give Canada as their destination, but come into the United States. The fact that of less than 5000 persons of the latter class inspected, 2000 were turned back, indicates clearly that the ineligible classes have been coming into the United States over the Canadian border.

The present immigration laws represent little more than sanitary measures designed to protect our society from the introduction of positively vicious and undesirable elements. The demand has been heard, and has been supported by a wealth of argument, that we should be more liberal in our interpretation of the word 'undesirable,' and exclude also such immigrants as, by reason of incapacity and ignorance, give the least promise of assimilation.

The question of still further restricting immigration made its appearance in the early nineties. It was felt that many persons were admitted into the United States who were not desirable acquisitions to our population. The demand was heard in many quarters that the illiterate should be excluded, and the question was actively agitated in Congress until 1897. In that year a bill passed both Houses of Congress which excluded from admission to the United States all foreign persons over sixteen years of age who could not read or write the English or some other language, except parents or grandparents accompanying persons otherwise qualified, or coming to join relatives already in the United States. The bill was vetoed in the closing hours of Congress, March 3, 1897, by President Cleveland, on grounds of general policy, as well as for material defects in the measure, such as the exclusion of the illiterate wives of qualified persons. The bill was reconsidered in the House of Representatives and passed over the President's veto by the constitutional majority of two-thirds; but as it passed the Senate by a narrow margin, no attempt was made to force a vote in that body, and the veto message was simply referred to the appropriate committee. In the following years the agitation subsided in view of the decreased number of immigrants.

BIBLIOGRAPHY. Official Documents: Reports of Bureau of Immigration, 1891-92; Senate Report 1333, 52d Congress, 2d Session (1893); Report of the Immigration Commission to the Secretary of the Treasury (1895); Veto Message of President Cleveland, Senate Document 185, 54th Congress, 2d Session (1897); Vol. XV. of the Report of the United States Industrial Commission on Immigration (1902). See EMIGRATION; MIGRATION. For temporary movements of population, see POPULATION.

IMMOLATION (Lat. *immolatio*, from *immolare*, to sacrifice, from *in*, in + *mola*, meal, mill-stone, from *molere*, to grind; connected with Goth., AS., OHG. *malan*, Icel. *mala*, Ger. *mahlen*, to grind, Eng. *meal*). A Roman sacrificial ceremony in which the victim was sprinkled with meal coarsely ground and mixed with salt (called *mola salsa*). Hence to 'immolate' means 'to sacrifice.'

IMMORALITY (from Lat. *in-*, not + *moralis*, moral, from *mos*, custom, right). In its broadest sense, any breach of the moral law; in a narrower sense, as contrasted with illegal conduct, an act of omission which is condemned by the law of morality, but which may not violate any rule of municipal law (q.v.). Many forms of moral conduct come under the con-

demnation of the criminal law, and it is the tendency of advancing civilization to brand with criminality many classes of acts which were formerly left to the penalties of conscience or of the Church. Other classes of immoral acts, not branded as criminal, yet incur indirectly the condemnation of the law, as by denying to the person who has been guilty of them his right to enforce a claim arising upon a contract or a tort. Thus a bond given for an immoral consideration, or to secure the performance of an immoral act, is unenforceable. Immorality which does not fall under the ban of municipal law rarely if ever affects the legal rights or status of a person. It may subject him to social censure, but it does not defeat him in the prosecution of a legal claim. Compare MALUM IN SE.

IMMORTALITY (Lat. *immortalitas*, from *immortalis*, undying, from *in-*, not + *mortalis*, mortal, from *mors*, death; connected with Skt. *mar*, to die, Gk. *μόρος*, *moros*, death, and *βροτός*, *brotos*, mortal, Lith. *mirti*, to die, OChurch Slav. *mrŭtvŭ*, dead, OHG. *mord*, Ger. *Mord*, murder, AS. *morþ*, death). The endless existence of the human soul in the continued possession of its distinct personality and consciousness. How early the idea of a survival after death entered the mind of man cannot be determined. There is no evidence of it in the Paleolithic period. But in the Neolithic period not only the ornaments, weapons, tools, and food placed by the side of the dead, but the houses, mounds, chulpas, and tombs built for them, testify to a belief that some of the dead for some time continue some kind of an existence after death. It is probable that at first death was looked upon as a deep and prolonged sleep. The dead was left in his dwelling-place, the survivors seeking a new home, or a special structure was made for him. Visions of the departed in dreams naturally led to the conclusion that they left their dwellings in the night, and, upon further reflection, to the theory of a double or finer material, but dependent upon the food and drink brought to the tomb. The practices of the Neolithic period already imply the development of some such theory of a 'soul.' The fact that these customs and the faith they imply survived into the more advanced civilizations of antiquity and are to be found extensively at the present time among peoples that have remained upon lower stages of development, indicates for them a very high age.

Tombs were the earliest temples, and the ancestral cult was the earliest form of divine worship. As long as offerings were made to the dead the departed ancestors were believed to exist and to protect their descendants. Thus the cult itself tended to create a confidence in an indefinite prolongation of existence in the case of the objects of filial worship. As the great cosmic forces began to attract more attention the double of the dead might be connected with them in one way or another, and thereby become more independent of the tomb. But even where, as in Egypt, this process can be most clearly perceived, the ancestral cult as the basis of hope for survival maintained itself to the latest times. Whether the mass of men in Egypt who were too poor to pay the cost of embalming and 'a house for eternity' were regarded as long surviving the shock of death is doubtful. But the assurance in a future life, as rich as the present and not very different in its outward conditions, for those properly embalmed and entombed, was very strong. Numerous pictorial representations and inscriptions in tombs and papyri from different periods show how intensely the inhabitants of the Nile Valley believed in a life after death.

Starting from the same premises, speculation as to the future took a different turn in India. The doctrine of metempsychosis was developed. Without losing its identity, the spiritual substance in man was supposed to enter into other forms of life, rising or sinking in the scale of being in consequence of the deeds wrought in the body and the character formed. (See ESCHATOLOGY.) This transmigration of souls implied eternal existence before as well as after any appearance in the world as a human being. It precluded the idea of a disembodied spirit, and it adjusted outward circumstance to inner character, punishment to crime, and reward to virtue more nicely than any other system of thought. But this assurance of eternal life became itself a burden to the mind of man, and it cried out for deliverance from the endlessly turning wheel of existence. Buddhism offered relief in the hope of Nirvana. In Persia, Mazdaism proclaimed, possibly not in the Gathic period, but certainly as early as the third century B.C., the doctrine of a resurrection (q.v.). This doctrine was no doubt based upon the simpler and more widespread belief that the sleepers in the dust might be aroused. Cases of apparent death and successful resuscitation would strengthen this expectation. The animistic basis is quite evident.

Among the Iranian peoples of the northwest, the Sarmatians, the Scythians, and the Thracians, the faith in a future life was very strong. From Thrace the Orphic cult spread in the Greek world. While the Mycenæan tombs, as compared with the remains of the preceding age, reveal a growing importance attached to the life beyond, but no conceptions differing from those generally associated with the ancestral cult, and the Homeric poems tell of Elysian fields as well as a barren and cheerless Hades, but put no emphasis upon what still is a somewhat shadowy existence beyond with no moral distinctions, the Orphic cult societies offered to the initiated the hope of a blessed immortality. (See ESCHATOLOGY; HEAVEN; HELL.) The arguments of Socrates and Plato are far from being the first intimations of immortality among the Greeks. They are not endeavors to open new vistas into a life beyond. On the contrary, they represent a critical tendency seeking to establish the truth of a view held by many, and to find the rational grounds on which it can be maintained, if at all. In the following periods skepticism prevailed in some circles, ardent belief in others. If the practical character of the Roman caused him to cling to the ancestral cult, his hospitality to religious ideas opened the doors to the doctrines taught by the Orphic and Dionysiac societies. It was a real life of battle and of joy to which the Teutonic warriors looked forward in Odin's hall, Valhalla.

Among the Semitic nations the prevailing view left little joy in the thought of man's fate after death. The Babylonians and Assyrians seem to have believed in a semi-conscious later existence, but with no distinctions based on character or conduct, and no feature rendering it desirable. The myth of Ishtar's descent to the nether world

abode of the dead, and the translation of some heroes to be with the gods tends to mark the contrast with the ordinary issues of human life. Substantially the same conception of the future was held by the ancient Hebrews. (See SHEOL; HADES.) There was no conception of an endless existence of the human soul in possession of a distinct consciousness, and no intimation of a difference based on conduct in this life. A poetic passage (Isa. xiv.) possibly shows that the kings were thought of as sitting upon thrones—consequently a social distinction. The intense religious life of the nation did not occupy itself much with the future of the individual. Neither the prophets, nor the legislators, nor the poets, nor the great wisdom-teachers, seem to have attached much importance to it. Their opposition to the ancestral cult and to necromancy may account in a measure for this indifference. Only as the sufferings of innocent individuals, particularly in the Exile, made the question of the divine government of the world acute, did 'the hope of man' receive attention by the thinkers of Israel. But the author of Job presents this possibility of a restoration to life only in order to reject it. He is not willing to obscure the issues by the introduction of what he considers a vain and improbable speculation. A high type of piety thus flourished without a hope of immortality. But the growing demand for a justification of the ways of God was met by foreign conceptions that brought relief by a temporary postponement of the problem. Persia contributed the thought of a resurrection, Greece that of immortality in the stricter sense. The conception of a resurrection appears for the first time in Jewish literature in the Book of Daniel (written about B.C. 165). Here some of the dead are raised, probably the martyrs of the great persecution and their oppressors, to continue their life on earth.

There is evidence that this new life was sometimes regarded as of limited duration. In regard to the new body, some maintained that it was identical with the old, or of a similar substance; others that it was spiritual; some that it was bestowed on men at a general resurrection in the future; others that it was given immediately after death. In some circles it was thought that only the Israelites or the good would be raised; in others, that all men, even the wicked, would rise. (See RESURRECTION.) The new doctrine was chiefly accepted by the Pharisees; the Sadducees strongly opposed it. Ecclesiastes rejected the idea of a survival after death in every form. Meanwhile the Greek conception of immortality based on the nature of the soul, with or without the notion of preëxistence, found acceptance not only among the Alexandrian Jews, but to some extent also in Palestine. A doctrine of a future life in which the resurrection had no place is found in the Slavonic Enoch, Wisdom of Solomon, Philo, among the Essenes, and elsewhere. Jesus himself seems to have believed in a spiritual resurrection occurring immediately after death. A somewhat similar conception is found in the Pauline literature, while the Fourth Gospel presents the eternal life as a sharing in the divine nature that may begin in time and continue through eternity, and seems to use the term 'resurrection' figuratively. The firm conviction of the early Church that Jesus had risen from the nether

presently return in glory to raise the dead and establish His kingdom on earth, tended to base the hope of survival upon His resurrection.

In I. Corinthians xv. the thought is expressed that if Jesus was not risen His disciples are not raised, and that it does not matter how life is lived, if that is the case. It was felt that through His resurrection He had thrown light upon life and immortality. Much of the success of Christianity was no doubt due to the prospect that it held out for a future life. It offered to all men, even slaves and barbarians not permitted to participate in the official cult and not invited to take the holy vows of the secret cult-societies, the same blessed immortality that was promised to those initiated in the Orphic, Dionysiac, and Mithraic mysteries, and it was itself influenced by the thoughts that had prevailed in these religious societies. (See HEAVEN; HELL.) The Greek idea that the soul is immortal by virtue of its own nature became dominant in Christian theology. The controversies within the Church have not affected this fundamental position, but have had reference to the character of the future life.

Through Maimonides the Greek conception of immortality found its way into the synagogue. At first it had a tendency to exclude the doctrine of a resurrection; subsequently it was made the philosophical basis of this doctrine as in the Church. With the renascence of learning and the development of natural science doubts as to the immortality of the soul began to be expressed. Uriel Acosta (q.v.) was persecuted for rejecting this doctrine, and he had sympathizers among the deists. The growth of evolutionary philosophy in the nineteenth century led many minds to question the survival of the human soul after death, and the possibility of a continued life of the spirit apart from the bodily organism is today widely denied in scientific circles. Various reasons are given for this negative position. It is maintained that the mental life of man is so closely connected with and invariably dependent upon the brain that a continuance of any intellectual functions after the dissolution of the body is inconceivable. As the mentality of man appears to differ from that of the animal only in degree, and not in kind, any argument from the peculiarities of the human mind is held to imply also the immortality of the lower organisms.

Still greater difficulties are thought to arise from man's embryological development. The lack of any convincing evidence of communication between the dead and the living is pointed out, and it is urged that the origin of the belief can be naturally accounted for, and that its persistence is largely due to the social conditions in which man is placed. On the other hand, the doctrine is defended not only from the standpoint of belief in an infallible revelation, but also by thinkers who claim the right of free inquiry, and base their views solely upon what appears to them to be sufficient evidence. As a more careful exegesis renders it increasingly difficult to appeal to the Old Testament on that subject, it is generally the New Testament, and particularly the words ascribed to Jesus himself, that furnish the authority. Even from an independent point of view, great weight is often accorded to the conception of Jesus and the New

intuition into religious truth possessed by them. The uncertainty, however, as to the actual words of Jesus and the growing impression that some at least of the writers of the New Testament did not believe in a natural immortality, but in an endless life bestowed as a free gift of God upon His children in an especial sense, have led many scholars who attach much importance to these spiritual authorities to accept the theory of a conditional immortality. The good will continue to exist; the wicked are destined for final annihilation.

Where the question of man's survival is decided in the affirmative without an appeal to authority, the reasons given are such as the inadequacy of the objections, the difficulty of accounting for certain phenomena except as manifestations of spirits, the incompleteness of the present life, and the 'intimations of immortality' to which it is felt that an objective reality must correspond. Facts are quoted that tend to show the independence of man's mind operating with great clearness, precision, and strength even in wholly abnormal physical conditions; and though, to render the argument strictly cogent, it would be necessary to prove that in these instances the brain was also affected, and that the mental power would not have been enhanced if the physical conditions had been more normal, importance seems to be rightly attached to this consideration. That the relation between mental activities and cerebral changes is very intimate is not denied; but it is thought that a distinct and separable spirit using the brain as its organ might act upon it in such a manner as to express different perceptions through different cerebral centres. The argument based on the evolution of mental life in animal and man, and the transmission of psychical as well as physical characteristics from man to man, is met by the observation that the consciousness of self, whatever its origin, is so distinguishing a mark of human nature and so intrinsically significant that a greater permanence and a loftier destiny may well be associated with it. Instead of making self-consciousness the basis of immortality, others prefer to think of the possession of a sense of right or a peculiarly high development of the moral nature as furnishing the ground for survival.

A mass of testimony is produced, ancient and modern, to show actual communication between the dead and the living. Much of this testimony comes from persons bereaved of some relative or friend whose potent personality still occupies the mind. In almost all instances the initiative is taken by the living, and the communication is mediated through a third person. A critical sifting is often impossible. Where the manifestations through a medium have been watched and studied by scientifically trained observers, there is at best only a small residue of facts that cannot be accounted for by known laws of nature. In the present state of our knowledge of psychic phenomena, it is sometimes hazardous to pronounce a judgment. The scientist is, as a rule, inclined to assume the operation of some law of nature not yet fully understood. The manifestations may thus furnish to our minds a presumption in favor of immortality, but they cannot prove it. With more effect an argument is founded upon the incompleteness of the present life. The largest part of the human race die in infancy, or before years of discretion have been reached, and it is natural to ask whether there is no outflowering elsewhere of the human life that only buds here. Even the longest lifetime raises more intellectual problems than it solves, and leaves the mind curiously looking for their solutions to the last. The moral imperfections, seen even in the best, painfully apparent in the masses of men, give the impression of something fragmentary, unfinished, partially realized. The inequalities of life as regards wealth, position, health, opportunity for self-realization, and the still more marked inequalities of character, seem to call for a readjustment, for compensations in another life. If these considerations strictly prove only a dissatisfaction with prevailing conditions, and would to some extent lose their validity as arguments in a state of society better organized, more intelligent, resourceful, and strong than the present, the shrinking from even a painless death, the sense of an inalienable personality, and the long and widespread prevalence of the hope of a future life are deemed by many to have evidential value. The fear of death may indeed be a dread of extinction, and the fear of something after death the involuntary reflection of a belief long cherished by mankind. But it is forcefully argued that a belief so strong and persistent is not likely to be a sheer delusion.

While manifestly it is not safe to conclude from the intensity and popularity of an idea that there must be an objective reality corresponding to it, and while it is especially to be considered that modern science has revolutionized that estimate of the universe, held throughout the ages, with which all eschatological speculations in antiquity were closely connected, it nevertheless seems plausible that some fact in nature's economy is reflected in the hope of immortality. That the elements composing man's body at death are imperishable and will forever continue to be integral parts of forms that manifest the eternal energy is reasonably certain. That his psychical peculiarities survive in his offspring and in the human lives that directly or indirectly come into contact with him, is a matter of easy observation. Whether this survival in the race is endless seems to some thinkers doubtful, on the ground that the earth itself will some day have run its course and ceased to be the bearer through space of organic life. But as it is quite inconceivable that in an infinite universe, constituted, as spectral analysis shows, of essentially the same substances, a single satellite of a single sun should have produced intelligence like that of man, the secret of the earth's life may become known, and the influence of the human race, large or small, good or bad, may be felt elsewhere in the universe ere the final catastrophe comes, and even out of the death of this planet are likely to rise new forms of life.

That man will live forever in other forms of physical organization and of consciousness may therefore be regarded as exceedingly probable. Whether the consciousness of personal identity which cannot be stripped off or dissolved in the succession of fluctuating mental states and the accompanying sense of moral accountability can be fully explained as products of the brain due to the persistency of the physical type, in spite of incessant changes in the organism, may be gravely questioned. From the standpoint of idealistic

philosophy this consciousness of self is interpreted as betokening the presence of a spiritual monad reflected to human sense-perception only as though it possessed a material form. But even if the ultimate reality is conceived of as an infinite, eternal, and inexhaustible energy, it does not seem to follow that each or any of its individualized expressions shares its everlasting persistence. Rather would it seem as if the reality that no longer is shadowed forth to our sense in the outward form of a man must have ceased to be what it was. The idea of a conditional immortality has received some additional strength from the doctrine of a survival of the fittest. It encounters great difficulties, however, in attempting to define what constitutes fitness. The difference between a short life on earth and an endless existence is so infinitely great that the mind shrinks from ascribing the power to determine so momentous a fate to any conviction that has been formed, or disposition that has been developed, or line of conduct that had been adhered to, during a few years of earthly life, especially in view of the enormous influence of heredity and environment. If, therefore, scientific inquiry apparently leads to a *non liquet*, and assurance based on authority can be preserved only until the authority itself is questioned, it is the more gratifying to note the important place the doctrine of immortality has had in the education of the human race in enhancing the worth of the individual and emphasizing his higher spiritual interests, in maintaining his confidence in the inherent rightness of the universe, and in training him to regulate his present conduct by considerations of the future.

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IMMORTALS, THE. A name given to the guards of the early Persian kings, forming a regiment of 10,000 foot-soldiers.

IMMORTEL, ē'môr'tĕl', L'. A romance by Alphonse Daudet (1888), picturing with keen insight and irony the intrigues and petty strivings of the Academic world. The chief personages are the Academician Professor Astrier-Réhu, a second-rate scholar, who finds the sources on which he has based his work to be forgeries; his false, intriguing wife; their spendthrift son; and Abel de Freydet, a candidate for the Academy.

IMMORTELLE (Fr., fem. sg. of *immortel*, immortal). A name applied to various species of Helichrysum, especially Helichrysum arenarium, which is grown extensively in France, where the flowers are made into compact wreaths for home use or for export. They are chiefly used as mortuary decorations, either in their natural color (yellow) or bleached white. Like other flowers, such as tuberoses and callas, that have been used largely for funereal decoration, immortelles have suffered in popularity, especially since the barbarous practice of dyeing them purple and vermilion, and working them into fantastic designs, came into vogue. The most striking feature of the immortelle is the one that suggested the name; the flowers, being dry and firm, are so-called 'everlasting.' They retain their natural colors for months or even years. See AMARANTH.

IMMUNITY (from Lat. *immunitas*, exemption, from *immunis*, exempt, from *in*, not + *munis*, serving, from *munus*, duty). Resistance of the living organism to infection. There is an astonishing difference in the resistance shown to the invasion by germs of disease by certain animals of allied nature. Human beings, cattle, and guinea-pigs show great susceptibility to tuberculosis; while the cat, dog, and horse resist it. Man easily becomes a victim of typhoid fever, while domestic animals never suffer from it. Immunity is either (1) natural or (2) acquired. *Natural immunity* is a congenital insensitiveness to infection or contagion which is possessed by certain individuals or families, or which exists as a racial characteristic. The same individual may be immune against a certain disease at one age and become susceptible to it at another age; thus infants are almost entirely immune against yellow fever, and but few cases occur among them. The Arab is said to be absolutely immune to typhoid fever. The Japanese are immune to scarlet fever. *Acquired immunity* is a condition of insusceptibility which results from passing through an attack of the disease, or from being inoculated with the poison of the disease, which results in a change in the blood. Immunity to yellow fever results after one attack of the disease. One attack of typhoid fever is almost a certain guard against another, a statement which is true also of scarlet fever and measles. *Experimental immunity* is acquired immunity resulting from introducing, for experimental purposes, attenuated microörganisms into susceptible animals, and thereby causing the production of immunity to virulent forms of those organisms. The house mouse and the white mouse, naturally very susceptible to anthrax, are rendered immune to this disease by receiving an inoculation of blood from a convalescent tetanic animal.

Immunity is lost or destroyed in a number of ways. It may be destroyed by (1) *variation from the normal temperature.* Pasteur found that chickens, naturally immune to anthrax, became susceptible to the disease after being plunged into a cold bath. (2) *Altering the chemical composition of the blood* by changing the diet, or by injection of drugs. (3) *Loss of strength, or exhaustion*, is a cause of loss of immunity, as Roget demonstrated by inoculating previously immune white rats with anthrax, after compelling them to work at revolving a

wheel. (4) *Removal of the spleen* is followed by susceptibility to disease (Bardach). (5) *Combining various microörganisms* destroys immunity in some experimental cases.

THEORIES OF IMMUNITY. In 1880 Pasteur taught that the microörganism, by its growth in the body, uses up some substances necessary for its existence, and then perishes. If the removal of this substance be complete, perfect immunity results. This is the *exhaustion theory*. Sternberg combats it, saying that if it were true, we must have in each of our bodies certain smallpox material, measles material, and scarlet-fever material, etc., each of which must be exhausted by its appropriate microörganism, thus necessitating an almost inconceivably complex body chemistry. The *retention theory* was advanced in 1880 by Chauveau, who suggested that the growth of the bacteria in the body probably originated some substance prejudicial to their further development. The *phagocytosis theory* was suggested by Carl Roser in 1881, received attention from Sternberg, and also from Koch, but was not advanced with any insistence till in 1884 Metchnikoff enthusiastically championed it and gave it his name. There are two varieties of the white blood-corpuscle whose duty it is to destroy bacteria: these are the large, unicellular leucocyte, or macrophagocyte, and the smaller form, the microphagocyte. Both these forms exhibit amœboid movements, and possess the attractive force called *chemotaxis* which exists between amœboid cells and food particles. Phagocytosis is the incorporation of foreign particles by these amœboid white blood-corpuscles. Leucocytes actually take up and envelop living pathogenic organisms, as demonstrated by Koch in 1878. The *humoral theory*, suggested by Grohmann in 1884, was advanced by Buchner, who claimed that not phagocytosis, but the bactericidal action of blood-plasma, is the cause of the destruction of pathogenic bacteria. He showed that freshly drained blood, blood-plasma, as well as aqueous humor destroyed such organisms. It was shown in rebuttal that dispersion in a large amount of watery fluid causes the death of microorganisms, which grow well when allowed to remain in a close colony. The prevalent and generally adopted theory is the *antitoxin theory*, defended by Behring and Kitasato, Brieger, Tizzoni, Cattani, Roux, Vaillard, and others. According to this theory, the metabolism of bacteria, during disease, gives rise in the blood of the sick person, not only to poisonous alkaloids called *toxins* (existing either in the bodies of the bacteria or produced by them), but also to defensive proteids called *anti-toxins*, which possess the property of neutralizing the toxins. Hankin divides the antitoxins (formerly called *alexins* by Buchner) into four groups. Proteid substances that occur naturally in animals and possess the power of destroying bacteria or their products, he calls *sozins*. Similar proteids resulting from acquired immunity in animals he calls *phylaxins*. Sozins are subdivided into those which have the property of killing bacteria, or *mycosozins*, and those which neutralize bacterial products, or *toxosozins*. A phylaxin which destroys bacteria he calls a *mycophylaxin*, and a phylaxin which neutralizes their ptomaïns he calls a *toxophylaxin*. Consult: Roser, *Entzündung und Heilung* (Leipzig, 1886); Chauveau, *Traité de physique biologique* (Paris, 1901); Behring, *Die Blutserumtherapie* (Leipzig, 1892); Sternberg, *Immunity: Protective Inoculations in Infectious Diseases and Serum Therapy* (New York, 1895). For the method of securing artificial immunity by means of defensive proteids, see ANTITOXIN; TOXINS; SERUM THERAPY; and VACCINATION.

IMMUNITY, in feudal law, and in international law. See FEUDALISM; INVIOLABILITY.

IMOGEN, ĭm'ō-jĕn. The daughter of Cymbeline and wife of Posthumus, in Shakespeare's *Cymbeline*, whom her husband is made to believe false by Iachimo, but whose fidelity is afterwards proved.

IMOGENE, ĭm'ō-jēn, THE FAIR. The heroine of Lewis's ballad "Alonzo the Brave and the Fair Imogene."

IMOLA, ē'mō-lä. A walled city, on the Santerno, in the Province of Bologna, Italy, 21 miles southeast of the city of Bologna (Map: Italy, F 3). It has been the seat of a bishop since 422. It has an ancient castle, several asylums, and two theatres. It markets wine and vegetables, and manufactures leather, majolica, bricks, gunpowder, and fertilizers. Near by are mineral springs. In Roman times the city was called 'Forum Cornelii,' after its founder, L. Cornelius Sulla. Here was born Saint Peter Chrysologus, Archbishop of Ravenna, who died in 449, and the painter Innocenzo da Imola, who died about 1550. Population of commune, in 1881, 29,343; in 1901, 33,210.

IMOLA, INNOCENZO DA (c.1494-c.1550). An Italian painter, born at Imola. His real name was Innocenzo di Pietro Francucci, and he was the pupil of Francia at Bologna, and then studied under Albertinelli in Florence. Afterwards he went to Bologna and painted the frescoes of the "Death and Assumption of the Virgin" at San Michele (1519), also the "Madonna in Glory," and a "Madonna with Kneeling Donors," both in the gallery of that city. Among his other works are altar-pieces in the cathedral at Faenza, in Berlin, and in Munich. His best pictures are reminiscent of Raphael.

IMOSHAGH, ē'mō-shäg'. The national name of certain pastoral tribes of Tuaregs in the Sahara Desert, who are independent. See TUAREG.

IMPACT (from OF. *impacter*, *empacter*, to press close together, from Lat. *impingere*, to dash against, from *in*, in + *pangere*, to fasten). If a body in motion meets a second body—either at rest or in motion itself—there is said to be an 'impact' between them. The general principles of mechanics of course may be applied to the changes in the motion. (See MECHANICS.) The geometrical sum of the linear momentum of the two bodies is not changed by the impact; nor is the sum of their kinetic energies provided they are perfectly elastic. Consider the two bodies as moving along the same horizontal line. Let their masses be m_1 and m_2 and the velocities of their centres of inertia before and after impact be v_1 and v_2 and V_1 and V_2, respectively. Then, for all bodies

$$m_1v_1 + m_2v_2 = m_1V_1 + m_2V_2.$$

(This law was given by Wallis, Wren, and Huygens almost simultaneously, 1668. The first applied it to inelastic bodies; the last two to elastic ones.) If the bodies are absolutely inelastic, $V_1 = V_2$; if they are perfectly elastic

$$\tfrac{1}{2}m_1v_1^2 + \tfrac{1}{2}m_2v_2^2 = \tfrac{1}{2}m_1V_1^2 + \tfrac{1}{2}m_2V_2^2;$$

if they are imperfectly elastic and of the same material, Newton has shown that

$$\frac{V_1 - v_1}{v_2 - V_2} = e$$

a constant for a given kind of material, which is called the 'coefficient of restitution.'

IMPALE (from Fr. *empaler*, It. *impalare*, ML. *impalare*, to impale, from Lat. *in*, in + *palus*, pole). In heraldry, to arrange two coats of arms side by side in one shield divided per pale. It is usual thus to exhibit the conjoined coats of husband and wife, the husband's arms occupying the dexter side or place of honor, and the wife's the sinister side of the escutcheon. A husband impaling his wife's coat with his own is not allowed to surround the former with the collar or insignia of any order of knighthood to which he may belong. Bishops, deans, heads of colleges, and kings of arms, impale their arms with their insignia of office, giving the dexter side to the former. In early heraldry, when two coats were represented in one shield side by side, only half of each was exhibited, an arrangement which had been called dimidiation (q.v.). Sometimes the one coat only was dimidiated. A reminiscence of dimidiation is preserved in the practice of omitting bordures, orles, and tressures in impaled arms on the side bounded by the line of impalement.

IMPALA (African name). An antelope. See PALLA.

IMPANATION (Fr. *impanation*, Port. *impanação*, It. *impanazione*, from Lat. *in*, in + *panis*, bread). A word coined in the Middle Ages to indicate a modification of the theory of transubstantiation. Formed upon the model of the word 'incarnation,' it ought to denote that the divine Logos took upon Himself the elements of the bread and wine of the Eucharist, just as He did humanity in the Incarnation. But it was used to denote the view that instead of a transubstantiation by which the substance of the bread and wine became the substance of the body and blood, there was in the Eucharist an assumption by the whole Christ, body as well as divine Logos, of the bread and wine, so that He was wholly present in them. This scarcely differs from Luther's personal view, which was that of the "sacramental permeation of the substance of the bread by the substance of the body," etc., and he was charged by Bellarmine and other Roman Catholics with reviving the old error of impanation. The official doctrine of the Lutheran Church, however, is that of the "sacramental coexistence at the same place of the two substances, both continuing to exist in their unmodified integrity." See LORD'S SUPPER; TRANSUBSTANTIATION.

IMPARLANCE (OF. *emparlance*, from *emparler*, to talk, from *en*, in + *parler*, to talk, from ML. *parabolare*, to discourse, from Lat. *parabola*, parable, from Gk. *παραβολή*, *parabolē*, comparison, from *παραβάλλειν*, *paraballein*, to place beside, from *παρά*, *para*, beside + *βάλλειν*, *ballein*, to throw). In common-law pleading, an allowance of time to the defendant in a civil suit to put in his defense. As the name indicates, the grant of time was originally made to enable the defendant, before pleading, to talk with the plaintiff, with the view of coming to an amicable understanding with him. Later, in certain classes of cases, the defendant was entitled to demand one imparlance (*licentia loquendi*) for this purpose, and this practice, in course of time, became a mere device for securing a reasonable time in which to plead. The term is not in general use in this sense in the United States. See PLEA; PLEADING. Consult Blackstone, *Commentaries on the Laws of England*.

IMPASTO (It., covered with paste). The name given to the practice of painters who lay on their color with solidity and thickness. Certain schools at one time loaded with color the light portions of their picture, and left the shadows thinly painted. In this way they thought to secure transparency, as it was called, in the shadows. The practice to-day, however, is to attain transparency in shadows by their true relation to the light parts of the picture, and this is done by painting all parts with equal thickness of pigment.

IMPATIENS. See BALSAM.

IMPEACHMENT (OF. *empeschement*, Fr. *empêchement*, hindrance, from OF. *empescher*, Fr. *empêcher*, to hinder, from ML. *impedicare*, to entangle, fetter, from Lat. *in*, in + *pedica*, fetter, from *pes*, foot). The act of calling a person to account for some misconduct, or of discrediting a witness, a document, or a record. Impeachment of waste is an ancient statutory proceeding instituted to restrain and punish the commission of acts of waste by tenants for life or years. (See IMPEACHMENT OF WASTE, and WASTE.) The manner in which a document or record or witness is impeached, and the legal effect of such impeachment, are explained in the articles on TESTIMONY and WITNESS.

There remains for our present consideration the peculiar method, known as impeachment, of prosecuting certain public offenders. In England it differs from the ordinary criminal prosecution in two respects: (1) the prosecutor is the House of Commons, and not the Crown; (2) the trial court is the House of Lords, and not an ordinary judiciary tribunal. In the United States an impeachment is generally instituted and prosecuted by the Lower House of Congress or of a State Legislature before the Upper House or Senate, although a few of our States provide for impeachments in the ordinary courts of justice.

This method of prosecuting criminals was employed for the first time in the case of Lord Latimer and others, who were accused of different kinds of frauds and malpractices connected with the revenue during the latter part of the reign of Edward III., and who were found guilty and condemned to imprisonment and removed from office. The proceeding is one of the monuments of the Good Parliament of 1376. Several other cases of impeachment of crime followed: but after 1459 acts of attainder (see ATTAINDER) took the place of impeachments for nearly two centuries. Under the Stuarts, however, Parliament again returned to impeachments as an effective method of dealing with officers of the Crown who were corrupt or oppressive. In 1621 Sir Giles Mompesson and Lord Bacon were impeached and convicted, removed from office, and heavily fined, for gross official misconduct. Since that date there have been fifty-two cases of impeachment in England, of which number but one has occurred within a hundred years, and

and vigorous institution. The court for the trial of impeachment is accounted the very capstone of our judicial systems, Federal as well as State. Its existence is secured and its organization is regulated by national and State constitutions. For example, the organic law of the Union provides that "the House of Representatives shall have the sole power of impeachment" (Art. I., Sec. 2, cl. 5), and "the Senate shall have the sole power to try all impeachments. When sitting for that purpose," it is declared, "they shall be on oath or affirmation. When the President of the United States is tried, the Chief Justice shall preside; and no person shall be convicted without the concurrence of two-thirds of the members present. Judgment in cases of impeachment shall not extend further than to the removal from office and disqualification to hold and enjoy any office of honor, trust, or profit under the United States, but the party convicted shall nevertheless be liable and subject to indictment, trial, judgment, and punishment, according to law." (Art. I., Sec. 3, cl. 6 and 7.) The Constitution further provides that "the President . . . shall have power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment" (Art. II., Sec. 2, cl. 1); and again, "the President, Vice-President and all civil officers of the United States, shall be removed from office on impeachment for, and conviction of, treason, bribery, or other high crimes and misdemeanors." (Art. II., Sec. 4.) Similar provisions are contained in nearly every State constitution, although a few States remit impeachment trials to the ordinary courts of justice.

It will be observed that this extraordinary proceeding is limited by the Federal Constitution to the punishment of Federal officers. Can a Federal officer escape impeachment by resigning his office? The Senate decided in the case of Belknap, by a vote of 37 to 29, that he cannot. On the other hand, the Supreme Court of Nebraska has held that the prime object of impeachment proceedings is to protect the State from official misconduct, and that as soon as an officer resigns, the reason for resorting to these proceedings ceases. Thereafter, the offender is to be prosecuted like any other criminal by indictment and trial in the proper judicial tribunal.

Differences of opinion have developed, also, in this country concerning the nature of impeachable offenses. According to one view, only such official misconduct as renders the wrongdoer liable to indictment will warrant an impeachment; while another view is that this proceeding was intended to be very elastic and comprehensive, and to be applicable to every sort of official misdemeanor which is subversive of any fundamental or essential principle of government or highly prejudicial to the public interests. This view was adopted by the House of Representatives in preparing its articles of impeachment of President Johnson, and has been approved by the Supreme Court of Nebraska. It has been embodied in the constitutions of some of the States.

The literature upon this topic is quite extensive, both in England and in this country. See Blackstone, *Commentaries;* Anson, *Law and tice* (10th ed., London, 1901); Pike, *Constitutional History of the House of Lords* (London, 1894); Poore, *Federal and State Constitutions* (Washington, 1877); 6 *American Law Register*, N. S. 257, 641; *State* v. *Hastings*, 37 Nebraska Reports, 96 (1893); Story, *Commentaries on the Constitution* (Boston, 1882); *Addison Trial* (Lancaster, 1803); *Chas's Trial* (Baltimore, (1805); *Peck's Trial* (Boston, 1883); *Prescott's Trial* (Boston, 1821); *Impeachment of President Johnson* (Washington, 1868); *Bellknap's Trial* (Washington, 1876); Mechem, *On the Law of Public Offices and Officers* (Chicago, 1890).

IMPEACHMENT OF WASTE (liability for waste). An expression of English law used to denote the liability of tenants for life or years for waste committed by them upon the estate. The phrase is commonly employed in connection with a lease of land for life or for a term of years, when an estate is given to such a tenant, "without impeachment of waste." He is then entitled to cut timber, and do many things on the estate which otherwise he would be unable to do. The privilege so granted is, however, not unlimited, but is confined to such reasonable use of the land as is included within the description of 'ordinary waste,' such as the cutting of timber for building and repairs, the improvement of the estate, etc. If the tenant abuses the right and attempts to cut down ornamental timber, for example, or deface the family mansion, the Court of Chancery will interfere by injunction to restrain the unauthorized waste. See WASTE.

IMPENDING CRISIS, THE. See HELPER, HINTON ROWAN.

IMPERATIVE, CATEGORICAL. See CATEGORICAL IMPERATIVE; ETHICS.

IMPERATIVE MOOD. See VERB.

IMPERATOR. See EMPEROR.

IMPERIAL CHAMBER (Ger. *Reichskammergericht*). One of the two highest courts of the Holy Roman Empire, coördinate with the Aulic Council (q.v.). It was created in 1495 by the Emperor Maximilian under pressure of the princes of the Empire, whose influence was greatly strengthened by the erection of the new tribunal. It was composed of a president nominated by the Emperor, two vice-presidents, and a number of associate judges, varying at different times from sixteen to fifty, selected partly from among men learned in the law and partly from the ranks of the nobility. Its jurisdiction included primarily all cases involving the princes of the Empire, but it sat also as the highest court of appeal in civil cases involving the interests of the member of any estate. It also offered redress for any refusal, delay, or miscarriage of justice on the part of any inferior court. Its sessions were held at Frankfort, Speyer, and, after 1693, at Wetzlar. It exercised a profound influence on the development of the civil codes in the various territories of the Empire.

IMPERIAL CITY, THE. A title frequently given to Rome.

IMPERIAL EAGLE, PIGEON, etc. See EAGLE, PIGEON, etc.

IMPERIAL FEDERATION. A plan to unite the different parts of the British Empire

more closely. At present the only formal tie between the various parts of the British Empire is the Crown. Many of these parts being so distant, of such diverse local interests, and having no representation in the Imperial Parliament, must naturally drift into complete independence, unless some reconstruction of the British Constitution be effected which shall retain and strengthen the interests of the self-governing colonies in the Empire. For several years this question has occupied the minds of British statesmen. In 1884 a gathering of leading members of both the Liberal and Conservative parties, in London, under the presidency of the Right Hon. W. E. Forster, resulted in the formation of the Imperial Federation League. A practical scheme of federation, prepared by a special committee of the League, was presented in 1892. It recommended the establishment of a council of the Empire, on which the chief self-governing colonies should be represented, including India and the Crown Colonies. This Council should deal with Imperial defense, to which each part of the Empire should contribute. The adoption of this report marks the end of the stage of general discussion without any definite plan, and the beginning of the period for taking steps to bring the matter to an issue. As the work for which the League was founded belonged rather to the first than the second stage, and as the members differed as to the best plan to be followed, it was decided to dissolve the League at the end of 1893, in order that there might be complete freedom in deciding on practical steps. Its place was taken by several organizations, among which are The United Empire Trade League, The British Empire League, The Imperial Federation (Defense) Committee, and The Unity of the Empire Association. Besides these there are many societies in the various colonies.

A conference which met in Ottawa June 28, 1894, composed of delegates from nearly all the self-governing colonies, marks a step in the progress of the movement. The object of the meeting was to promote the development of trade within the Empire by means of improved intercolonial communication. The keynote of the discussions was loyalty to the mother country and a determination to maintain intercolonial solidarity. Thus the conference served to bring about a mutual acquaintanceship and to arouse a feeling of intercolonial kinship. There are several practical difficulties to be encountered. Critics of the project doubt if the mother country would permit herself to be outvoted by a combination of the colonies, or whether each part would be willing to aid the others in matters not directly affecting itself. The various colonies have different tariff systems, some being strongly protectionist, and it is a question whether these last would agree to the free-trade preferences of the mother country, or whether England would modify her policy to please them. The basis upon which India could be included within the union is also a matter frequently discussed. These and other problems, it is asserted, must be solved before the federation can be accomplished.

On the other hand, the project has received the warm approval of a large section of the British and colonial press, and of men of such widely differing political views as Mr. Forster, Lord Randolph Churchill, Sir John Lubbock, and Mr. Cecil Rhodes. The growing intimacy between the parts of the Empire, as shown by the conference of 1894, and the gradual reduction of the barriers of time and distance, augur well for the success of the movement. The existence of a real and practical, though not formal, union is demonstrated by the aid furnished to the mother country in the Transvaal War of 1899-1902, and in the Chinese fighting of 1900. Many persons see a strong tendency toward ultimate Imperial federation in the recent federal unions of Canada (q.v.) and Australia. See AUSTRALIAN FEDERATION.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES, AND INDIA. A memorial of the Queen's Jubilee of 1887, which is a public institution in South Kensington intended to contain "sample collections of the natural products and resources of every portion of the British Empire, so arranged and displayed as to be of practical benefit to commercial business men, and to allow of scientific research by every class of students." It is furnished, therefore, with laboratories and with reading and lecture rooms as well as with exhibitory departments. The University of London is now housed also in the buildings of the Imperial Institution. For a description of the building, with illustrations, consult in *Magazine of Art*, March, 1890, an article by Sir Somers Vine.

IMPERIALISM. A term originally applied to the character and spirit of that form of government known as an empire (q.v.), and connoting absolute power vested in the hands of a single ruler. More recently the term has been generally used to describe the policy, pursued by various nations, of establishing 'world powers' through the extension of their rule over other and especially inferior races of mankind, and, sometimes, through the acquisition, on whatever motive, of new territory lying outside their 'natural' boundaries. The policy, when logically carried out, results in the establishment or maintenance of colonies or outlying dependencies. In Great Britain the term is sometimes applied to the doctrine which calls for the closer union, into a so-called Imperial Federation, of the component parts of the British Empire. With reference to the questions of expansion of territory and extension of power, there has been much discussion in recent years, especially in Great Britain and the United States. In the former country those favoring such a policy are popularly known as 'Jingoes,' and those opposing it as 'Little Englanders.' Each acquisition or attempted acquisition of new outlying territory by the United States has met with much opposition, and the opposition was particularly pronounced at the close of the Spanish-American War, when a group of citizens, who soon came to be known as 'Anti-Imperialists,' vigorously contended against the acquisition by this country of the Philippines and Porto Rico. By various political leaders and a large number of voters 'imperialism' was regarded as the 'paramount' issue in the Presidential campaign of 1900.

IMPERIAL MOTH. The largest of the 'royal moths' (*Basilona imperialis*), sulphur yellow marked with purplish brown. The wings expand from four to five inches; the larva is thinly clothed with hairs and bears spiny horns on the

IMPERIAL ORDER OF SERVICE. A new order instituted in London June 26, 1902, by King Edward VII., to confer honor on those who have held continuous office under the British Crown either in England or in the colonies. The order consists of a sovereign and companions. Though the number of companions is unlimited, the order is practically confined to persons who have been employed in the various branches of the British Civil Service for at least forty years. Up to January 1, 1903, the order had been conferred on about one hundred and five gentlemen.

IMPERIAL WOODPECKER. See IVORY-BILL.

IMPERIUM (Lat., power, jurisdiction). A term applied to the sovereign power of a Roman magistrate when in command outside of Rome. Thus, a Roman consul, when operating in war, was invested with the power, *imperium*, that in Rome was the inalienable prerogative of the *Senatus Populusque Romanus;* and he was known as *imperator*, general-in-chief. When Augustus took under his own control all the important functions of the State, the republic merged into a monarchy, the *imperium* became the exclusive prerogative of the monarch, and *imperator* passed to its modern meaning of 'emperor.'

IM'PETI'GO (Lat., from *impetere*, to attack, from *in*, in + *petere*, to seek). A disease of the skin. The term was formerly applied to many different diseases of the skin which were characterized by pimples, pustules, and scales. In modern times Willan restricted the term to a disease of the skin, characterized by an eruption of small itching pustules, single or in groups, terminating in scaly crusts of a yellowish color. Hebra and more recent writers discard the term, and classify the old impetigo as a form of eczema (q.v.). Tillbury Fox, of London, describes impetigo contagiosa as an acute pustular, contagious skin disease, during which the patient suffers from fever, with vesicles and pustules on the face and hands, and thence extending to other parts of the body and followed by the production of yellowish crusts. Impetigo herpetiformis is a similar, noncontagious eruptive dermatosis, occurring in pregnant women, attended with grave general symptoms. Impetigo rodens is either cancer or syphilis. For treatment of impetiginous eczema, see ECZEMA.

IMPEY, ĭm'pĭ, Sir ELIJAH (1732-1809). An English jurist, Chief Justice of Bengal, born at Hammersmith. He was educated at Westminster School and Trinity College, Cambridge, and was called to the bar in 1756. He was counsel for the East India Company in 1772, and two years later was knighted and sent out to Calcutta as the first Chief Justice under the new regulating act. He naturally sided with his old school-fellow, Warren Hastings, in that Governor's political troubles, and this course of conduct, together with his condemning to death the famous forger Raja Nand Kumar, brought about his own recall and impeachment (1783); but he was discharged with honor, having been revealed as an amiable and upright judge, perhaps a trifle vain and too easily led by Hastings. Impey was elected member of Parliament for New Romney in 1790, but, although he held his seat until 1796, retired to the country in a couple of years, and

IMPEYAN PHEASANT. See PHEASANT.

IMPHEE. See SORGHUM.

IMPLEMENTS, AGRICULTURAL. A loose term applied to all implements and tools used in farming, not only in the tilling of the soil, but in the later preparation of the crop for market. Doubtless the first tools used were such as required only human strength in their manipulation. The crude spade, hoe, rake, sickle or scythe, and the flail of the ancients are the prototypes of the modern plow, cultivator, harrow, self-binder, and threshing-machine. After animals were subjected by man, the primitive plow and harrow appeared. At first these were branches of trees; the former a crotched stick drawn through the ground, the latter a twiggy limb dragged over the surface. Cultivators and other implements for clearing the ground of weeds, for the occasional stirring of the ground while under crop, and for earthing up crops are all modern inventions. Especially during the nineteenth century were improvements made in almost every kind of farm implement. Indeed, not a few first appeared during that period, notably the perfected seed-drill, reaper, and self-binder. The threshing-machine has not only supplanted the flail and the use of animals in treading out the grain, but has also rendered obsolete the ancient methods of winnowing away the chaff. In short, every necessary operation of the farm is now performed with some implement or machine specially adapted to the purpose, and horse, steam, and in some instances electric power, have supplanted manual labor as far as such substitution has been deemed feasible. Since the publication of Thomas's *Farm Implements and Machinery* (1859 and 1869), a few American books have appeared which illustrate and describe many farm conveniences and appliances; but improvements in farm implements have been so numerous and important, and the applications of science so striking, that there is great need of a work which shall deal with fundamental principles.

Consult: Bailey, article "Tools," in *Cyclopedia of American Horticulture* (New York, 1900); Myrick, *Farm Conveniences* (New York, 1884); Martin, *Farm Appliances* (New York, 1887).

IMPLU'VIUM (Lat., receptacle for rain-water). A tank or cistern in the centre of the hall or atrium of a Roman house. In the examples which remain at Pompeii the impluvium is generally formed of marble. It is placed immediately under the unroofed part of the atrium, and is intended to receive the rain which runs down from the roof through the opening or compluvium. The impluvium was frequently adorned with a fountain, and with busts, statues, and vases, and formed a very peculiar and interesting feature in the house. The term was also applied to the central open space of the atrium, even if unprovided with a collecting basin.

IMPOON, ĭm-pōōn' (Zulu name). One of the duikers (*Cephalolophus mergens*), a small antelope, very plentiful in South Africa, in wooded districts. See DUIKER.

IMPORTS AND EXPORTS. In a general sense, imports and exports are goods which are conveyed across the boundaries of a region which

is economically a unit. Thus we read of the imports and exports of mediæval cities, and the intercolonial trade in America before the Revolution is classified in imports and exports. Since, however, almost all of our knowledge of imports and exports is connected with the collection of duties from them, it has become customary to apply the terms to goods carried into or away from regions which are units politically, in which no part levies discriminating duties against goods from another part. The trade between different parts of Australia, which formerly figured in statistics of imports and exports, has ceased to be so classed since the federation of the Australian colonies. A mere customs union of independent political units, however, would not change the character of the trade among its members.

The formation of extensive empires and federations which has taken place in modern times would in itself have largely diminished imports and exports. So also would the great diversification of industry which has marked the recent economic history of the chief modern States. Agricultural countries are rapidly becoming manufacturing countries also, and hence have less reason to export raw produce and import manufactures. On the other hand, the great cheapening of transportation and the development of a wider range of wants have had a tendency greatly to increase imports and exports. How greatly the latter set of forces have overbalanced the former may be seen by comparing the statistics of foreign trade of a hundred years ago with those of the present. See COMMERCE.

Since the opening of the modern epoch there has existed a feeling that imports are injurious to a country, while exports are advantageous to it. Early statesmen believed that imports tended to drain a country of its bullion, while exports tended to restore that form of wealth. Hence the numerous regulations of the mercantile period which aimed to discourage importation and encourage exportation. The special character of English imports and exports of the time assisted in developing this prejudice against imports. England largely exported wool and corn—commodities of high utility—and imported chiefly fine wares and articles of luxury, which were regarded by statesmen as injurious. The physiocratic school of writers, on the other hand, argued that since exportation of useful articles encouraged their production, it was to the advantage of a country to import its luxuries and devote itself to production of necessaries. But this point of view has never been widely adopted by practical statesmen.

Prejudice against imports still exists; but it is chiefly on the ground that importation tends to diminish the employment of labor and capital within a country. Exports are regarded with favor as encouraging industry. Economists have shown that exports and imports have an irresistible tendency to balance each other. An excess of imports, followed by a drain of specie, lowers prices in the importing nation, and so encourages exportation. On the other hand, development of export trade must sooner or later result in an inflow of specie, higher prices, and consequent importation. The advantages of foreign trade in its entirety should, therefore, be the subject of study, not the advantages and disadvantages of the correlative phenomena that compose it.

In practical politics much stress is still laid upon the character of imports and exports. It is commonly regarded as highly desirable that a nation should export manufactures, and that its imports should as far as possible be raw materials. Manufacturers draw less upon the natural resources of a country and more upon the industry of its people. It is obvious, however, that a country with unique natural resources may attain a higher standard of well-being if it devotes its labor and capital to the exploitation of those resources, instead of endeavoring to produce manufactures in which it would have no relative advantage over other countries.

It has been said that there is a natural tendency for imports and exports to balance each other. This is true, however, only with qualifications. The total value of imports of the world must naturally exceed that of exports, since the cost of carriage enhances the value of goods transported from one nation to another. A nation like England, which does a more than proportionate part of the world's carrying trade, can permanently import more than it exports; while the United States, since it carries only a small part of its imports and exports, must permanently have a balance of exports. Again, a nation may invest the wealth gained by exportation in foreign enterprises, and will therefore have no corresponding surplus of imports until the returns from such enterprises begin to come in. Thereafter it may receive a permanent surplus of imports. So England, having invested heavily in other countries, normally shows a great excess of imports over exports, as does also France, while the countries which are heavily indebted to foreign capitalists export as a rule far more than they import. See COMMERCE; INTERNATIONAL TRADE; BALANCE OF TRADE.

IMPOST (Fr. *imposte*, from Lat. *impositus*, p.p. of *imponere*, to place upon, from *in*, in + *ponere*, to place, from *po-*, Gk. *ἀπό*, *apo*, away + *sinere*, to allow). The point where an arch rests on a wall or column, or the part of the structure from which it springs. It is usually marked by horizontal moldings; but sometimes these are absent, especially in Gothic architecture, where different forms of impost are used. These have been classed as—first, the continuous impost, where the arch moldings are carried down the pier; second, the discontinuous impost, where the arch moldings abut and are stopped on the pier; third, the shafted impost, where the arch moldings spring from a capital, and are different from those of the pier, the form used in best Gothic; fourth, the banded impost, where the pier and arch have the same moldings, but the impost is marked by a band of horizontal moldings, as is frequently the case in Italian-Gothic buildings. Two adjoining arches often spring from the same impost block. The member which receives this name was unknown before mediæval architecture.

IMPOSTORS, THE THREE (Lat. *De Tribus Impostoribus*). The name given to a work alleged to deny all divine revelation, characterizing the three great founders of religions—Moses, Jesus, and Mohammed—as impostors. Though it is often mentioned since the tenth century, and attributed to heretics of various ages and various degrees of eminence, no authentic copy is known to have ever been seen. A book bearing this title, and professedly published in 1598, was reprinted

rected to the subject by the spread of infidelity caused the appearance of an apocryphal edition, which has been frequently reprinted.

IMPOTENCY (from Lat. *impotentia*, inability, from *impotens*, powerless, from *in-*, not + *potens*, able, from *potis*, powerful; connected with Lith. *patis*, Skt. *pati*, lord). As a legal term, an incurable incapacity that admits of neither copulation nor procreation. It is a ground for divorce by either spouse if it existed at the time of marriage and is incurable, whether it results from a defect caused by nature, or by accident, or by the acts of the party. It has been held that "where impotency is simply the result of old age, the marriage is still binding; that a man of sixty who marries a woman of fifty-two should be content to take her *tamquam soror*." The burden of proving impotency is upon the party alleging it as a ground for a divorce. Consult the authorities referred to under DIVORCE; HUSBAND AND WIFE.

IMPOUNDING. The placing in a pound goods which have been taken by distress (q.v.), or cattle which have been taken damage feasant or found astray. See POUND; STRAY.

Also, the retention of a deed or other legal document in the custody of a court in which it is produced. This may be done where the instrument is suspected of being forged, or is otherwise of such a character as to satisfy the court that it may be used as the basis of a criminal prosecution. It is then impounded by order of the court, in order that it may be available when required for that purpose.

IMPRESSIONIST SCHOOL OF PAINTING (from Lat. *impressio*, from *imprimere*, to impress, from *in*, in + *premere*, to press). A group of painters who endeavor to render the impression of an object, or being, exactly as it is in nature. Strictly speaking, every painter is an impressionist, in so far as he renders his own impressions, and the term 'Luminists' has been proposed by Van Dyke as more appropriate, since the school is mainly concerned with rendering light. They constitute a branch of the Realist school, and are also called Naturalists, corresponding to the modern Naturalist schools of sculpture and literature. They differ from Realists like Courbet in that they conceive nature to present a series of flat, colored surfaces, and not figures in rounded contours. Their pictures are marked by an absence of modeling.

The chief object of the Impressionists is to render the effects of light. They paint everything in full light, and condemn the practice of painting in the studio as giving untrue tones. All their pigments are light. Bright colors are placed side by side, and the school avoids the middle tones by which earlier painters achieved harmony of color. Their works, being momentary impressions, are marked by great rapidity of execution, and seem sketchy in character. Indeed, the members of the school have justly laid themselves open to the criticism of exhibiting unfinished sketches for pictures. So great a painter as Monet, for example, held an exhibition of studies of poplars seen at different times of day and seasons of the year. Closely inspected, their paintings seem mere blotches of color roughly of execution enables the Impressionists to portray motion and the nuances of expression to an extent not previously attained. Their figures are real men and women in the actions of daily life, not models posed in a studio. They took the final step in the liberation of modern art from ancient tradition in color—a revolution begun by the Romanticists under Delacroix, and continued by the Realists under Courbet. Being the latest school, they have also come nearest to solving the specific problem of nineteenth-century art—the representation of light, color, and moving life.

The Impressionists found their way to public favor very slowly. At first they were the subject of much ridicule. Manet, the founder of the school, had to exhibit his first Impressionist picture in the Salon des Refusés in 1863. A powerful factor in their progress to public favor was their championship by Zola, whose articles in behalf of Manet attracted great attention. They were much aided by the picture dealer Durand-Ruel, who, at a time when they were generally condemned, held exhibitions of their work side by side with that of the Barbison masters. It was not until the early seventies that critics and the general public began to take them seriously. Painters, however, were quicker to recognize the progress in color and atmosphere which Impressionism represents. Its work is quite generally accepted and followed, and its permanent influence has been to raise the pitch of light in present painting. It is, however, a question whether there will not be a reaction in favor of greater form and solidity in painting than is the present practice.

The chief French representatives of Impressionism are Monet, the present head of the school, and Siseley, in landscape; Degas, Raffaelli, and Pissaro, in figure and genre painting. Its influence is strongly felt at Munich and Glasgow, and in the United States, where the chief representatives are Weir and Twachtmann. The late Theodore Robinson was also a prominent exponent of the school. Consult: Duranty, *La nouvelle peinture* (Paris, 1876); Duret, *Les peintres impressionistes* (ib., 1878); Lecomte, *L'art impressioniste* (ib., 1892); Muther, *History of Modern Painting* (London, 1896).

IMPRESSMENT. A procedure formerly adopted in Great Britain to obtain additional seamen for manning the navy. It was admitted to be unjust to the individual, but was made legal on the ground that the country had the right in time of war to the services of any individual. All seafaring men, except masters and mates of merchant vessels, watermen-apprentices, and certain other exempted persons, were liable to be forcibly seized, taken on board men-of-war, and compelled to serve. The practice was extended to cover men on board vessels in other than home waters. As the British Government claimed a right to the services of her seamen wherever found, men were seized on board foreign merchant vessels, and even on men-of-war which were too weak to resist. Similarity of language and the fact that many American seamen were of British birth caused the United States to be the greatest sufferer from the British press-gangs, and eventually this grievance became a leading cause of the War of 1812. It is stated that the number of

impressed Americans serving in British ships between the years 1802 and 1812 was seldom less than the total enlisted force of the United States Navy at the time, and at the beginning of the war more than 2000 Americans were discharged into prison ships for refusing to fight against their own country. In the treaty of peace Great Britain did not formally give up her claim to the right of impressment as respected seamen in American ships, for the subject was not mentioned; but the claim of the United States was tacitly admitted, and no further attempts were made to impress men from American ships.

IMPRISONMENT (from *imprison*, OF., Fr. *emprisonner*, from *en*, in + *prison*, prison, from Lat. *prensio*, arrest, from *prehendere*, *prendere*, to seize). The restraint of a person's liberty for any cause whatever, whether by authority of the Government or in defiance thereof. In the latter case it is 'false imprisonment' (q.v.). It does not necessarily imply a prison with bolts and bars, but may be exercised by any use or display of force, lawfully or unlawfully, in the open street. A man becomes a prisoner, wherever he may be, by the mere word or touch of a duly authorized officer directed to that end. Usually, however, imprisonment is understood to imply an actual confinement in some jail or prison employed for the purpose according to the provisions of law. The power to imprison is in many cases inherent in courts or magistrates, and in others conferred upon them by statute, and it may be employed in civil as well as criminal proceedings. Imprisonment for debt, once universal in this country, under the operation of the English common law, is now generally abolished by statute, except in cases where the action of the debtor is tainted by fraud, or he is reasonably suspected of an intention to avoid his debts by concealing his property, or removing that and himself from the State. Witnesses whose testimony is necessary for the conviction of a criminal often are imprisoned to prevent their escape from the jurisdiction of the court. Persons accused of crime are either confined till the day of trial or released on bail, according to the gravity of the offense. Courts have the power to imprison for contempt of their authority, and persons found guilty of crime are imprisoned for periods definitely fixed by statute or by the judgment of the court. The confinement of lunatics in asylums appointed for the purpose is not here considered, as such asylums are not usually regarded as prisons. A person who wrongfully or illegally deprives another of liberty may be sued in a civil action for false imprisonment by the person aggrieved, or prosecuted as for a criminal offense. A prisoner desiring release is entitled to a writ of *habeas corpus* to obtain the judgment of a competent court as to the legality of his imprisonment. See ARREST; DEBTOR; DURESS; PUNISHMENT; BAIL; DEBT; etc.

IMPROBATION (Lat. *improbatio*, disapproval, from *improbare*, to disapprove, from *in-*, not + *probare*, to approve, from *probus*, good). In Scotch law, the title of a proceeding for setting aside a deed or other instrument, which is apparently valid and probative, on the ground of forgery or falsehood. It belongs to the class of 'rescissory' actions, and is equivalent to the jurisdiction exercised by the courts of equity in England and America, in setting aside and canceling legal instruments, and in removing clouds on title. See EQUITY; FRAUD; MISTAKE.

IMPROMPTU (Lat., in readiness). In music, a short, extemporaneous composition. Also a title given to compositions for pianoforte that have little thematic development.

IMPROMPTU DE VERSAILLES, ăN'prôN'-tu' *de* vâr'sâ'y', L'. A play by Molière (1663), in which he attacked the critics of his *Ecole des femmes*.

IM'PROPE'RIA (Lat. nom. pl., reproaches). A series of antiphons and responses which are sung in the Catholic Church on Good Friday, as a part of the mass of the presanctified. Ever since 1560 Palestrina's famous Improperia have been sung in the Sistine Chapel in Rome.

IMPROPRIATION (from ML. *impropriatio*, from *impropriare*, to impropriate, from Lat. *in*, in + *proprius*, own). A term used in England, signifying the transfer to a layman of the revenues of a benefice to which the cure of souls is annexed, with an obligation to provide for the performance of the spiritual duties attached to the benefice. The spiritual duties are discharged by a clergyman, who is called a vicar, and who receives a certain portion of the emoluments of the living, generally consisting of a part of the glebe-land of the parsonage, together with what are called the 'small tithes' (i.e. tithes of hops, potatoes, and the like farming products) of the parish.

IMPROVISATION (from Lat. *improvisus*, unforeseen, from *in-*, not + *providere*, to foresee, from *pro*, before + *videre*, to see). The art of producing without previous preparation a poem, or a musical composition. Oratory, although in its original form it is founded on spontaneous efforts, is not ordinarily considered under the head of improvisation; but poetry and music, while subject to inspiration, are rather dominated by their complexity, and improvisation in these branches represents a peculiar and unusual ability. Poetry and music, like the dance and music, were inseparable in their early history; the Egyptian priests chanted improvised hymns to their deities; while in Greece, the real home of improvisation in antiquity, it was customary for poets to recite impromptu verses to the accompaniment of the lyre. In later Roman times Archias, the friend of Cicero, Publilius Syrus, Ovid, and Statius, were famous improvisatori. But as in the course of centuries languages grew more compact, and as less license was allowed, improvisation almost died out among civilized nations. Among savage peoples it has always been practiced. From the decline of Rome to the ninth century improvisation as an art was practically unknown. Then, however, came the renaissance, and the troubadours, the trouvères, the minnesingers, and the meistersingers (qq.v.) followed each other in rapid succession. Italy was quick to take advantage of the adaptability of her language, and the courts of Naples, Milan, and Ferrara became poetical centres from which the new art spread throughout the Peninsula. In Germany and in France improvisation was soon superseded by careful composition, but in Spain, and especially in Italy, it lingered long. Petrarch, in the twelfth century, gave a great impetus to improvisation, and down to the present day in Italy it has played an important rôle in the imaginative life of the

complicated metres, and to great length. Some of the most famous of the Italian improvisatori have been: the Venetian Leoniceno (died 1524); Serafino of Aquila (died 1500); Accolti of Arezzo (sixteenth century); Metastasio (q.v.), who, however, soon abandoned the art; and Tommaso Syrici (died 1836). In Corsica and Sardinia there are many women (improvisatrices) who improvise long memorial poems at funerals. Among the best-known improvisatrices may be mentioned Magdalena Fernandez (died 1800), Signora Mazzei (born c.1800); and Giovannina Milli.

In music, improvisation is the art of performing extemporaneously upon an instrument. A given theme or themes may be developed in strict form, or the performer may give himself up to momentary impulses and employ any number of themes in a free fantasia. The former, however, is a great art, and nearly all the masters, notably Bach and Beethoven, excelled in it. To improvise in a given form requires not only an unusual command over the technique, but also a marvelous power of concentration. Undoubtedly the improvisation of a strict fugue is the most difficult task imaginable. Bach was a master of this.

IMPULSE (from Lat. *impulsus*, incitement, from *impellere*, to incite, from *in*, in + *pellere*, to drive). The typical motive to voluntary action. (See ACTION.) Such action is, at first, unequivocally determined: that is to say, the bodily movement follows, without hesitation or reflection, upon the formation of single, unchallenged motive. As the physical organism and the mind grow in complexity, voluntary action comes to be equivocally conditioned; there is a period of deliberation and doubt, characterized by a conflict of motives, some one of which ultimately prevails, as actual motive, over the potential motives, its rivals.

The simplest form of voluntary action, that which is prompted unequivocally by one unquestioned motive, is termed in psychology impulsive action, and the motive itself an impulse. The scientific definition of the terms is reflected in popular usage: we call a character 'impulsive' which acts off-hand, without balancing of alternatives: though the ideas of waywardness and unaccountability that we associate with the idea of an 'impulsive character' do not attach to the impulse as such, but indicate rather some inherited idiosyncrasy or defect of early training. The impulse proves, on analysis, to be a fairly stable connection of sensational and affective processes. If we look at it in its complete or perfect form, but make its constituent processes as simple as possible, we find the following components: (1) the perception of an *object* to which we are attracted or from which we are repelled; (2) an idea of our own movement toward or away from the object, based upon previous experience of actual movements; (3) an idea of the result of our movement; and (4) an affective process, the resultant of the affective colorings—oftentimes mutually opposed—of the three sensory factors. It is not difficult, in laboratory practice, to arrange for the formation of a motive in which these latter processes shall be represented on practically equal terms. In predominance of some one of the three ideas, and a subordination of the others. Thus, the idea of our own movement may recede far into the background of the impulsive consciousness, where it finds expression, perhaps, only in some inconspicuous fringe of organic sensation; while, as the reach of consciousness increases, the idea of object comes more and more to be lost sight of in comparison with the idea of end or result. It should be remarked, further, that the idea of our own movement, important as it is at a certain level of mental development, cannot be contained in the very first impulse, and cannot be of much importance for a considerable time after voluntary movements have been initiated: for, on the one hand, we must have moved before we can have an idea of our movement (so that the most primitive action of all is an 'action upon presentation,' made in response to the simple perception of object); and, on the other, primitive movements are too vague, and too little differentiated to play the regulating and refining part that they later assume. Conversely, the complex motives that enter into conflict with one another in volitional and selective action are simply complicated impulses, in which the place of perception and idea is taken by associations of ideas or by judgments or trains of reasoning.

It is difficult to give an illustration of an impulsive action, for the reason that what is impulsive in one man's consciousness need not be so in another's. The impulsive action which we select may have been repeated so often as to have degenerated into ideomotor action, or even into a secondary reflex; or it may be so unaccustomed as rather to deserve the name of selective or volitional action. We can, however, take a fictitious case. Suppose that a boating party, arriving at a secluded bay, are seized with the impulse to bathe. Here we have the object-perception of the cool, clear water; the anticipation in idea of the free movements of diving and swimming; and the further forecast of the bodily vigor and refreshment that will ensue. All three ideas are pleasant. An opposition of affective processes might arise if the water is distinctly cold: in this case, the combined pleasantness of movement and result overcome the unpleasantness of the object-perception. It is, however, easy to see that, for persons who always bathed when they had the opportunity, the action would be rather ideomotor than impulsive; whereas, by those members of the party who were weak swimmers, the plunge might be taken only after a good deal of hesitancy and indecision.

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IMPULSE OF A FORCE. See MECHANICS.

IMPUTATION (Lat. *imputatio*, from *imputare*, to ascribe, from *in*, in + *putare*, to think, from *putus*, clear; connected with Lat. *purus*, pure, Skt. *pū*, to purify). One of the common technical terms of Christian theology. It de-

notes the transference of the *merit*, in a legal sense, of punishment or reward.

The two problems in connection with which the term is used are those offered by the universal prevalence of sin in the world, and by the forgiveness of men, which the New Testament teaches is for Christ's sake. The former problem arose in connection with the Pelagian controversies in the time of Augustine (see PELAGIANISM; PELAGIUS; AUGUSTINE); the latter in connection with the controversies of the Reformation. The Scriptures teach *some* connection between Adam's sin and the sinfulness of all men (cf. Rom. v. 12). Augustine explained it by a theory of realism, that men sinned *in* Adam. Calvinism taught that Adam's sin was *imputed* to his posterity, so that they were treated *as if* they had committed it, being held to the consequences of it in the form of disorder of nature, and actual sin resulting therefrom. In the course of time several varieties of imputation were distinguished, immediate, mediate, etc. This phraseology was supposed to be derived from the scriptural usage, but no like use can be found in the Scriptures. Properly understood, it conveys erroneous ideas, and may be allowed as one of the standard forms of theological expression. But it has the disadvantage of being a purely external, forensic form of statement, and of neglecting the ethical elements of the doctrine. In respect to the forgiveness of sinners for Christ's sake, imputation was originally applied by the Church of the Reformation only to Christ's passive obedience, or suffering on the cross; and when this was said to be imputed to us, nothing more was meant than that we are forgiven for Christ's sake. Later, by that scholastic tendency which always dominates in the period of systemization, distinction was made between the passive and the active obedience of Christ or His obedience to the law, and this was also said to be imputed to the sinner in the act of justification. A new connotation was insensibly added to the word impute, and it was supposed that only that could be imputed to one which he did *not have*. Thus the Westminster Confession finally went so far as to say that faith itself is not imputed to believers as 'their righteousness,' although it is said in Rom. iv. 3 that Abraham's faith was imputed to him for righteousness. The distinction is correct if it be understood that faith is not imputed as the *ground* of their forgiveness, which ground is the work of Christ. This is the indubitable meaning of the Confession. But it is as certainly the meaning of the Epistle to the Romans that faith, since it involves complete and loving submission to God's will, is of the essence of righteousness.

Modern theology, even when of Calvinistic descent and in sympathy with the truths which Calvinism sought to formulate and defend, professes to emphasize the internal and ethical aspects of the doctrine. The connection of Adam and the race in the matter of sin, instead of being explained by realism and imputation, is explained by the law of heredity. If Adam sinned, it was inevitable that so serious and deep-reaching a fact should propagate itself. Like begets like; a web-footed bird, another web-footed one; a sinner, a sinner. The law of habit plus the law of heredity is all that is necessary to explain the universal corruption of human nature and the universality of sin. Forgiveness for Christ's sake, in like manner, can be better explained without than with the employment of the idea of imputation. Christ cannot, strictly speaking, *merit* anything for us, because merit, like demerit, is essentially personal, and cannot be transferred. But Christ can do that *on account of which* it is consistent with the nature and attributes of God, and with the honor of the law and of the divine justice, freely to forgive sin. He alone can do this. And therefore He alone can lay the ground of our forgiveness. His sufferings are, therefore, that on account of which we are forgiven; and this covers the whole subject without need of bringing in any imputation whatever. The difference is, however, more one of point of view and phraseology than of essential doctrine.

IMUS, ē'mōōs. A town of Luzon, Philippines, in the Province of Cavité, founded in 1795 (Map: Philippine Islands, E 5). It lies within a short distance of Manila Bay, and about 18 miles south of Cavité. Population, in 1898, 14,675.

INACHUS, ĭn'ā-kŭs (Lat., from Gk. Ἴναχος). The Greek name of a river in Argos, and also of the god of the river. When Poseidon disputed about the possession of Argos, and Inachus decided for Hera, Poseidon is said to have dried up the bed of the stream, so that no water could flow through it in summer. Inachus is described also as the first King of Argos, and leader of the Argives from the mountains to the plains, whence Argos is called Inachian. In the legends he is especially celebrated as the father of Io (q.v.).

INAGUA, ē-nä'gwä, GREAT and LITTLE. Two of the Bahama Islands, West Indies, situated at the southern end of the group (Map: West Indies, L 4). Great Inagua lies about 60 miles northeast of Cuba, and occupies an area of over 660 square miles. It is only slightly elevated, and is surrounded by reefs. The chief settlement is Matthew Town. Little Inagua lies about 10 miles northeast of the larger island, and has an area of about 36 square miles, and but few inhabitants. The population of Great Inagua is estimated at 1500.

INAJA PALM, ĭn-äj'ä (probably from the native name), *Maximiliana regia*. A South American palm, common in the countries near the Amazon. It has a massive stem 15 to 20 feet high; very long, drooping, pinnate leaves, which are sometimes more than 15 feet long, with leaflets in groups of three, four, or five at intervals along the midrib, from which they stand out in different directions; numerous spadices; large woody spathes; and densely clustered elongate fruit, with tough skin and soft pulp, and hard stony seed. The spathes are used by hunters to cook meat in, and with water in them they stand in the fire well enough for the purpose. They are also used as baskets, and as cradles by the Indians, who also eat the fruit, which is particularly attractive to monkeys and some kinds of birds. The leaves yield a serviceable fibre that is used by the natives in the manufacture of ropes, hats, etc.

INAMA-STERNEGG, ē-nä'mä-stĕr'nĕg, KARL THEODOR VON (1843—). An Austrian economist and statistician, born at Augsburg. Educated at Munich, he became docent there (1867), professor at Innsbruck (1868), and at Prague (1880). In the following year he was made head of the Statistical Bureau in Vienna, and professor of the University of Vienna. He was

president of the Central Statistical Commission (1884), and in 1891 he was named a life member of the Austrian Upper House. An economist of the historical school, he was editor of the *Zeitschrift für Volkswirtschaft, Socialpolitik und Verwaltung* (1892), and of many departmental publications. He wrote: *Verwaltungslehre* (1870); *Die Ausbildung der grossen Grundherrschaften in Deutschland während der Karolingerzeit* (1878); *Deutsche Wirtschaftsgeschichte* (1879-1901); the important *Zur Verfassungsgeschichte der deutschen Salinen im Mittelalter* (1886); *Salzlandstudien* (1889); *Abriss der deutschen Wirtschaftsgeschichte* (in Paul's *Grundriss der germanischen Philologie*, 1889); and *Die persönlichen Verhältnisse der Wiener Armen* (1889).

INANITION. See STARVATION.

INARCHING. A method of grafting (q.v.).

INBREEDING. See CROSS-FERTILIZATION.

INCANDESCENT ELECTRIC LIGHT. See ELECTRIC LIGHTING.

INCANDESCENT GAS LIGHT. See GAS, ILLUMINATING.

INCANTATION (Lat. *incantatio*, from *incantare*, to enchant, from *in*, in + *cantare*, frequentative of *canere*, to sing). The employment of song for magical purposes. In consequence of the excitement awakened by rhythmical utterance, verse has from early times been supposed to possess a divine element. Vergil and Horace represent songs as able to bring down from heaven the moon and the stars; and such influence, in these poets only fanciful, was at an earlier period commonly ascribed to sacred verses. It was further believed that both gods and ghosts were placated by song; and it is a universal feature of worship that in all ceremonies chants are employed which have been handed down from antiquity, preserved with scrupulous exactitude, and supposed to exert supernatural effect. In ancient times every function of human life was accompanied with incantations, presumed to be as essential as were the natural means employed. Poetic formulæ, it was supposed, had power to summon and banish demons, to raise and disperse storms, to bestow sunshine and rain, to grant success in war and in love, to inflict and remove disease, to cause crops to grow, wither, or remove from one granary to another, to make cattle breed and bees swarm, to bring success to the fisherman and hunter, and so on indefinitely. Song, when used for magic ends, is often reënforced by appropriate motions and actions, and frequently recited by a shaman (medicine-man, magician). Thus, among Navahos the rite called the Mountain Chant, primarily intended for the cure of disease, constitutes an elaborate festival of nine days' duration. It is explained by a myth, to which the songs allude. These form sequences, of which the order must not be changed, and among them are prayers of a simple character, which recite the nature of the sickness, entreat that it may be healed, and end with an assertion that the work is accomplished. Similarly, ancient Babylonian formulæ of an exorcistic character, directed against diseases conceived as evil spirits, ordinarily begin with enumerating the effects of the malady or names of the hostile powers, express the desire of the suppliant for recovery, and conclude with an invocation to Heaven and Earth, who are besought to deliver the sufferer. These also were often associated with ritual, for the performance of which directions are given. Of course, with the songs are sometimes employed other agencies, as when in the *Odyssey* the hero, injured by a boar's tusk, has his hurt bound by the sons of Autolycus, who then proceed to employ an incantation, supposed to stanch the wound. In process of time the ceremonies employed in such cases fell into disuse, and the words of such charms became half intelligible, or altogether meaningless. It seems to have been always usual that the miraculous healer should recite his rhymes in a low tone of voice, in such a manner as to be unintelligible to spectators, whose sense of mystery was thereby heightened. Considering the tenacity of tradition, it might be expected that some of these formulæ should have a long history. For instance, a German incantation recorded in the tenth century, and evidently of heathen origin, relates that while certain deities were riding in the forest, a horse dislocated his leg, which the gods wished to heal; Wodan was successful by means of an incantation. A similar charm at a later time appears in Christian form, Peter and John replacing the deities, and Christ taking the place of Wodan as the healer. In the nineteenth century, a form of this incantation was still in use in Shetland, but accompanied by an elaborate ceremony, every part of which was regarded as essential, and which included the use of a thread spun from black wool and having nine knots, wound about the sprained part. At the present day the custom remains in force among simple peoples. In English nursery lore the habit of incantation survives in some simple rhymes of children and young people, as, for example, in verses directed against rain, or those addressed to the moon and stars in order to obtain auguries as to the future mate. Consult the authorities referred to under MAGIC. See SPELLS.

INCARNATION (ML. *incarnatio*, from Lat. *incarnari*, to be made flesh, from *in*, in + *caro*, flesh, Gk. κρέας, *kreas*, AS. *hrēaw*, Skt. *kravya*, raw flesh). In Christian theology, the assumption of humanity, by the second person of the divine Trinity, by which He was both God and man in one person. The idea of the manifestation of God in human form is as old as religion. It underlies all the supposed appearances of God to men. It is found especially in the religion of India, where there are repeated incarnations of the divine principle in beasts and men. (See TRANSMIGRATION.) The biblical doctrine is, however, entirely different from all these doctrines, since it is the doctrine of a real assumption of human nature, by a distinct person of the Trinity, for a specific purpose, and once only. It is as different from other doctrines of incarnation as the Christian doctrine of sin is from other doctrines.

The fact of the incarnation is variously represented and sustained in the Scriptures. It is introduced by the story of the miraculous conception of Jesus. He was not born, as other men are, of two parents, but was born of a virgin, miraculously conceived by her of the Holy Ghost. The direct evidence for this is confined to the two Gospels of Matthew and Luke. The disposition has been frequently manifested to deny the value of the accounts and the reality of the miraculous conception. This has recently received some furtherance from the higher criticism of the New Testament. The fact that the accounts are not

confirmed from other sources of the Gospel history, that the genealogies seem to derive Jesus' descent from Joseph, that various expressions are used in the body of all the Gospels implying that He was born in the natural way, and that Paul and other New Testament writers know nothing of the matter, is variously urged. But there is nothing inconsistent with the accounts or the fact in other portions of the New Testament, and the peculiar nature of the subject demanded a degree of reticence upon it which would naturally lead to its late explanation, and to the silence of most of the New Testament, written when it was, upon this point. For an excellent discussion of the subject, consult Weiss, *Life of Christ*, book ii., ch. 11 (Eng. trans., Edinburgh, 1883).

By the miraculous conception God specially prepared the humanity of Jesus, and the natural conclusion is that it was prepared for a special purpose. Then, all through the Gospels Jesus is represented as having 'come' into the world. In the Gospel of John it is said that the Word, who "was in the beginning with God and was God," "became flesh" (John i. 14), or man, and in Philippians (ii. 6-7) it is similarly said that Christ, "being in the form of God," emptied Himself and took "the form of man." The whole atmosphere of the New Testament is that in Christ we have a heavenly, an eternal, a divine, being come to earth for the salvation of man. And that there may be no doubt that such is the real meaning of the Bible (intimated in the Old Testament as well as declared in the New), the later writers of the New Testament ascribe to Christ the work of creation, that of preservation, and that of divine government of the world, designate Him as the goal toward whose glorification the world is tending, and teach that He will come in glory to be our judge, to close the history of this world, and to deliver up the kingdom again to the Trinity.

Thus the reality of the divine nature of Christ is set forth. But another point must be understood before the biblical doctrine is fully comprehended. This heavenly being, come to earth of His own act for the salvation of man, is the proper 'self,' the dominating and willing 'I,' in the person of Christ. Thus Christ is not a man in whom God dwells, illuminating Him and fitting Him for the work of a prophet, but He is God Himself, acting variously for the instruction, enlightenment, and salvation of man.

At the same time, the human nature of Christ is real and entire. He was truly born, and lived as other men do. All this in perfect unity of consciousness, which was the consciousness of the divine Logos. The explanation of the union of these two natures in one person is the task of Christology (q.v.).

Consult: Gore, *Incarnation of the Son of God* (London, 1891); Ottley, *Doctrine of the Incarnation* (London, 1896); Simon, *Reconciliation by Incarnation* (Edinburgh, 1898); Dorner, *History of the Development of the Doctrine of the Person of Christ* (Eng. trans., Edinburgh, 1861-63); Eck, *The Incarnation* (London, 1902); Powell, *Principle of the Incarnation* (London, 1896); Orr, *Christian View of God and the World as Centring in the Incarnation* (Edinburgh, 1893); Dix, *The Sacramental System Considered as an Extension of the Incarnation* (London, 1893); Didon, *Vie de Jésu* (Paris, 1890; trans. *Jesus Christ*, New York, 1891); Touard, *The Christ the Son of God* (trans., London, 1890); G. F. Baur, *Die christliche Lehre von der Dreieinigkeit und Menschwerdung Gottes* (Tübingen, 1841); Thomasius, *Christi Person und Werk* (Erlangen, 1874); id., *Dogmengeschichte* (ib., 1874); Gess, *Christi Person und Werk* (Basel, 1870-87); Harnack, *Dogmengeschichte* (Freiburg, 1893). See CHRISTOLOGY; KENOSIS.

IN'CAS. See PERU.

INCE-IN-MAKERFIELD, ins'in-māk'ĕr-fēld. A town in Lancashire, England, one mile east-southeast of Wigan (Map: England, D 3). It has railway-wagon works, iron-works, blast-furnaces, cotton-works, and extensive coal-mining. The town has owned its water-works since 1871. Population, in 1891, 19,250; in 1901, 21,270.

INCENDIARISM. See ARSON.

INCENDIO DEL BORGO, ĕn-chān'dē-ō dĕl bōr'gō (It., burning of the city). A fresco by Raphael in the Vatican.

INCENSE (from OF., Fr. *encens*, Lat. *incensum*, incense, from *incendere*, to burn, from *in*, in + *candere*, to glow; connected with Gk. *kaqarós*, *katharos*, pure, Skt. *ścandra*, *candra*, shining, noon, from *ścand*, to be bright). A perfume the odor of which is evolved by burning. Its use in public worship prevailed in many ancient religions. The incense at present in use consists of some resinous base, such as gum olibanum, mingled with odoriferous gums, balsams, etc. There is no regular formula for it, almost every maker having his own peculiar recipe. The ingredients are usually olibanum, benzoin, styrax, and powdered cascarilla bark. These materials, well mingled, are so placed in the censer (q.v.) or thurible as to fall by sprinkling on hot charcoal, which immediately volatilizes them, and their odor is diffused through the edifice. Among the Jews the burning of incense was exclusively employed as an act of worship. In the Catholic Church, both of the West and of the East, incense is used in public worship, more particularly in connection with the eucharistic service, which is regarded as a sacrifice; but writers are not agreed as to the exact date at which such use was introduced. Saint Ambrose, in the Western Church (340-397), alludes to incense in terms which suppose the practice of burning it to be an established one; and in later writers it is mentioned familiarly as a part of ordinary public worship. It is used in the solemn (or high) mass, in the consecration of churches, in solemn consecrations of objects intended for use in public worship, and in the burial of the dead. In the reformed churches the use of incense was abandoned, but in the last half-century it has been restored to some extent in the Anglican communion; and the 'Catholic Apostolic' (or Irvingite) Church (q.v.) has used it since its foundation.

INCEST (OF., Fr. *inceste*, from Lat. *incestum*, incest, neut. sg. of *incestus*, unchaste, from *in-*, not + *castus*, chaste). Sexual intercourse between persons who are legally prohibited from marrying because of their affinity or consanguinity (q.v.). It is not a common-law offense, but in England is punishable in the ecclesiastical courts by excommunication and penance. It is said to be the only form of immorality which, in the case of the laity, is still punished by the

ecclesiastical courts on the general ground of its sinfulness.

In most of the American States it is a criminal offense by statute, punishable by imprisonment for a term of years, usually not exceeding ten. In some States the marriage of persons within the prohibited degrees, even when not followed by cohabitation or accompanied by sexual intercourse, amounts to criminal incest. Consult: Stephen, *History of the Criminal Law of England* (London, 1883); Blackstone, *Commentaries;* Bishop, *Statutory Crimes* (Chicago, 1901).

INCH'BALD, Elizabeth Simpson (1753-1821). An English novelist and playwright, born at Stanningfield, near Bury Saint Edmund's, Suffolk. She educated herself, mostly by general reading. After vain attempts to engage herself as actress, both in Norfolk and in London, she married, in 1772, the actor Joseph Inchbald. Later in the same year she made her first appearance on the stage at Bristol in the rôle of Cordelia. With her husband she performed in the provincial towns till his death (1779), and continued to appear for ten years more. As an actress she had the advantage of great personal charm, but an impediment in speech prevented the highest success. Beginning to write for the stage as early as 1782, she produced about twenty comedies and farces, which were well received at the London theatres. But of her literary work, only her two novels have survived: *A Simple Story* (1791), which, though ill-constructed, was one of the best novels since the death of Smollett; and *Nature and Art* (1796), which was also very popular. Mrs. Inchbald also edited three collections of plays: *The British Theatre* (25 vols., 1806-09); *Modern Theatre* (10 vols., 1809); and *Farces* (7 vols., 1809). She wrote her memoirs, but destroyed them. Consult: Scott's edition of her *Novels* with a memoir (London, 1880); Boaden, *Memoir* (ib., 1833); Elwood, *Memoirs of the Literary Ladies of England* (ib., 1842).

INCH'CAPE ROCK, or Bell Rock. A dangerous reef in the North Sea, east of the Firth of Tay in Scotland. A bell attached to a buoy is said to have been placed here by an abbot of Aberbrothock to warn sailors. This bell was cut from its support by a pirate, who, on a subsequent voyage, was lost on the spot. The tradition is embodied in Southey's ballad "The Inchcape Rock." In 1810 a lighthouse was built with much difficulty on the reef.

INCH'COLM. A picturesque islet in the Firth of Forth, Scotland, separated from the Fife shore by 'Mortimer's Deep,' a channel about a mile wide (Map: Scotland, B 4). It is half a mile long, with a maximum width of one-third of a mile, and is noted for its monastic ruins, which exhibit traces of the twelfth-century Romanesque architecture, but are chiefly in the early pointed style of the thirteenth and fourteenth centuries. They consist of the remains of an abbey of Austin Canons regular, founded by Alexander I. in 1123, and include a vaulted oratory, and a chapter-house with groined roof and three elegant sedilia. The Latin names of the islet are *Æmonia* and *Insula Sancti Columbæ*, the latter derived from Saint Colm or Columba (q.v.) of Iona, who dwelt here in the sixth century. As Saint Colm's Inch, it is mentioned in Shakespeare's *Macbeth*, act i., scene 2. The monastery was frequently sacked by the English during the fourteenth, fifteenth, and sixteenth centuries. Consult Simpson, *Æmona and the Islands of the Forth* (Edinburgh, 1861).

INCHKEITH, inch'kēth. A small fortified island of historic interest in the Firth of Forth, Scotland, nearly midway between Leith and Kinghorn (Map: Scotland, B 4). It has a lighthouse 220 feet above high water, visible 21 miles.

INCHWORM, or Measuring Worm. See Geometrid Moth.

INCIDENT (from Lat. *incidere*, to fall upon, from *in*, in + *cadere*, to fall). In law, a right, privilege, or burden inseparably annexed to an estate or tenure of lands. Thus, rent reserved upon a lease for life or years is incident to the reversion, or estate of the landlord, and passes with the latter upon its assignment; and a right to distrain is incident to a rent charge and attends it into whosesoever hands it may come; and a court baron is incident to a manor (q.v.), which, indeed, cannot exist without such a court. In the same sense, the rights of inheritance and of free alienation are incidents of an estate in fee simple, and the right to take estovers (q.v.) is an incident of a tenancy for life or years, while dower and curtesy are among the incidents of estates of inheritance.

More specifically, the term incident is employed in English law to describe a certain class of obligations attaching to the several forms of feudal tenure. Viewed from the standpoint of the lord of whom the lands were held, these were certain legally defined rights which inured to him by virtue of his superior or paramount title. They were due, as a matter of legal obligation, from all land held by such tenure, and not by virtue of any understanding or agreement—which fact distinguishes them from the *services* due from the tenant to the lord, which were entirely a matter of agreement.

The most important of these 'feudal incidents,' as they are termed, were *aids*, *reliefs*, and *escheats*, which were due from all secular tenures, and *wardship* and *marriage*, which were peculiar to the military tenures. These will be described under their appropriate titles. Though differing greatly in the kind and amount of the burden which they imposed upon the land, they had this in common, that they came to be regarded as the essential and distinguishing characteristics of the several forms of tenure to which they were appropriate. The military structure of the feudal system in England decayed rapidly after the Conquest, and the expression military tenure, or tenure in chivalry, was regarded not as tenure for which military service was in fact to be rendered, but tenure attended by the burdensome incidents of wardship and marriage; while socage tenure was not so much a tenure by a fixed and determinate service, but one free from those incidents.

Most of the incidents of tenure were done away with by the famous statute which abolished military tenures (12 Chas. II., c. 14), and only the right of escheat remains to remind us of the feudal origin of our land law. See Feudalism; Knight Service; Socage; Tenure; and the authorities there referred to.

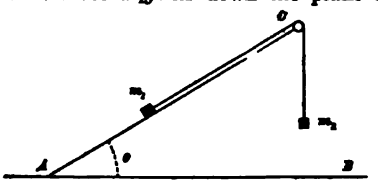
INCIDENTALS (from *incident*, from Lat. *incidere*, to fall in, from *in*, in + *cadere*, to fall).

In music, the notes of a chord which are not absolutely essential to its harmonic completeness. Incidentals are thus opposed to essentials (q.v.). They are divided into two classes, consonant or strong incidentals, and dissonant or weak incidentals.

INCLEDON, ĭn'k'l-dŏn, CHARLES BENJAMIN (1763-1826). An English singer, born at Saint Keverne, Cornwall. He received his musical education in the choir of the Exeter Cathedral, to which he was admitted in 1771. A few years afterwards he entered the navy, and served until 1783. His professional career as a musician began when he appeared at the Southampton Theatre in the *Castle of Andalusia*. In 1817 he visited America, and sang the rôle of Hawthorn in *Love in a Village*, at the Park Theatre, in New York City. Soon after his return to England he left the stage, and from that time traveled in the provinces as a musical entertainer. His voice was best adapted to ballads, and it was in this kind of singing that he excelled. Three songs which contributed greatly to his popularity were "The Storm," "Black-Eyed Susan," and "Arethusa."

INCLINATION, MAGNETIC, or DIP. The angle made with the horizontal by the axis of a magnetic needle swinging freely in a vertical plane. The inclination of a magnetic needle varies at different places of the earth's surface, ranging from 90° at the magnetic poles to zero at the magnetic equator. The varying amount of magnetic inclination will be found indicated on the isoclinic charts accompanying the article MAGNETISM, TERRESTRIAL. This property of a magnetic needle was first discovered by Robert Norman in 1576, and an instrument was devised by him by which the amount could be measured. The phenomenon had previously been noticed by George Hartman, in Nuremberg, in 1544, but he was neither able to measure the amount of inclination accurately nor to explain the phenomenon. The amount of inclination is determined by the dipping needle (q.v.) and is measured when the magnetic needle is freely swinging in a vertical plane containing the meridian. If the plane of the needle is placed at right angles to the magnetic meridian the axis needle will form an angle of 90° with the horizontal. The dip of the needle is subject to the same periodic variations as its declination (q.v.), but these changes play a far less important part. In order that an ordinary compass-needle may swing in a horizontal plane, it is customary in northern latitudes to make the southern end of the needle heavier; or the same effect may be secured by using a symmetrical needle which has been weighted with a small bit of brass on its southern half. See COMPASS; DECLINATION; DIP OF THE MAGNETIC NEEDLE; DIPPING NEEDLE; MAGNETISM; MAGNETISM, TERRESTRIAL.

INCLINED PLANE. A smooth plane inclined to the horizontal plane at any point on the earth's surface. Imagine a plane section through this inclined plane and the horizontal one, perpendicular to their line of intersection. Let the plane be supported by an upright; and let two bodies of masses m_1 and m_2, joined by an inextensible string, be placed, as shown, one on the plane, and one hanging freely, the string passing over a pulley. If the bodies are in equilibrium, the forces on the body of mass m_1, parallel to the plane, must balance each other. There is a force $m_1 g \sin I$ down the plane and a



INCLINED PLANE.

force $m_2 g$ up the plane; hence $m_1 g \sin\theta = m_2 g$; or, in general, the force up the plane equals the weight of the body on the plane multiplied by the sine of the angle of inclination of the plane. To produce motion up the plane of a heavy body requires, therefore, less force than its weight. The 'mechanical advantage' is $\frac{1}{\sin\theta}$

Another method for solving this problem is to consider as before the two bodies in equilibrium, and to produce a small displacement; let the body whose mass is m_1 move up the plane a distance s_1, and the body whose mass is m_2 move vertically down, owing to this, a distance s_2. By the principle of energy $m_1 g \sin\theta\, s_1 = m_2 g s_2$; but $s_1 = s_2$; hence, as before, $m_1 g \sin\theta = m_2 g$. Inclined planes are still used daily for rolling up heavy weights. They were used by all ancient peoples for raising heavy stones for building purposes. The screw is nothing but an inclined plane rolled around a cylinder.

INCLOSED ARC LAMP. See ELECTRIC LIGHTING.

INCLOSURES OF COMMONS. At common law, the only method by which the right to inclose lands subject to common rights could be gained was by mutual agreement between all who had commonable privileges therein. It was a tedious and unsatisfactory method. Oftentimes some of the interested persons were subject to disabilities, in which event a special act of Parliament was required. The benefits of inclosure became evident centuries ago, and as early as the reign of Henry III. a general act of Parliament, known as the Statute of Merton, was passed, authorizing the 'inclosure and approvement' of commons of pasture, upon certain conditions. In the reign of Edward I. the Statute of Westminster the Second was passed in amendment and extension of the former act. Comparatively little progress was made under the laws in the partition of common lands. Not until 1801 was a general inclosure act passed. This has been followed by a large amount of legislation, all tending in the direction of facilitating the division of commons, their conversion into separate and independent land holdings, the inclosure of such holdings, and the improvement of those portions that are retained for the common use of towns or villages. Consult: Williams, *Rights of Common* (London, 1880); Scrutton, *Commons and Common Fields* (London, 1887).

IN CŒ'NA DOM'INI (Lat., at the Supper of the Lord). A celebrated Papal bull, so called because designed to be read in the Church on every Holy Thursday, the day on which the Lord's Supper was instituted. It is not, as other bulls, the work of a single pope, but with various ad-

times; some tracing it to Urban V., and others to Martin V., Clement V., and some to Boniface VIII. Its present form, however, it received from the popes Julius II., Paul III., and finally Urban VIII., in 1627, after which it continued for a century and a half to be published annually. Pius V., in 1568, decreed that it should be read every Holy Thursday until superseded. The contents of this bull have been a fertile subject of controversy. It may be briefly described as a summary of ecclesiastical censures, especially of those with which grievous violation of the faith of the Church, or of the rights of the Church or of the Roman see, are visited; excommunication being denounced against heresy, schism, sacrilege, usurpation of the rights of the Church or of the Pope, forcible and unlawful seizure of Church property, personal violence against ecclesiastics, unlawful interruption of the free intercourse of the faithful with Rome, etc. The bull, however, although mainly dealing with offenses against the Church, also denounced under similar censures other crimes, as piracy, plunder of shipwrecked goods, forgery, etc. This bull, being regarded by most of the sovereigns of Europe as an infringement of their rights, encountered in the seventeenth century the determined opposition of nearly all the courts, even the most Catholic; and at length, in 1770, Clement XIV. discontinued its publication, which has never since been renewed. Pius IX., on October 12, 1869, abrogated many of its censures.

INCOMBUSTIBLE FABRICS. Much attention has been paid to the production of incombustible fabrics, and of solutions which may be applied to any fabrics to render them more or less fireproof. As typical of the first may be mentioned asbestos cloth when this fibre is used either wholly or in part to form the fabric. Experiments have shown that many salts possess this power of rendering substances which were immersed in solution of them incombustible, but at the same time some of these injure the fabric, spoil the color, or are so very expensive as to render their general use impossible. Two, however, viz. tungstate of soda and sulphate of ammonia, produce the best results without injuring the tissue or color of the fabric. The first of these acts physically by preventing contact with the air, and does not interfere with the process of ironing and starching; it is, therefore, preferable for goods requiring washing. For fabrics which are used without previous washing, sulphate of ammonia is preferable. Soluble glass is a highly alkaline solution of minerals composing glass which is applied to textures, in theatres especially for curtains and scenery, to render them fireproof. Fire touching them melts the invisible minerals into a glaze which excludes air and prevents combustion. All these solutions, however, are likely to lose their efficiency if some time has elapsed since they were applied. See FIREPROOFING.

INCOME TAX. A tax upon the income of individuals. It may be levied directly upon the individuals receiving the income, or it may be collected from the income at its source in the form of a tax upon dividends, interest on bonds, etc. It may be uniform, taxing all incomes at a uniform rate, or progressive, increasing the rate by the individual. An income tax may differentiate between various forms of income, as, for example, between incomes from labor and incomes from property, or between permanent and temporary incomes. Differentiation may be attained either by levying a higher rate upon some forms of income than upon others, or by the imposition of a supplementary tax upon property or upon consumption which will in effect fall upon the incomes discriminated against.

In States which levy an income tax it is usually the practice to exempt small incomes, or that portion of the income necessary to mere independent existence or to the maintenance of the usual standard of life, and to levy the tax only upon the excess. The theory of such exemption is that the State should not take from the individual in the form of taxes what it will be obliged to return to him in the form of poor relief or otherwise.

In theory the income tax, more nearly than any other system, meets the requirements laid down in the most advanced canons of taxation. A man should be taxed according to his ability, or 'faculty'; and income is the best test of ability. A graduated tax on incomes is popularly defended on the ground that it may be employed to bring about a more equal distribution of wealth. In the latest financial theory, however, graduated taxation is justified on the ground that a man's ability to pay taxes increases more rapidly than his income. Differentiation of taxation is advocated on similar grounds. One who receives an income from permanent property is in a more favorable position than one who receives an equal income from labor, since the latter is compelled to make provision against unemployment, while the income of the former is quite at his disposal. It is, therefore, in accordance with the faculty test that incomes from property should pay a higher rate than incomes from labor.

In practice it is found to be difficult to determine directly the magnitude of a man's income. This is especially true in countries like America and England, where it is the policy of Government to interfere as little as possible in the business affairs of the individual. This difficulty is greatly reduced when the tax is levied, not directly upon the individual, but upon the source of the income. Under this system, corporations may be required to withhold a part of the dividends for the payment of the tax as well as a part of the salary of employees. When the tax is levied at the source, however, it is difficult to graduate it so as to tax those who receive large incomes at a higher rate than those whose incomes are small.

The income tax was introduced in England as a purely fiscal expedient. The huge expenditure of the Napoleonic wars forced the adoption in 1799 of an income tax, which, with a short intermission, lasted till the close of the war. It was again revived in 1842, and although in 1874 an attempt was made by Gladstone to secure the repeal of the tax, it has maintained its position to this day as an integral part of the British financial structure. The British income tax is levied on the source of the income, and does not attempt to provide for graduation or differentiation. It has proved to be a very productive tax; and by changing the rate the Government is enabled to increase or diminish its revenue so as

to cover exactly fiscal needs. In Italy the income tax was introduced by the law of 1864 (amended in 1877), and the fiscal needs of France after the Franco-Prussian War forced it also to adopt a national tax upon the income of corporations and associations. By a law of 1891 Prussia introduced a direct tax upon incomes. The tax was graduated, but at first made no provision for differentiation. In 1893 an auxiliary tax was levied upon property, thus establishing differentiation in effect. In 1893 Holland adopted an income-tax law which provided both for graduation and differentiation. By this law corporations as well as individuals are subject to the tax; but the holders of corporate securities pay no additional income tax on the revenue from them. A similar law was introduced in New Zealand in 1893. Switzerland, Denmark, and Austria levy income taxes, as does also Australia.

During the War of 1812 an income tax was advocated for the Federal Government by Secretary Dallas, and in 1862 such a tax was actually adopted, and remained in force until 1872, despite the opposition of the propertied classes. No satisfactory machinery was established for its application. Individuals were required to submit estimates of their incomes, and as there was no means of verifying these estimates, the tax was paid only by those who were scrupulous enough to admit that their incomes exceeded the untaxed minimum. In spite of the great increase in national wealth, the receipts from the income tax declined from year to year. In 1894 the income tax was again introduced as a part of the Wilson Tariff Bill, and was carried largely by the Western and Southern members, despite violent opposition from the cities of the East. The tax, however, was declared unconstitutional (May 20, 1894) because, although a direct tax, it was not apportioned among the States according to population.

Income taxes have been imposed in several States (Massachusetts, Pennsylvania, Louisiana, Virginia, North Carolina, South Carolina), but in no case have they been rigidly enforced and justly administered, and in no case have they been productive of large revenue. The Income Law of Massachusetts dates from colonial times, and exempts incomes under $2000, as well as income derived from property already taxed. See FINANCE; TAXATION.

INCOMMENSURABLE. See COMMENSURABLE.

INCONNU, ăn'kô'nụ' (Fr., unknown). A fish, usually called the Mackenzie River salmon (*Stenodus Mackenzii*), which is intermediate between salmon and whitefish, usually weighs ten pounds, though sometimes it is much larger. It ascends all the rivers of Arctic America and Asia, and is of much importance to the natives of their valleys, though the fish is oily. It was discovered by Alexander Mackenzie, whose followers named it.

INCONSTANT, THE; OR, THE WAY TO WIN HIM. A comedy by George Farquhar (1702), adapted from Fletcher's *Wild Goose Chase.*

INCORPORATED SOCIETY OF AUTHORS, THE. A society organized in London, in 1884, by Sir Walter Besant, for the protection of authors and composers, and modeled on *La Société des Gens de Lettres* of Paris. Its purpose is to maintain the rights of authors, to advise them as to questions of copyright, to assist them in making contracts with publishers, and in recovering money due under contracts. The society has also vigorously advocated amendments to the copyright law, and in 1899 sent its secretary, Mr. G. Herbert Thring, to Canada to bring about a settlement of the colonial copyright question. The official organ is the *Author*, which is published monthly from the society's office. Among its other publications are: *Grievances of Authors; Literature and the Pension List; Copyright Law Reform; The Methods of Publication.* The first president of the society was Lord Tennyson.

INCORPORATION. The act by which a corporation is formed; also, the body or legal person so formed, which is more usually called a *corporation.* This act consists in the incorporators (or persons of whom the corporation is initially to consist) fulfilling the conditions which are imposed by law as a condition precedent to the formation of the corporation, which may consist in accepting a charter (q.v.), or in complying with the conditions of enabling statutes, or, for some purposes, the performance of acts as if the persons constituted a corporation (a corporation *de facto*). The effect of the act of incorporation is to create the rights and liabilities which the law attaches to the form of corporation so created, so that future acts relating to the corporate body may affect that as legal entity instead of the individual by whom the corporation is represented. For a treatment of the various classes of corporations and the specific acts necessary to their creation, see CORPORATION; CHARTER; also consult the authorities there referred to.

INCORPOREAL (from Lat. *incorporeus*, bodiless, from *in-*, not + *corporeus*, bodily, from *corpus*, body). In the common-law classification of real property, that which is not accompanied by seisin or the right of possession. Present estates in land, such as freeholds and leaseholds in possession, are identified with the land itself, and are described as *corporeal;* that is, as something substantial and tangible; while corresponding interests not in possession, such as future estates and rights in the land of others, are regarded as being of an unsubstantial and intangible nature, and are accordingly described as *incorporeal.* The distinction has no scientific value, as the idea connoted by the terms 'property' and 'ownership' is always that of a legal right, and rights are always bodiless things, and are equally immaterial and unsubstantial, whether they relate to present or future enjoyment of land, and, indeed, whether they have to do with things or persons. But the distinction is a convenient one, nevertheless, and has had an important influence on the development of property law.

In our legal system the classification of property as corporeal and incorporeal is confined to interests in land. Though future interests in chattels and such property as shares of stock, patent rights, and copyrights are sometimes described as incorporeal, and though such eminent legal authorities as Sir Matthew Hale and Blackstone apply the term corporeal to jewels and other personal chattels, the distinction is of no value or importance in the law of personal property. On the other hand, the usual limitation of the terms corporeal and incorporeal to hereditaments, i.e. to such interests as descend to the heir of the owner upon his death, is too narrow,

as a future leasehold estate, or a profit *à prendre* (q.v.) for a term of years, which pass like other personal property to the executor or administrator, are equally entitled to be described as incorporeal.

It was in the methods of conveyance employed in creating or transferring the two kinds of property that the distinction between them attained its principal importance. Corporeal interests being susceptible of seisin, of possession, were said to 'lie in livery,' i.e. to be capable of transfer by the method of livery of seisin, or delivery of possession; whereas the more intangible incorporeal property, not being susceptible of physical transfer, was said to 'lie in grant,' i.e. to be transferable only by the form of deed known as a grant (q.v.). With the abolition of conveyance by livery of seisin and the general adoption of the method of conveyance by deed for all kinds of property, corporeal and incorporeal, the distinction has largely lost its importance. See HEREDITAMENT; REAL PROPERTY.

INCREMENT, THE UNEARNED. See UNEARNED INCREMENT.

INCROYABLES, ăn'krwȧ'yȧ'bl' (Fr. word, meaning incredibles). A name applied to the Parisian dandies under the Directory, who made themselves conspicuous by their extravagance in dress, manner, and speech. One of their peculiarities was the omission of *r* in speaking, and they got their name from their favorite expression, *Ma petite pa'ole d'honneu', c'est inc'oyable* (me wohd of honnah, it's incwedible). They were mostly royalists. The type has been known at different periods in the history of France, by various names: *Agréables, Gommeux, Merveilleux, Mirliflors, Lions, Muscadins, Muguets, Petits-maîtres,* etc. (See JEUNESSE DORÉE.) The term 'Incroyables' is also applied to the exaggerated style of hats which they wore.

INCUBATOR (Lat. *incubator,* one who lies in a place, from *incubare,* to lie within, to incubate, from *in,* in + *cubare,* to lie). A term applied in poultry-raising to devices used for artificial incubation or the hatching of eggs. Artificial incubation was successfully practiced in very ancient times in Egypt and China, and probably other countries. The methods and appliances still used in China are quite simple, and even crude, but are employed with great skill and

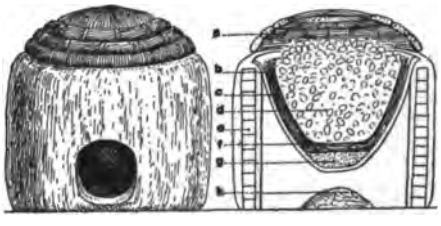


FIG. 1. CHINESE INCUBATOR.

a, cover; *b,* basket; *c,* jar; *d,* eggs; *f,* mat; *g,* ashes; *h,* charcoal.

success. Réaumur, the eminent French physicist, used successfully a very crude form of incubator, consisting of a barrel heated with fermenting manure; but he encountered much criticism and opposition on the ground that chickens so hatched "were unfit for human food because they tasted of the heating material, and that such chickens were absolutely sterile, and if the process were persisted in the race of fowls would necessarily die out." Similar prejudice against incubator chicks has persisted until within comparatively recent years; but artificial incubation has become so firmly established, and, the experimental stages having long been passed, the methods and appliances have been made so simple and practical, that it is considered absolutely necessary in the rearing of fowls in large numbers. There were, of course, many failures in the early attempts to devise a practical incubator, although in the first application for a patent on such a device in this country, in 1847, some of the principles on which incubators should be constructed were stated with remarkable clearness and accuracy. Practical success with

FIG. 2. MODERN INCUBATOR.

modern incubators may be said to date from the Paris Exposition of 1877, at which Rouillier and Arnoult exhibited their 'hydro-incubator.' "This incubator," says Beale, "has a very large tank, holding about fourteen gallons of water, which is divided into three horizontal compartments, each communicating with the others by means of a few small holes. This tank is placed in a wooden case, and surrounded on all sides save the bottom (under which is the egg-drawer) by an inch or more of felt, or some other non-conducting material, tightly pressed down. When this tank is filled with hot water, it is found that the water loses only from two to five degrees every twenty-four hours, according to the temperature of the place where it is kept. If the water in the top compartment only be drawn off, and that in the lower ones be left undisturbed, the former being again filled with boiling water, the heat from this will gradually affect the [temperature of the] lower body, and prevent its going down. By repeating this every twelve hours, the heat in the egg-drawer can be maintained at almost any degree of temperature, with a scarcely perceptible variation." Notwithstanding the simplicity and efficiency of incubators of this type, attempts to devise a practical automatic, self-regulating incubator were persisted in until incubators of this kind have been brought to a high state of perfection, and have been generally adopted. Incubators of the automatic type are of two main classes—hot-water and hot-air. The advantages and disadvantages of the better makes of the two classes are very

evenly balanced. There are hundreds of different makes of incubators on the market, many of them very efficient when properly handled. An average hatch of over 80 per cent. of fertile eggs is secured by experienced poultrymen, but experience, skill, and careful attention to details are essential to such success.

The essentials of a good incubator are an egg-chamber uniformly heated, preferably from above; a self-regulating source of heat, controlled by a thermo-regulator, the actuating arm of which is situated in the egg-chamber, and which is sensitive to 1°, or preferably ½°, above or below the desired temperature; and provisions for the ventilation of the egg-chamber, and for maintaining the proper degree of humidity therein. In addition to these, says Watson, "a convenient appliance for turning the eggs, positive in action, should accompany each incubator. This may be an extra tray that is to be placed bottom side up over the tray of eggs and held firmly in this position while both trays are turned, thus completely transferring the eggs from one tray to another without jar. The different machines have very different appliances for accomplishing this result." The object sought in artificial incubation is to imitate as closely as possible the conditions of heat, air, moisture, etc., which obtain in natural incubation under the hen. The temperature is carefully maintained at about 100° F. or only a few degrees above by placing the incubator in a basement, cellar, or other room where the temperature is stable, and by using a sensitive thermo-regulator to control the heat applied; the moisture of the air in the egg-chamber is carefully controlled, so that evaporation from the eggs proceeds as under normal conditions; and a sufficient amount of fresh air is supplied to the chamber to carry off the harmful gases which may accumulate and kill the incubating chick. The frequent turning of the eggs during the earlier stages of incubation is believed to have an analogy in the practice of the hen. However, it is not considered advisable to disturb the eggs after the eighteenth day, or to open the incubator thereafter until the hatch is complete, and the chicks dry. As the success of incubation depends so largely upon maintaining the proper moisture conditions in the air of the egg-chamber, some reliable means of controlling these conditions is essential. It has been proposed to use the normal loss of weight of eggs during incubation under brooding hens as a guide for this purpose. The West Virginia Agricultural Experiment Station found that the eggs which hatched under hens lost on an average 16.5 per cent. of their weight in nineteen days. The infertile eggs and those which did not hatch lost from 1 to 2 per cent. less. The normal loss of weight of 100 eggs under natural incubation was found to be about 10 ounces in 6 days, 20 ounces in 12 days, and 31 ounces in 18 days. By weighing the eggs in the tray at the beginning of incubation, and at intervals during the process, the progress of evaporation (loss of weight) may be determined, and the ventilation and humidity so controlled as to make the loss of weight conform to the normal figures. Except in very dry climates there is said to be more danger of over-saturation than under-saturation of the air. A humidity of 45 per cent. saturation is considered safe, as a rule.

If artificial incubation is practiced, some provision must be made for the care of the chicks when they leave the incubator. Variously artificially heated devices known as brooders are used for this purpose. These may be very simple and cheap, or elaborate and expensive. Almost all manufacturers of incubators also make brooders, and there is consequently a great variety of forms to choose from. The requisites of a good brooder are that it should be: (1) Warm (90°-100° during the first week, with gradually lowering temperature thereafter), and economical of heat, which is preferably applied mainly from the sides or above; (2) clean, dry, and well-ventilated; (3) simple in construction, and so arranged that the chicks may be seen. The brooder should be so constructed that the chicks may go out for exercise, and return at will.

BIBLIOGRAPHY. The literature of the subject is voluminous. All up-to-date treatises on poultry-raising explain the processes of artificial incubation, and describe methods and appliances. Among the books which may be consulted are: Watson, *Farm Poultry* (New York, 1901); Beale, *Profitable Poultry Keeping* (New York, 1895); Stoddard, *The New Egg Farm* (New York, 1900); Cyphers, *Incubation and Its Natural Laws* (Boston, 1894); *Incubators and Chicken-Raising Appliances* (London, 1899); Fiske, *Poultry Appliances and Handicraft* (New York, 1902). See POULTRY.

INCUBUS (Lat., nightmare). (1) A sprite or demon, thought to have been the cause of nightmare. In the Middle Ages both Church and State believed that the incubus had carnal knowledge of women while asleep, and that from this connection deformed children sprang. The *succuba* was the corresponding female sprite, supposed to consort with sleeping men. (2) Metaphorically, a burden upon mind or spirit. (3) A genus of parasitic hymenopters of the family Braconidæ.

INCUMBRANCE (OF. *encombrance*, from *encombrer*, to incumber, from *en*, in + *combrer*, to cumber, from *combre*, obstruction, from Lat. *cumulus*, heap). A generic term including every kind of charge or burden upon land; every right to or interest in land which may be held by a third person in diminution of its value, but not preventing the passing of the fee from a grantor to a grantee. The most frequent examples are afforded by *judgments*, *leases*, *mechanics' liens*, *mortgages*, *easements*, and similar burdens.

A covenant against incumbrances is one of the usual 'covenants for title' contained in a conveyance of land. As usually construed it amounts to a contract of indemnity, securing the grantee against loss by reason of any incumbrance which may exist upon the land at the time of the conveyance. See COVENANT.

IN'CUNAB'ULA (Lat., cradles). A name applied to printed books published before 1500. Specimens of such works are generally rare, and sought after for their historical bearing on the art of printing, and, as in first editions of Greek and Latin classics, for their scientific value. The number of incunabula is variously estimated, but is probably upward of 20,000. Among the works on the subject are: Hain's *Repertorium Bibliographicum* (Stuttgart, 1828-38) and Bernard, *De l'origine et des débuts de l'imprimerie en Europe* (Paris, 1853), besides a number of later treatises.

IND. A poetical form of India.

INDEBITATUS ASSUMPSIT. See ASSUMPSIT; DEBT.

INDEMNITY (from Fr. *indemnité*, from Lat. *indemnitas*, security from loss or damage, from *indemnis*, unhurt, from *in-*, not + *damnum*, loss). An engagement, either express or implied, to make good a loss or expenditure. It is not a guaranty within the fourth section of the Statute of Frauds (q.v.), which requires a special promise to answer for the debt or default of another to be in writing. When the indemnitor performs his engagement he may in so doing pay the debt of another, but the discharge of such debt is not what he promises to do; it is a mere accident of the situation. At times the engagement takes the form of a bond or other writing; but more frequently it is implied from the acts of the parties. Whenever a person asks another to become surety (q.v.) for him, the law implies the promise by the principal debtor to indemnify the surety for any loss that he may sustain by acceding to the request. So if two or more persons become co-sureties, there is an implied engagement on the part of each to indemnify the other to the extent of his share of the common loss. Fire and marine insurance policies are contracts of indemnity, the obligation of the insurer being not to pay the amount of the policy in any event, but only to save the insured harmless from loss in the event insured against. See INSURANCE. Consult the authorities referred to under SURETY.

INDENTED (from *indent*, OF., Fr. *endenter*, It., ML. *indentare*, to notch, from Lat. *in*, in + *dens*, tooth). In heraldry, one of the partition lines of the shield notched similarly to dancetté (q.v.), but with the notches much smaller, and not limited in number. See HERALDRY.

INDENTURE. See DEED.

INDEPENDENCE. A city and the county-seat of Buchanan County, Iowa, 69 miles west of Dubuque; on the Wapsipinicon River, and on the Illinois Central and the Rock Island railroads (Map: Iowa, F 2). It is in a farming and dairying region, and is noted for its horse-breeding farms. There are here the well-known Rush Park, with its kite-shaped race-track, the State Insane Hospital for Northern Iowa, and a public library. The water-works and electric-light plant are owned by the city. Population, in 1890, 3163; in 1900, 3656.

INDEPENDENCE. A city and the county-seat of Montgomery County, Kan., 85 miles southwest of Fort Scott; on the Verdigris River, and on the Missouri Pacific and the Atchison, Topeka and Santa Fé railroads (Map: Kansas, G 4). It has a public library and a fine court-house. The city is of considerable importance as a distributing point for an agricultural region, and has flour-mills, planing-mills, cracker-factories, cotton-mills, paper-mills, sugar-mills, a window-glass factory, vitrified-brick works, and a creamery. Natural-gas and oil wells are numerous in the vicinity. Population, in 1890, 3127; in 1900, 4851.

INDEPENDENCE. A city and the county-seat of Jackson County, Mo., five miles east of Kansas City; on the Chicago and Alton, the Missouri Pacific, and the Kansas City and Independence Air Line railroads (Map: Missouri, B 2). It is rapidly developing into a residential suburb of Kansas City. The Kansas City Ladies' College and Saint Mary's Academy are private schools situated here, and there is a public library. The industrial establishments include a large flouring-mill, a planing-mill, a canning factory, and scale-works. Independence was settled and incorporated in 1827, and was organized as a third-class city in 1889, the charter of that year still being in operation, and providing for a mayor, elected biennially, and a unicameral council. The electric-light plant is owned by the city. Population, in 1890, 6380; in 1900, 6974. Independence was occupied in 1831-38 by the Mormons, who regard the city as the 'Zion' where the chief Mormon temple will be ultimately erected on the famous 'Temple lot.' About 2000 members of the Reorganized Church of Jesus Christ of Latter-Day Saints, which disclaims belief in polygamy, now live in this vicinity. In 1849-50 Independence was a rendezvous and a starting-point for emigrants to California, two of the great trails leading from here westward. In the summer of 1862, during the Civil War, a Federal garrison of 312 under Lieutenant-Colonel Buel was captured here by a superior Confederate force under Colonel Hughes, and here on October 22, 1864, General Pleasanton attacked and defeated the rear of General Price's Confederate Army.

INDEPENDENCE, DECLARATION OF. See DECLARATION OF INDEPENDENCE.

INDEPENDENCE DAY. July Fourth, the United States national holiday.

INDEPENDENCE HALL. An unpretentious brick building in Chestnut Street, Philadelphia, erected in 1729-34, and intimately connected with the birth of the nation. In it the Continental Congress met, Washington was made commander-in-chief of the American Army in 1775, and the Declaration of Independence was adopted on July 4, 1776, and read to the people assembled in the street. It is now a museum of Revolutionary and historical relics.

INDEPENDENT CATHOLIC CHURCH IN THE UNITED STATES, THE (POLISH). An independent Church organized among the Polish immigrants in Chicago, with the hope of staying the progress of agnosticism among citizens of Polish descent who had become disaffected toward the Roman Catholic Church. Its founder, the Rev. Anthony Kozlowski, attended one of the Old Catholic conferences in Europe, and was there consecrated a bishop. A steady growth is affirmed of the Church, both in the consciousness of actual reformatory tendencies, and in numbers of adherents and strength of organization. It has established a hospital, a dispensary, an orphanage, and a Home for the Aged in Chicago, and has acquired a considerable property; primary, a grammar, high, and industrial schools have been established, with a college enterprise under way. All these schemes are connected, and form integral parts of a central philanthropic institution, called Saint Anthony's Home. In October, 1902, Bishop Kozlowski addressed a letter to the House of Bishops of the Protestant Episcopal Church in the United States asking for intercommunion. The subject was referred to a committee for consideration. The estimates of members in the Church vary. A careful computa-

tion gives it 33 ministers, 43 churches, and 42,850 communicants.

INDEPENDENT METHODIST CHURCH. See METHODISM.

INDEPENDENTS. Such bodies of Christians as claim the right of each individual church to administer its own affairs, free from ecclesiastical or civil authority. In history the name has been usually applied to the Congregationalists of Great Britain, who differ from the Congregationalists of America and other countries in regarding the fellowship of the local churches as unessential. The first Independent Church was organized in London about 1555, and the Brownists (q.v.), or Separatists, as the Independents were first called, steadily increased in numbers, in spite of persecutions and emigration. They were prominent in the Westminster Assembly. See CONGREGATIONALISM.

INDEPENDENT TREASURY. The name given to the system of keeping and disbursing the public money without the intermediary action of banks, State or national, adopted by the United States in 1846. The act of August 6, 1846, provided, in brief, that the public revenues should be held, until actually paid out, in the vaults of the Treasury at Washington or in the several subtreasuries in the larger cities created by the act. Prior to this date the Government receipts had been deposited in banks. The first Bank of the United States (see BANK; BANKING) was established in 1791, largely with the view of facilitating the fiscal operations of the Government. In it or its branches were deposited the Government funds, and from it were obtained temporary loans in anticipation of the revenue. When the bank charter expired, in 1811, the Government funds were deposited in the State banks throughout the country. With the subsequent suspension of specie payments, in 1814, the Government not only suffered with other creditors, but was seriously embarrassed by the fact that there was no standard national currency. In 1816 the second bank of the United States was chartered for a period of twenty years, and for the greater part of its existence it acted as the fiscal agent of the Government. Its effort, beginning in 1829, to obtain a renewal of its charter, led to a violent political contest, in which the opponents of the bank, led by President Jackson, won the victory. Though the charter did not expire until 1836, the President in 1833 ordered that no further deposits of Government funds be made in the bank, and that the funds of the Government be gradually withdrawn. This order for the 'removal of the deposits' was made on the alleged ground that the bank was unsound and that the public money was in danger.

Beginning October, 1833, the Government funds were deposited in State banks. Contracts were entered into between the Secretary of the Treasury and the several banks fixing the conditions upon which deposits were to be received. The refusal to recharter the Bank of the United States, together with the deposit of Government funds in the State banks, led to an ominous expansion of these institutions. A speculative era, marked especially by enormous sales of public lands, and the deposit or distribution of the Government surplus with the States (1837), now set in, which culminated in the panic of 1837. The Government funds were tied up in the non-specie-paying banks, and Congress was called together in September, 1837, to devise measures of relief. President Van Buren favored a complete separation of the Government from the banks, the establishment of an independent treasury, and a requirement that all debts due the Government be paid in specie. It was the latter provision which caused the defeat of the measure, as it appeared to the friends of the banks as a discrimination against the bank-note. Toward the close of Van Buren's Administration (June 30, 1840) the measure for which the President had fought valiantly was enacted into law, but not without the concession that in the first year of its operation only one-fourth of the Government receipts need be in specie, a further fourth being added each year until the whole should be so payable. The victory was dearly bought, for the party went down to defeat at the polls in November. The new Administration promptly repealed the law (August 13, 1841); but in the fruitless controversy with President Tyler over the Bank Law failed to provide any substitute for it. Public officials were left to their own devices in the custody of the public funds, and it was not until a new political revolution had occurred that the independent treasury system was finally established by the act of August 6, 1846.

The spirit of the measure was an absolute divorce of the Treasury from the banks. The Government was henceforth to keep its own funds, and to recognize only money issued by Federal authority, specie and Treasury notes, in the Government operations. The vaults and safes provided for keeping the money of the Government at Washington, and at such other places of deposit as were fixed by the law, were declared to constitute the Treasury of the United States. The Treasurer of the United States and assistant treasurers, and all other officials, were required to keep safely, without lending, using, depositing in banks, or exchanging for other funds, except as allowed by the act, all public money received by them or otherwise in their custody, until the same was ordered by proper authority to be transferred or paid out. In the early experience of the system some embarrassment was created by the failure to provide at once the necessary protection for the money in all the places where it was kept. But in general the system has worked well, and loss by theft or defalcation has been slight compared to the loss suffered through dealings with unsound banks in earlier years.

The isolation of the Treasury contemplated by the act soon proved illusory, and little by little inroads have been made upon the principle. The spectacle of the Treasury coming to the 'relief of the money market' has become familiar. The 'relief' thus afforded consists of placing in circulation money which the law accumulates in the hands of the Government. Operating with a surplus of revenue over expenditure, the Government balances may and do grow to such a size as to materially affect the volume of money in circulation. This, then, is a Treasury reserve which may be unloosed when a stringency in the money market occurs, and the fact that the Secretary of the Treasury is called upon for such relief is evidence of the futility of attempting utterly to separate the Government's operations from all business affairs. The independent Treasury was not ten years old before the possible dangers of

an accumulation of funds were perceived, and in 1853 large redemptions of bonds were made to avoid them. In the panic of 1857 the Government escaped unscathed, and this added to the popularity of the independent treasury system.

But with the fiscal necessities of the Civil War the principle of isolation was broken down. The banks became essential to the support of the Government. The Secretary of the Treasury secured their aid in making the first loans of the war. He would not recognize their notes in the Government operations, but soon brought forward his plans for transforming the banks into national institutions under Federal control, with power to issue notes of a kind which could be recognized by the Government. When the national banking system was organized, in 1863, the banks were allowed to become depositories of the public money, except the receipts from customs, under regulations established by the Treasury Department. Customs receipts, being in specie, were excluded from the funds capable of being deposited, since banks were not then paying specie. These deposits in the banks are secured by bonds deposited with the Treasury Department. The extent to which the banks have been used as places of deposit has varied with the state of the Treasury and the nature of its operations. When loans have been made the money has been paid in through banks and allowed to remain there until expended. In the refunding operations of 1879 the banks sold nearly $400,000,000 worth of bonds, and held at one time (May, 1879) as much as $279,544,645. On the other hand, when the surplus has dwindled the amount of money so deposited has decreased, while in periods of an abundant surplus it has swollen in size. On October 1, 1902, the amount so deposited in banks was $126,102,430.

The idea of the Independent Treasury Law was that the banks should not interfere with the Treasury, while in its practical administration, with the enormous growth of Government revenue, the problem has been for the Treasury so to conduct its operations that it shall interfere as little as possible with the banks and the ordinary course of business. In principle the Government pays cash, demands cash, and keeps its funds in a strong box—a method of conducting business entirely at variance with the usual practice in mercantile life. The income and outgo of the Government have not, moreover, the regularity which frequently characterizes mercantile affairs. Money accumulating in the Treasury in anticipation of future payments is withdrawn from circulation. Such withdrawal may accentuate a stringency, while the subsequent payment may aggravate a plethora. As an offset to these disadvantages of the system, it has been contended that it equalizes conditions by permitting the Secretary of the Treasury to come to the 'relief' of the money market. This is a questionable advantage. The relief is contingent upon a plethoric Treasury; it is, moreover, largely in the discretion of one man, the Secretary of the Treasury, whose impulsiveness or conservatism may materially affect the relief afforded. Finally, when determined upon, it is not always as speedy as desired. The Secretary of the Treasury can increase the money in circulation (1) by additional deposits in banks, (2) by anticipating payments, (3) by redemption or purchase of the public debt. Of these methods the first is gradual, as no transfers can be made from the Treasury to the banks, the latter's holdings increasing only by deposit of internal revenue and other general receipts. Moreover, banks have been unable, even during periods of stringency, to apply for funds that could legally be deposited with them, owing to the requirement that such funds were to be secured by deposit of national bonds—a requirement sometimes difficult to meet, because of the high price of such bonds. By an order of the Secretary, dated October 4, 1902, banks are permitted, under certain conditions, to substitute specified State and municipal bonds for the national bonds hitherto required. It is hoped that in this way the Treasury will be able to give a larger measure of relief than formerly. The second method applies chiefly to certain definite payments, like the interest upon the public debt. The third is the most satisfactory, so long as there is outstanding a redeemable debt, but cannot be free from criticism when the Government goes into the market to buy up its own bonds. Moreover, with the debt limit of the United States growing less, and with a larger part of the debt held by banks as a security for deposits or currency, this resource is growing weaker. Since any sale of bonds by banks would diminish the circulation in other directions, it is only the bonds held by individuals whose sale to the Government would affect the volume of the circulation. Hence the 'relief' which the Treasury can afford the monetary situation is spasmodic, irregular, and uncertain; it is very far from being a scientific automatic corrective of the excesses of the money market.

It is the opinion of those who have examined the matter in all its details that the independent Treasury offers the Government no advantages which could not be secured by properly guarded contracts with the banks. Such contracts would relieve the Government of the custody of its own surplus, and would not withdraw that surplus from the ordinary channels of trade. There is a growing feeling that our Treasury methods are antiquated, and should be replaced by methods more in harmony with business principles. It has been pointed out that if others should follow the example of the Government, business would come to a standstill. See FINANCE; BANKS; BANKING. Consult Kinley, *The Independent Treasury System of the United States* (New York, 1893).

INDESTRUCTIBILITY OF MATTER. See MATTER, PROPERTIES OF.

INDETERMINATE COEFFICIENT. See COEFFICIENT; EQUATION.

INDETERMINATE EQUATION. See EQUATION.

INDETERMINATE MULTIPLIERS. The use of indeterminate multipliers is well illustrated by Bezout's method of elimination in solving systems of simultaneous equations. E.g. let it be required to solve the system of equations,

$$(1)\quad 4x - 5y + 2z = 0.$$
$$(2)\quad 3x + 2y + 7z = 28.$$
$$(3)\quad x - y + 2z = 5.$$

Multiplying the members of the first equation by λ and those of the second equation by λ' and adding to those of the third equation, we obtain the equivalent system,

$$(4)\quad 4x - 5y + 2z = 0.$$
$$(5)\quad 3x + 2y + 7z = 28.$$

(6) $(4\lambda + 3\lambda' + 1)x - (5\lambda - 2\lambda' + 1)y + (2\lambda + 7\lambda' + 2)z = 28\lambda' + 5$

Selecting for λ, λ' values such that

(7) $5\lambda - 2\lambda' + 1 = 0$

(8) $2\lambda + 7\lambda' + 2 = 0$,

then $\lambda = -\frac{1}{39}$, $\lambda' = -\frac{3}{39}$, and from equation (6), $x = 1$. Choosing next λ, λ' such that

(9) $4\lambda + 3\lambda' + 1 = 0$

(10) $2\lambda + 7\lambda' + 2 = 0$,

then $\lambda = -\frac{1}{11}$, $\lambda' = -\frac{2}{11}$, and, from equation (6), $y = 2$. It may similarly be found that $z = 3$.

INDETERMINATE PROBLEMS. See DIOPHANTINE ANALYSIS.

INDETERMINISM. See INDIFFERENTISM.

INDEX (Lat., indicator). An alphabetical list of names, topics, words, and the like, with indications of the passages in which they occur. The index usually comes at the end of the book; the analytical table of contents is normally placed at the beginning, except in the case of French, Italian and Spanish books.

As books began to multiply the need of indexes was felt and their value was recognized. Many old books of the sixteenth and seventeenth centuries have well-made indexes of such fullness and value as put to shame the farcical substitutes issued by many modern publishers when they give any at all. Numerous authorities might be cited as to the worth of a good index in enhancing the value and usefulness of a good book. Long and loud have been and are the complaints against the publication of books of knowledge without indexes, emphasizing Carlyle's growl against "books born of Chaos, which want all things, even an index." Lord Campbell of England, and Horace Binney of Philadelphia, each advocated withholding copyright from any author who published a book without an index. "I have come," says the latter, "to regard a good book as curtailed of half its value if it has not a pretty full index. It is almost impossible, without such a guide, to reproduce on demand the most striking thoughts or facts the book may contain, whether for citation or further consideration." The value put by many scholars on the old Delphin edition of the classics is based on its copious indexes, by means of which a classical quotation can be made or located with the least trouble. Years of time have been lost to students and scholars in fruitless search for much wanted bits of information buried from sight in unindexed pages of books of value and authority. What the seeker demands is a complete index, and it is essential that this should not only refer to the letter, but should also embody the spirit of the work indexed. To this end the indexer must possess intelligence, quickness of perception, the power of analysis and condensation, and the ability to put himself *en rapport* with the author and his work, of the subject of which he must himself have a very considerable knowledge. Any index is valuable in proportion as it is concise in expression and accurately exhaustive, not only of the broader statements of fact or of opinion, but also of the small points of detail, the incidental and illustrative references contained in the book or volumes to which it aims to be the guide or key.

Minuteness of indexing must vary according to character and uses of books indexed. Before beginning to make entries, an indexer should read the book. He may then indicate by underlining text or writing chosen headings in the margins against the topics to be indexed. A book may require a general index of quite obvious subjects treated in it, as Bryce's *American Commonwealth;* a name or word index, as for atlases, botanies, quotations, etc.; an index of ideas more or less difficult to reduce to alphabetic keywords, as Emerson's *Essays*, Holmes's *Autocrat*. The indexer cannot be too careful in choosing headings or catch-words, which must not only represent the subject treated, but also be such as would occur to the seeker who has not the text before him. Entries on the same subject should not be scattered among various synonymous headings. Each subject must be indexed every time it occurs, and related matter should be indicated by cross-references. If entries under headings are few it is better to repeat them under each heading needed to make reference easy and complete; if many, a single heading may be chosen for entries and cross-references made from other possible headings. Entries should be concise, definite, and specific. Scattered page references should not be massed under a heading without clew to the character of the information given. Where matter relating to a single subject is given consecutively and is brief, a single reference may suffice, but if extended it should be analyzed under headings. In a book on municipal affairs, the seeker must not be forced to examine several pages on the Mayor of New York to ascertain his salary. Specific rather than general headings should be chosen; e.g. entry should be under potatoes, not tubers, sparrows rather than birds, cross-reference being made only when necessary. In general, indexing under the main subject of the book should be avoided. This would bring too great a mass together, and render the heading practically useless. The excellent index of Fiske's *American Revolution* has but seven entries under 'Revolution.' A work in several volumes should have a general index to all in the last one. Separate indexes to each volume (except for serials) are seldom afforded.

Each entry should be written on a separate slip and the slips alphabeted in trays. Library supply houses make slips 5×7.5 cm. or 7.5×12.5 cm., and trays to fit. The smaller size is usually better. Careful, final editing of entries is necessary to assure consistency, proper cross-reference, clear punctuation, and absolute accuracy. Words alike in spelling but different in meaning should be repeated as headings. Entries like the following are confusing:

Lead, copper
metallurgy
kindly light
poisoning

Entries should be arranged in alphabetic order. Two or more distinct words should not be treated as integral parts of one word. Thus the arrangement should be:

New Bedford New reasons for New York Newark News from abroad Newton	not	Newark New Bedford New reasons for News from abroad Newton New York

When verified and edited, slips may be sent to the printer either pasted in order on large sheets, or numbered, punched, and tied together, or entries may be copied on sheets. Great care is essential in verifying both the original entries and the printer's work, an index error being serious. A paper on "Indexing," by J. B. Nichols in *Library Journal*, October, 1892, gives the best directions and suggestions in print for would-be

indexers. H. B. Wheatley's *How to Make an Index* (London, 1902) is entertaining reading and valuable in suggestion. It contains the rules of the English Index Society. The American Library Association's *List of Subject Headings for Use in Dictionary Catalogs*, Cutter's *Rules for a Dictionary Catalogue* (Washington, 1891), and various articles referred to under *Index* and *Indexing* in Poole's *Index to Periodical Literature* are also useful. A study of well-made indexes and criticism of poor ones will aid materially.

INDEX, in mathematics. See EXPONENT.

INDEX (more fully INDEX LIBRORUM PROHIBITORUM). A catalogue published by Papal authority in the Roman Catholic Church of books the reading of which is prohibited to members of that Church, whether on doctrinal, moral, or religious grounds. A natural consequence of the claim of the Church to authority in matters of religion is the right or the duty of watching over the faith of its members, and of guarding it against every danger of corruption from books believed to be injurious to faith or to morality. The earliest recorded exercise of this restrictive authority is the prohibition of the *Thalia* of Arius; and a council of Carthage, in the year 398, issued, even for bishops, a similar prohibition of Gentile books, although it permitted to them the reading of the works of heretics. The earliest example of a prohibitory catalogue is found in the decree of a council held at Rome (494), under Pope Gelasius, which, having enumerated the canonical books of Scripture and other approved works, recites also the apocryphal books, together with a long list of heretical authors, whose writings it prohibits. The mediæval popes and councils pursued the same course as to the heterodox or dangerous writings of their respective periods, and the multiplication of such books after the invention of printing led to a more stringent as well as more systematic procedure. Henry VIII. of England published a list of prohibited books in 1526, and a larger one (containing 85 titles) in 1529, in which year Charles V. published for the Netherlands his most noteworthy edict against dangerous reading, with a long list, which was included in that issued by the university press of Louvain in 1546, and again in 1550. Similar lists appeared by authority at Venice, Paris, and Cologne, and Paul IV. issued in 1557 and 1559 what may be regarded as properly the first *Roman Index*. One of the gravest undertakings of the Council of Trent was a complete and authoritative enumeration of all those books the use of which it was expedient to prohibit to the faithful. A committee was appointed for the purpose, and had made great progress in the work; but it was found impossible to bring the examination of the books to an end before the close of the council, and all the papers of the committee were handed over by the council to the Pope. When the work was completed, the result, known as the *Tridentine Index*, was issued with the bull *Dominici Gregis Custodiam*, by Pius IV. in 1564. From this time the burning of dangerous books fell into disuse, and the Church contented herself with warning her children against their use, under penalty of purely ecclesiastical censure. Further additions and certain modifications of the rules of this *Index* were made by Sixtus V., Clement VIII., Alexander VII., and Benedictine XIV. It was republished in 1595, and, with the addition of such books as from time to time it was deemed expedient to prohibit, in several subsequent editions, the most remarkable of which are those of Brasichelli (Rome, 1607); Quiroga, *Index Librorum Expurgandorum* (Salamanca, 1601); and Sotomayor, *Novissimus Index* (Madrid, 1648). In the intervals between the editions, the decrees which make further additions to the *Index* are published at Rome and circulated in the various countries. The latest edition of the *Index* is by Leo XIII. (Turin, 1895).

The prohibitions of the *Roman Index* are of two classes, either absolute and total, or partial and provisional, until the books shall have been corrected. The edition of Quiroga, mentioned above, gives a list of the latter class, known as *Index Expurgatorius*. The ground of the prohibition may be either the authorship of the work, or its subject, or both together. Under the first head are prohibited all the writings of *heresiarchs*—i.e. the first founders of heresies—no matter what may be the subject. Under the second head are prohibited all books confessedly immoral, and all books on magic, necromancy, etc. Under the third are prohibited all books of heretical authorship treating on doctrinal subjects; all versions of the Bible by heretical authors; and all books, no matter by whom written, which contain statements, doctrines, or insinuations prejudicial to the Catholic religion. The preparation of the *Index*, in the first instance, was committed to the care of the Congregation of the Inquisition in Rome; but a special Congregation of the Index was established by Pius V., and more fully organized by Sixtus V. This congregation consists of a prefect (who is always a cardinal), of consulters, and of examiners of books (*qualificatores*). Its proceedings are governed by rules which have been authoritatively laid down by several popes, especially by Benedict XIV., in a constitution issued July 10, 1753, which is the best and most authentic exposition of a subject on which much misconception exists. The edition of the *Index* by Brasichelli was reprinted, with an English preface, by Richard Gibbings (Dublin, 1837). By far the most elaborate study of its contents is by F. H. Reusch, *Der Index der verbotenen Bücher* (2 vols., Bonn, 1883-85). The same author also reprinted all accessible indices of the sixteenth century in the *Bibliothek des Stuttgarter litterarischen Vereins*, vol. clxxvi. (Stuttgart, 1886).

INDEX, CEPHALIC, CRANIAL, PELVIC, etc. A term employed by anthropologists to mark the proportions of certain related parts of the human body, especially of the head or cranium, in order to distinguish biological varieties in mankind. The most important of these, and the easiest to obtain, is the ratio of the width of the head to the length, called cranial index for the skull, and cephalic index for the living subject. To avoid the decimal point at the beginning of the index, the width of the skull is multiplied by 100 and divided by the length, the formula being thus $\frac{W100}{L} = I$. The extreme length is between the glabella and the most prominent portion of the occiput, and the width is the greatest breadth, wherever that may be. All appliances necessary for these measurements are a set of calipers and a rule, in centimeters or in inches.

Three terms are applied by anthropologists to heads, according to these measures. Those having cephalic indexes with a ratio below 80 are called dolichocephalic, those between 80 and 82 are mesocephalic, and those above 82 are brachycephalic. For crania, or skulls of the dead, the indexes are about two points lower. In the numerous cases where a finer subdivision is necessary, a quinary method of nomenclature is followed, the Germans adopting a series called the Frankfort Agreement, the French, the scheme of Broca, modified by Deniker, as follows:

	Cranial index	Cephalic index
Dolichocephals	below 75	below 77
Sub-dolichocephals	75 - 77.6	77 - 79.6
Mesocephals	77.7-79.9	79.7-81.9
Sub-brachycephals	80 - 83.2	82 - 85.2
Brachycephals	83.3-84.9	85.3-86.9
Hyper-brachycephals	85 and upward	87 upward

Dolichocephalic skulls of exceptional length have reached an index of 58, the lowest limit, while brachycephalic examples have gone as high as 90 or even 100.

Before proceeding to other indexes it should be stated that the cranial and cephalic indexes just described are far from being a perfect guide to the classification of mankind, for the subdivisions of the human species have no governing rule and are not subspecies, but separate varieties and mixtures, as with domestic animals.

Again, the ratio between the width and the length of the skull does not give complete information as to its shape. The measurements, therefore, lead to uncertain conclusions, since precisely the same figures would be obtained from crania or heads of widely different cross-section, so that one having an almost rectangular shape, an oval with a narrow end far in front, and a long ellipse would lead to the same index. Unless a large number of skulls among the same people are measured and give something like a uniform result, the measurements are an unsafe guide. Very little good arises from simply adding a number of indexes and dividing by a number of observations. The average result might be a number to which not a single head in the whole series measured would correspond. It is customary, therefore, to tabulate results by coördinates. Frequently, when such a plan is pursued there arise several apexes, as in Italy, the higher number representing the brachycephalic Northern Italians with Celtic blood in their veins, and the lower number the Southern long-headed Mediterranean type.

The cranial and cephalic indexes are not precisely coördinated with purely descriptive characteristics of the human body. It cannot be said that any one of the subspecies of man is either dolichocephalic or brachycephalic, but tendencies toward one or the other exist, as the following table of cephalic indexes shows:

Caroline Islanders (black)	69.4
Kashmirians (yellow-white)	72.2
Bakongo (black)	72.5
Hindus (white, mixed)	72.8
Karaya Indians, South America (red)	73.0
Australians (straight-haired blacks)	74.2
Norwegians (blondes)	76.0
Corsicans (white)	76.6
Spaniards of Valencia	76.8
British Isles	77-79
Parsis of Bombay (white)	82.0
Koreans (yellow)	82.6
Malays (brown)	82.8
Negritos, Philippines (black)	84.7
Arawaks, Guiana (red)	82.6
Saras, Chad-basin, Sudan (black)	82.4
Samoans (brown mixed)	83.7
Votyaks (yellow)	82.0
Walloons (white)	82.2
Italians (white)	82.7
Armenians (white)	85.6
Piedmontese (white)	85.9
Sudanese (brown)	86.3
Savoyards (white)	86.9
Tahitians (brown)	85.6
Aleuts (red)	87.8
Magyars (mixed)	87.8
Burmese (yellow)	85.7
Aissor, Transcaucasian (white-yellow)	88.7

Among the European whites the people of the British Isles are mesocephalic; of France the index is 78-88; of Italy, 75-87; of Spain, 77-80; Switzerland, 76-85, with two types, the long and the short head; Austria, 80-84.

Other indexes than those expressing the relation of width to length are also employed. The facial index is the ratio of the width to the height, from the glabella to the alveolar border, and separates skulls into brachyfacial and dolichofacial. The ratio of width to length in the orbital orifice separates crania into megasemes (90 and upward), mesosemes (89 to 84), and microsemes (below 84). The nasal index is the ratio between the width of the bony mass of the nose and its height, giving rise to leptorhine, or narrow-nosed, platyrhine, or flat-nosed, with the intermediate term, mesorhine. The dental index is based upon the importance which naturalists place on dentition in the classification of mammals. Upon the ratio of the size of the teeth to related parts, Flower divides men into megadont, mesodont, and microdont; and this series bears a surprising relation to the three anthropometric types of man—Negroid, Mongoloid, Caucasoid.

SCHEME OF PRINCIPAL CLASSIFICATIONS ACCORDING TO INDEXES

Skull	Dolichocephalic, long skulls. Mesocephalic, medium skulls. Brachycephalic, broad skulls.
Nose	Leptorhine, narrow noses. Mesorhine, medium noses. Platyrhine, flat or broad noses.
Eyes	Megaseme, round eyes. Mesoseme, medium eyes. Microseme, narrow eyes.
Teeth	Megadont, large teeth. Mesodont, medium teeth. Microdont, small teeth.
Jaws	Orthognathic, straight or vertical jaws. Mesognathic, medium jaws. Prognathic, projecting jaws.
Face	Chamæprosopic, low or broad face. Mesoprosopic, medium face. Leptoprosopic, narrow or high face.
Pelvis	Platypellic, broad pelvis. Mesopellic, medium pelvis. Leptopellic, narrow pelvis.

Consult: Roberts, *Manual of Anthropometry* (London, 1878); Török, *Grundzüge einer systematischen Kraniometrie* (Stuttgart, 1890); Deniker, *Races of Man* (London, 1900); Livi, *Antropometria* (Milan, 1900); Boas, *Stone's Measurements of Natives of the North-West Territory* (New York, 1901).

INDEX EXPURGATORIUS. See INDEX.

INDEX KEWENSIS. A reference book of the names of flowering plants, accepted as authoritative throughout the world. It was conceived by Darwin, who, having experienced difficulty in definitely identifying many of the plant

species with which he worked, provided the money for its completion. It was compiled by Benjamin Daydon Jackson (q.v.), whose aim was to record every genus and species of phanerogamous plants published up to 1885; to follow Bentham and Hooker's *Genera Plantarum* as authority for the limitation of genera; to add to each name, whether retained or synonymic, a full reference to its place of publication, retained names being the earliest under which they were published in the recognized genus and not necessarily the earliest specific names; and, finally, to indicate the geographical distribution of each species. Two supplements, bringing the work down to 1895, and embracing specific names between Aalius and Irika, appeared in 1902. In these the author was assisted by Theophilus Durand of Brussels.

INDEX LAWS. See EXPONENT.

INDEX NOTATION. See NUMERALS; NOTATION.

INDEX NUMBERS. An index number is a method adopted by statistical and economic writers to exhibit the course of prices of a group of commodities or of commodities generally.

A crude method of attaining this result is to add the prices of the various commodities together. The defects of such a procedure are apparent from the following simple illustration:

	1st date	2d date
Cotton, per lb	$0.08	$0.07
Flour, per bbl	3.50	3.25
Pig iron, per ton (2000 lbs.)	18.00	18.50
Total	$21.58	$21.82

If the sum be a criterion, it appears that there has been on the whole an advance in price of the group despite the fall in cotton and flour. A little reflection will show that had pig iron been quoted by the pound instead of by the ton the result would have been different, as follows:

	1st date	2d date
Cotton, per lb	$0.08	$0.07
Flour, per bbl	3.50	3.25
Pig iron, per lb	.009	.00925
Total	$3.589	$3.32925

But even here there are still great differences in the initial prices and the variations are measured on very different scales.

The index number avoids this difficulty by reducing the initial prices to common terms. It establishes the variation of each price from its own starting-point, and then determines the average variation. The assumed figures above given will serve the purpose of demonstration, and the following statement of relative prices is true for either of the series:

	Price at 1st date	Price at 2d date in terms of price at 1st date
Cotton	$100	$87.5
Flour	100	92.9
Pig iron	100	102.8
Total	$300	$283.2
Average	100	94.4

In this comparison, where each article has an equal weight in determining the result, there appears to have been a fall in price of 5.6 per cent.; while in the first statement, where pig iron predominated, a rise in price of 1.2 per cent. appeared, and in the second statement, where flour predominated, the fall in price appeared to be 7.2 per cent. It is obvious that the third statement or simple index number is a far better indication of the course of prices of these articles than the other two, where one article or the other dominates the result simply by reason of the fortuitous circumstance that its unit of measurement is relatively large.

The third statement is not, however, an absolutely exact measure of the total price change, since it is not of equal significance that flour falls and that pig iron rises. To the individual consumer no doubt a slight fall in flour is more important than an equal rise in pig iron. It may readily be assumed that he buys for his daily needs 10 times as many things affected by the price of cotton as are affected by that of pig iron, and perhaps four times as many affected by the price of flour as are affected by that of cotton. His relative consumption might be: pig iron, 1; cotton, 10; flour, 40. Hence the price changes noted affect him in varying measure, and this must be accounted for in estimating the significance of the total change. The calculations are as follows:

	Price	Units of importance	Product
Cotton	$87.5	10	875.0
Flour	92.9	40	3716.0
Pig iron	102.8	1	102.8
Total	$283.2	51	4693.8
Average	94.4	...	92.0

On the other hand, in the aggregate consumption of the nation the proportions of the different articles might be quite different, and hence also the significance of these combined changes in the wholesale market. Let us assume them to be: pig iron 1, cotton 2, and flour 4. We then have the following calculation:

	Price	Units of importance	Product
Cotton	$87.5	2	175.0
Flour	92.9	4	371.6
Pig iron	102.8	1	102.8
Total	$283.2	7	649.4
Average	94.4	...	92.8

We have now determined by these slightly different methods the price of the group to have been at the second date, compared with the first, as 94.4, 92.0, and 92.8 respectively are to $100, and we have in these results from assumed figures a fair illustration of the methods of index number calculations, and the problems to which they give rise.

The problems of a general index number are not dissimilar. The first is the choice of articles whose prices are to be included. No definite statement of what articles should or should not be comprised in the index can be made except that they should be staple articles of general use. It would defeat the object of an investigation

aiming to determine the course of general prices, to include specialties, or rarities, or objects of such restricted use as not to be subject to the ordinary influences affecting prices.

The character of the component price series being thus stated, how shall the number be fixed? It must evidently be large enough to include all the more important lines of staple commodities. No precise limit can be fixed. While it would seem obvious that in any effort to determine general prices, the greater the number of commodities embraced in the comparison, the more accurate the result, such is not the case, since, as the number multiplies, the proportion of articles of limited demand which are more or less removed from the primary influences affecting prices generally increases.

The base line with which prices are compared is usually the average of a series of years, the purpose of taking such an average being to overcome any eccentricities of prices which might characterize a briefer period of time. This practice is not universal, and some well-known calculations have been based upon the prices of a single year. This method is justified on the ground that the prices so chosen were those of normal conditions.

In the combination of the price series into a general index of prices, the simple mean is the most frequent method employed, as illustrated in our first index calculation. This has been the subject of much criticism on the ground of the unequal importance of the objects concerned. To overcome this difficulty two sets of weighted averages have been proposed. The first was one which measured all articles by their importance in the national consumption as illustrated in the third calculation; the second measures articles by their importance in individual consumption as revealed by family budgets and typified in our second calculation. In applying national consumption as a test, we find that calculations of such consumption are very precarious and extend to comparatively few articles. In family consumption we can ascertain for certain groups of persons the proportions of expenditure which cover a much wider range of commodities. But the commodities covered by the family budgets are not the same as those covered by price statistics, since the former represent the retail, and the latter the wholesale markets. In the food products this makes little difference, but in textiles, metals, lumber, and the like there is no little adjustment needed to bring the prices and the relative expenditures into relation.

Those who have done the most to establish more rational and at the same time more complicated calculations have been the first to point out that the ultimate results differ but slightly from those obtained by the somewhat rough calculation of a simple average.

The index number of the London *Economist* is based upon the wholesale prices of 47 commodities which by combination are reduced to 22. The quarterly prices for 1845 to 1850 were arranged as a basis for calculation and the relative prices for subsequent years upon the January prices. The total price index for 1845 to 1850 was 2200, and for later years the price indices are also expressed as an aggregate, without reduction to 100. As in a few cases the full number of articles was not given, this was somewhat misleading. In the following table we give the results of this calculation as published by the *Economist*, together with a reduction to the scale of 100:

"Economist" Index Number

Year	Total as published	Reduced to scale of 100	Year	Total as published	Reduced to scale of 100
1845-50	2,200	100	1879	2,225	101
1851	2,283	104	1880	2,538	115
			1881	2,376	108
1858	2,612	119	1882	2,435	111
			1883	2,342	106
1861	2,727	124	1884	2,221	101
1862	2,878	131	1885	2,098	95
1863	3,492	159	1886	2,023	92
1864	3,787	172	1887	2,059	94
1865	3,575	163	1888	2,220	101
1866	3,564	162	1889	2,187	99
1867	3,024	137	1890	2,236	102
1868	2,682	122	1891	2,240	102
1869	2,666	121	1892	2,133	97
1870	2,689	122	1893	2,120	96
1871	2,590	118	1894	2,082	95
1872*	2,835	129	1895	1,923	87
1873	2,947	134	1896	1,999	91
1874*	2,891	131	1897	1,946	88
1875	2,778	126	1898	1,891	86
1876	2,711	123	1899	1,918	87
1877	2,715	123	1900	2,145	98
1878	2,529	115	1901	2,125	97
			1902	1,948	89

* Twenty-one articles only.

The general tendencies of price movements, the rising tendency till 1873, and the subsequent downward trend as shown in these figures are amply confirmed by other investigations. The enormous rise in the period of 1861 to 1865 was due not only to the extravagant prices for cotton paid in this period, but also to the fact that in the twenty-two series represented in the total as many as three were for cotton. This fact, and the prominence given to indigo, and the absence of so important a staple as coal, led to numerous efforts to improve the calculation. Mr. R. H. Inglis Palgrave sought to remedy the defects by a system of weighing each article by its importance in the national consumption—a method already indicated.

Mr. Augustus Sauerbeck published in 1886 *in* the *Journal of the Royal Statistical Society* an index number which has been brought down to date in subsequent issues of that periodical, and which is in many respects an improvement upon the older calculation. His annual prices are based upon averages of the monthly, and in some important commodities weekly prices, and these are compared with the average prices of 1867 to 1877. The tables embrace 45 series of quotations; and while some commodities are repeated (in different grades), they have been chosen in such a manner that the total number of quotations for a group of commodities such as meats, textiles, iron and steel represents approximately in its proportion to the whole number of quotations—forty-five—the importance of this group in the commerce of the United Kingdom. The superiority of this calculation rests, therefore, on the more trustworthy character of its material, and the breadth of choice.

In France similar calculations have been based upon the import prices of commodities, and in Germany (Soetbeer's) upon the import prices of goods at Hamburg. The latter are more comprehensive, since Hamburg was so long a free city that practically its entire trade was in commodities imported by sea and land. The calcu-

articles, to which were added 14 articles from the British trade returns. Neither the more limited French calculations nor those of Dr. Soetbeer developed any mode of combination other than the simple average.

In the United States comprehensive statistics of prices for the period of 1840 to 1891 were published in the Senate report on wholesale prices, wages, and transportation. The report based its calculations upon the prices of 1860 and furnished an index number comprising 223 different series of prices. These were combined by the method of simple average, and also by estimating the importance of the price series as measured by family consumption. As in previous instances when different methods of combination had been tested upon the same figures, the results of the two methods differed but little. This price index closed with 1891, but the United States Department of Labor in its *Bulletin* has furnished the material for carrying the study of price movements down to the present day.

It should perhaps be mentioned that this report applied the index-number principle to its statement of wage statistics, a procedure which had been previously suggested, but was carried here to execution for the first time. It is also applied effectively to the study of transportation rates. The methods of the report, especially as applied to wages, have been made the subject of searching criticism by the English statistician A. L. Bowley, who has effectively used the index principle in his investigations of the course of wages in England.

Consult: Bowley, *Wages in the United Kingdom* (Cambridge, 1900); id., *Elements of Statistics* (London, 1901); Falkner, *Wage Statistics in Theory and Practice* (Boston, 1899), in *Publications of the American Statistical Association;* Mayo-Smith, *Statistics and Economics* (New York, 1899); *Senate Report 1394*, Fifty-second Congress, second session, 1893, four volumes.

INDEX OF REFRACTION. See LIGHT.

INDIA. A region comprising the middle member of the three great southern peninsulas of Asia and a territory of nearly equal extent to the north, together with an extension eastward as far as the Malay Peninsula. India in this sense constitutes the Empire of India, one of the members, and by far the most populous, of the British Empire. India proper, however, does not extend farther east than the head of the Bay of Bengal; nor does it include some of the northern or westernmost districts of the Empire. The name Hindustan was formerly frequently used instead of India, but it belongs more properly to the north-central portion of India, the land of the Hindus. The name India has been used in a very broad sense, but improperly, so as to embrace the great southeastern peninsula of Asia, which is still sometimes spoken of as Farther India. This article will treat of the Empire of India. Since British influence became predominant there no other country of the Asian mainland has been so diligently explored or is now so well known as India. In the form of a great triangle, the Indian Peninsula extends southward between the Bay of Bengal, on the east, and the Arabian Sea, on the west, through 15° of latitude to Cape lowlands of the Ganges Basin and the great plains east of the Indus, which connect it with the mighty highlands of the Himalayas. India, within the official boundaries of the British possession (including the Native States), stretches north and south through about 29° of latitude. Its east and west extension is across nearly 40° of longitude. The Empire has an area of about 1,860,000 square miles, including the Native States and dependencies (Baluchistan, etc.). (See INDIA, NATIVE STATES OF.) It is thus about half as large as the United States (inclusive of Alaska). It is a world in itself, for the great barrier of the Himalayas, the Hindu Kush, and the Suleiman Mountains shuts it off from land communications with the rest of Asia, except through very difficult mountain passes; the sea is the only means of easy approach. Thus guarded, though by no means completely, by mountain bulwarks and wide seas against intrusion, India was able to develop a civilization and social system peculiar to itself.

TOPOGRAPHY. The coasts of India are comparatively little indented except at the mouths of the larger rivers and along the northwest shores; and though there are many roadsteads and harbors for small vessels, there are only a few good harbors for large vessels, and they are in the deltas of the rivers, or, as at Bombay, under the shelter of islands. The railroad system was, therefore, planned so as to connect all the leading trade centres of the interior with the largest seaports.

Three distinctly defined physical regions are recognized—the mountain districts of the Himalayas, the low plains of the three great rivers of North India, and the high plateau of the Deccan, extending from the plain of the Ganges to the south end of the peninsula. The colossal ranges of the Himalayas, 1500 miles in length, extend along the north part of the country in several parallel chains separated by deep valleys and tablelands. The most northerly of these ranges is the loftiest, and Mount Everest or Gaurisankar, the highest mountain in the world, rises to a height of 29,000 feet. In the west the Himalayan ranges are continued by the Hindu Kush, from which the Suleiman and Hala chains stretch to the south, along the western borders of India. The barrier presented by the Himalayas is far more formidable than those of the other ranges, and can be crossed only by passes of 17,000 to 19,000 feet in height, above which tower many snow-capped summits. It was through the less difficult but still formidable passes on the northwest border that India was long subjected to invasion; and Burma was the victim of similar attacks through the passes on its northern frontier. The mountain rampart has the greatest influence on climate and fertility, for it wards off the freezing winter blasts from the north and condenses the immense volume of water vapor brought by the summer monsoon to vivify the plain below. The barren mountain slopes fall to the south in successive terraces down to the fertile plain teeming with animal and vegetable life. But while the higher slopes of the mountains are devoid of vegetation, some of the wide, high mountain valleys are exceedingly beautiful, most notably that of Kashmir, unexcelled for healthful climate and fertile soil.

The great river plains cross India in a wide belt from east to west, south of the mountains; and at their ends the plains are projected southward, where the Indus and the Ganges-Brahmaputra have advanced their deltas far seaward. On the alluvial lands are the densest population and the richest cultivation; for density of population is determined in India, not by the temperature, but by the supply of water available for the farms. But there are waste and almost unpeopled districts also among these lowlands; and the rainless Desert of Thar or Indian Desert, to the east of the Indus delta, extends northeastward almost to the base of the Himalayas.

The third topographic division of the country is the peninsula, the great triangular plateau of the Deccan, from 1600 to 3000 feet above the sea. The northern boundary of the plateau is the Vindhya Mountains, which join the plateau to the low plain. The Deccan triangle is further defined by the Western Ghats rising above the fertile and accessible Malabar coast, and in the east by the Eastern Ghats overlooking the Coromandel coast, which is difficult of access, for the harbors are few and very poor. No other part of the world testifies more eloquently than the Deccan tableland to the prodigious energy formerly displayed by plutonic forces. The greater part of this immense plateau was built up by outpourings of lava and basalt (trap), which in places are 6000 feet thick.

The coast-line of Burma is not deeply indented except where the projecting delta of the Irrawaddy forms the Gulf of Martaban. The low coast and the flooded valleys make Burma the greatest producer of export rice in the world. Farther inland, to the east of the Irrawaddy and on both sides of the river in its upper course, the country is hilly and heavily forested.

Hydrography. The four great rivers of India are the Indus, the Ganges, the Brahmaputra, and the Irrawaddy, the last named in Burma. The heaviest rainfall is not on the plains or on the southern plateau, but on the slopes of the mountains, which pour their torrents into the great rivers below, with the result that the Ganges and the Brahmaputra carry to the sea a volume of water that is entirely out of proportion to their length or the area of their drainage basins. The Indus contributes to the basin of the Arabian Sea the waters derived from the Punjab (land of five streams), and from the plateau of Afghanistan. It is navigable for over 900 miles, but its value as a water highway is small on account of the impetuosity of its current. It is least important among the great rivers. The majestic and smoothly flowing Ganges is far more valuable for navigation than any other river of India. Both the Ganges and the Brahmaputra, which joins it near its mouth, are turbid with fertilizing silt from the mountains, which has formed the great Bengal delta. The Irrawaddy of Burma is navigable by steamers to Mandalay. The rivers of the peninsular part of India, though some of them are of considerable length, are not important for navigation. Among them may be mentioned the Nerbudda (Narbad) and Tapti, both flowing into the Arabian Sea, and the Mahanuddy (Mahanadi), Godavery (Godavari), Kistna (Krishna), and Kavery, which pour their waters into the Bay of Bengal.

Climate. On account of the great extent of India and its differing altitudes, the country has many differences of climate. The whole land may be described as more or less tropical except in the higher altitudes. Slopes of the Himalayas, as high as they are habitable, enjoy a temperate climate; neither is there for the natives an oppressive degree of heat on the high plateau of the Deccan. Among the Himalayas and the Nilgiris Europeans have established sanatoriums amid the most agreeable climatic conditions, where many of them take refuge from the prostrating heat of the hot months. The climate of India, except in the districts of jungle and marsh lands, is not, on the whole, unhealthful for the white race if the ordinary precautions required in all hot countries are observed. The most heated area is that of the northwest, in or about the region of the Indian Desert, where the mean July temperature exceeds 95°.

By far the most important climatic element is the rainfall, upon which depends the very existence of the people. Throughout the country in general there are only two seasons, the dry and the rainy, also known as the season of the northeast monsoon and the season of the southwest monsoon. These names are derived from the direction of the winds prevailing in the Arabian Sea and Bay of Bengal during the two periods. They are really inapplicable, however, over a great part of India, where the winds are from directions nearly opposite to those indicated by the names of the seasons, and are chiefly determined by the axial directions of the local river valleys. Thus the winds in South Bengal are from the southeast, and in Behar from the east, during the southwest monsoon, and are from the opposite directions in the northeast monsoon. The two seasons in India might, therefore, more appropriately be called the dry monsoon and the wet monsoon, from their most characteristic features.

The dry monsoon or season usually begins in November or December, and continues until May. Winds of land origin prevail more or less steadily in the interior, and hence the period is usually marked by great dryness of the air and little or no rain. The first three months of this period (December to February), characterized by a comparatively low temperature, are known as the cold-weather season; and the second three months (March to May), when the temperature increases rapidly and culminates in a period of excessive heat in May, as the hot-weather season. During the cold-weather season storms of large extent, the majority of which form in Persia, enter India from Beluchistan and traverse Northern India from west to east, distributing light rains in the Indo-Gangetic plains and heavy snow over the Western Himalayas. The severity of the hot-weather season is occasionally relieved by the occurrence of thunder-storms and dust-storms, which cool the air for brief periods. The characteristic features of the dry season are persistent dry weather, with clear skies, and large diurnal range of temperature.

The rains of the wet season or the southwest monsoon set in suddenly on the west coast of India in the first week of June, and a little later (in the second or third week of June) on the Bengal coast, and extend more or less rapidly into the interior. The prevailing winds of this period are of oceanic origin, and are, in fact, the northward extension of the winds of the southeast trades. The extension of these winds north-

ward across the equator and up the Indian seas usually begins in the third week of May and gives a complete and permanent change of weather (lasting for five or six months), more especially over the land area of India. The winds due to the extension of these massive humid air-currents usually begin to give daily rain to the Malabar coast in the last week of May, and to the Bombay coast on June 4th or 5th. The humid currents advance more slowly into the interior, but are usually established before the end of the month over the whole of India. Cloudy, showery, or rainy weather, with a moderately high temperature and small diurnal range of temperature, prevail during the next three months, which are in striking contrast with the excessively hot and dry weather that has prevailed during the previous two or three months. Over the mountain tracts of Assam and over the plains of Lower Burma the yearly rainfall exceeds 500-600 inches, and in one particular year the record of 805 inches was established.

Sometimes the wet monsoon is greatly delayed or has little strength, and this failure of an adequate supply of rain involves the direst tragedy. (See FAMINES, below.) India and the adjacent seas are often visited by the destructive hurricanes called typhoons, whose tracks are frequently traced by ruined towns and crops.

The soil, except on the steep mountain slopes, is of great fertility, being largely composed of alluvium throughout the plains and in the mountain valleys and of disintegrated volcanic rocks, from which many rich soils are derived, on the southern plateau. The food demands of the enormous population make it necessary to maintain a high degree of fertility.

FLORA. The very unequally distributed rainfall causes great differences in vegetation. The almost rainless region just east of the Indus has desert conditions of plant life, while the low-lying coast lands along the Gulf of Bengal have large areas of dense, wet jungle. The plains of the Deccan east of the Western Ghats have little rain, for it falls on these mountains instead of on the plains. Vegetation is therefore sparse where irrigation is not applied; while the lower slopes of the northern mountains, drenched with rain, are densely wooded; and far above the forests there is an Arctic flora close to the glaciers and snow-fields. The greatest possible area of plowed fields is needed for food production, and so a large amount of forest area has been cleared for cultivation. Timber supplies are chiefly derived from the mountain slopes, from the hilly lands of parts of the Deccan, and from Burma. Teak, the most valuable wood, is cut on the slopes of the Western and Eastern Ghats, in Lower Burma, and to some extent among the western hills of the Deccan. Sandalwood and blackwood are found in the teak-growing regions; sal, another hard wood, and cedars, on the slopes of the Himalayas; and the common woods are scattered, not profusely, over various parts of the country. The larger part of the plain has no forests, and in the irrigated districts there are few trees except in the watered gardens. The Government has all the best timber areas under protection, and applies forestry methods to their management. The bamboo, the mango, and the cocoanut and other palms are widely distributed, and are of the greatest utility. One of the most distinctive of the Indian trees is the banyan. The forests of Assam, Malabar, and the lower slopes of portions of the Himalayas are luxuriant in the extreme, and present a wealth and variety of vegetable forms which are equaled or surpassed only by the forests of tropical America. In the Himalayas is the home of the giant rhododendron. Orchidaceous plants are markedly numerous, and the upper floral zones of the mountain range have furnished the most valuable types to the floriculturist.

FAUNA. The country forms a part of the Oriental Region (q.v.) of zoögeography. Although the plains of the northwest partake of the characteristics of Central Asia, India possesses the lion (in the northwest, but now nearly extinct), the wild ass, and sundry smaller mammals, birds, and reptiles that belong rather to the country westward. The massive ranges of the Himalaya also contain a peculiar montanic fauna, characterized especially by an abundance of wild sheep, goats, and of goat-antelopes (qq.v.), such as the Charal Pulis sheep, the ibex, markhor, goral, and others elsewhere described. These, too, are more closely related to Palearctic than to Oriental forms; but two or more species of goats exist on the Nilgiri Hills and other heights of the Peninsula. The forests, swamps, and grassy plains of Peninsular India support life in extraordinary profusion, and civilization seems to have little effect upon it because of the jungle fastnesses to which animals may everywhere retreat and be safe. The elephant (which is still met with in many parts in large herds), however, requires protection, and the wild cattle are becoming scarce. Several kinds of deer, including the sambur, axis, and swamp-deer, and several kinds of antelopes are numerous, as well as very many of the minor mammals.

India is the home of the gallinaceous tribe of birds, and is rich in many kinds of pheasants, partridges, and jungle-fowl (to which is traced the origin of domestic poultry), besides a rich avifauna of the woods and fields. With this plenitude of prey, to which may be added a great variety of fresh-water and marine life, including many valuable food-fishes, there would naturally be found carnivorous beasts, rapacious birds, and poisonous predatory reptiles. The tiger (which is probably indigenous to India), leopard, cheeta, and several lesser cats wander throughout the whole country, and are dangerous to man as well as beast. Other animals are the rhinoceros, gayal (or bison of the Ghats), bear, jackal, and various forms of ape. The true buffalo, as well as the camel, is domesticated, and is largely used in the service of the field and farm. India is famous also for venomous snakes (see COBRA, etc.), crocodiles, and sea-snakes. The deaths of human beings by wild beasts and snakes number thousands each year, and the loss of cattle reaches hundreds of thousands of dollars in value. On the other hand, India is one of the most attractive regions of the world for sportsmen, who annually distribute much wealth within its confines.

GEOLOGY. The topographic divisions of India with their characteristic features are based largely upon differences in geological structure. The main system of the Himalayas, so far as explored, has been found to be composed of crystalline strata—gneisses, schists, and igneous rocks—which show the effects of upheaval and

folding during the great crustal movements that elevated the ranges in late Tertiary times. In the southern flanking chains, or sub-Himalayas, the most prominent formation comprises Tertiary sandstones, conglomerates, and clays, in disturbed position. These strata (the Siwalik group) are enormously developed, and contain a remarkable assemblage of fossil mammals. The great river plains of India occupy depressions in sedimentary strata, mostly of Eocene age. The Deccan plateau is formed largely of basalt which poured out from great fissures during the Cretaceous period. These basaltic sheets occupy an area estimated at 200,000 square miles, and attain a vertical thickness of several thousand feet. The Vindhya Mountains on the north have a gneissic axis, with Paleozoic sediments on the flanks. East and south of this range there is a large area underlain by sandstones and shales, to which the name Gondwana system has been given. This group extends probably from the Permian to the Jurassic period; its fossil fauna and flora are more nearly allied to the life-forms of South Africa and Australia than to those of the Eurasian continent.

MINING. Considering the extent of area and the large population, the mining industry is strikingly insignificant, though the recent developments are beginning to give it some importance. Increased utilization is being made of the coal resources of the country, much to the advantage of the railroad and milling interests. The annual output of coal increased from 2,562,000 tons in 1893 to 6,095,000 tons in 1900. The Province of Bengal produces over three-fourths of the total product, the output having grown from 1,915,000 tons in 1893 to 3,883,000 tons in 1899. The principal other coal-mining regions are the Nizam's Dominions, Assam, the Central Provinces, and Central India (Rewa), in each of which the output was greater in 1899 than in any preceding year. The increased production has resulted in the decrease of the imports of coal—which amounted in 1900 to only 83,200 tons—and the increase in the exports of coal, amounting to 541,400 tons in the same year. Coolie labor is prominent in the working of the coal-mines.

The mining of gold is also rapidly becoming important, the yield having steadily increased from 107,273 ounces in 1890 to 513,266 ounces in 1900. The greater part of this is mined from the quartz deposits of Mysore, although some gold is obtained from river gravels in the Himalayas and elsewhere. A parallel growth is being made in the production of petroleum, the output in 1900 having been nearly 38,000,000 gallons, the greater part of which was obtained from Upper Burma. The importation of mineral oil is still more than twice as great as the home production. The Government has long maintained a monopoly in the production of salt. It is obtained mainly by the process of evaporation, and the industry is carried on along the coast region and at some of the interior lakes. The annual yield is estimated at about 1,000,000 tons. Saltpetre is obtained in the plains, lead and copper are mined in the Himalayas, and tin and rubies in Burma. India was long famous for its diamonds, but the output in the last century has shrunk into insignificance.

AGRICULTURE. This industry, which has always been the principal source of subsistence for the people of India, is increasing in importance under British control, as improved means of production and transportation enable foreign manufacturers to deprive native artisans of their occupation, forcing them back to dependence on the cultivation of the soil. The land of India, though varying in composition, is generally fertile and is very productive, being aided by the tropical climate. The country is kept in continuous danger, however, of crop failure and consequent famine by the general uncertainty of rainfall. Practically the only districts exempt are the southwestern Malabar Coast, the Deltaic district of the Ganges, Brahmaputra, and Burma. (See paragraph above on CLIMATE.) In some regions, as in the lower Ganges Valley, the precipitation is ordinarily quite heavy, rarely failing to meet the needs.

IRRIGATION. From remote times the inhabitants of India have sought, by means of artificial water-supply, to protect themselves against the calamities of drought. Under British control the irrigation works have been enlarged and new ones constructed on an enormous scale. In 1900 there were 31,544,000 acres, one-seventh of the total crop area, under irrigation. This was over four times the area irrigated in the United States, which ranks next to India in this respect. The area actually irrigated varies with the lack of rainfall from year to year, and the commercial value of irrigation schemes varies in different sections. In Sindh and Lower Punjab irrigation is necessary every year. In the valley of the Indus the necessity for irrigation decreases with the distance from the Himalayas, but the system is used as a protection against drought years, and to supplement the rainfall of average years. This is true also of the Upper Ganges region. In the Lower Ganges valley, as indicated above, irrigation becomes less and less necessary toward the Deltaic region, in portions of which the danger of drought gives place to that of inundation. In Madras (except the west coast) and the Deccan or Central India region, irrigation is a practical necessity as a protection against frequent droughts, and to supplement the usual rainfall. On the east coast of Madras, especially where 'wet crops' principally are grown, irrigation is an absolute necessity. In Orissa and Upper Bengal, though the ordinary rainfall is quite adequate and droughts seldom occur, the Government has constructed irrigation works as a safeguard against dry periods. These works are considered indirectly profitable to the Government, however, since they obviate the loss of land revenue and the expense of supplying a famine-stricken district with food during a drought year. The Orissa and some of the other canals are also valuable for navigation.

The sources and methods of irrigation vary throughout the country. Before the British occupation wells were used chiefly, and have continued to increase in absolute, though not in relative, importance, because, where practicable, they constitute the cheapest method. They are generally employed by private enterprise, and are still the largest source of irrigation in the United Provinces of Agra, Oudh, and Gujarat. Reservoirs, generally called tanks, have been used since ancient times to furnish water for irrigation, and are especially adaptable to broken, hilly regions, where the construction of a long system of canals is impracticable. They are found

chiefly in the eastern portion of Madras, where they vary in size, according to the supply of water and the irrigable area which they command. In many instances they are dry during a part of the year, and crops are sometimes raised in them. This tank system is also carried on by private enterprise. But since India has been in the hands of the British the greatest progress in irrigation has been accomplished through the extension of the canal system.

This method also was used in ancient times, but some of the more important systems had fallen into disuse when the British took possession. Their construction requires heavy outlays of capital, and presupposes a stable form of government. The numerous legal complications which rise out of such an undertaking, and the relation of the Government to the land, together with the necessity of constructing certain systems having no remunerative financial value, have all led the British Government to take the system almost wholly in its own hands. The execution of this method requires a fairly level area. The methods used for the application vary in different localities. In the Madras Deltas, dams are constructed across the rivers at their entrance to the Delta region, and since their beds are almost on a level with the surface of the land, water is easily diverted into artificial channels. They yield their main supply during the annual flood period, and the region dependent upon them is therefore limited to one crop. In the Lower Punjab and Sindh the channel of the Indus River lies so far below the surface of the riparian country that its waters cannot easily be diverted by dams. Through the high banks deep cuts are made, and 'inundation canals' are constructed, which convey the water of the river during the flood period. By this means the land is watered sufficiently to produce one crop a year. The valleys of the Upper Ganges and Upper Indus are also too deep and broad to admit of damming, nor would the inundation system of the Lower Indus answer the purpose. Some of the crops commonly raised, and which require irrigation, grow in those seasons during which the rivers are at their lowest. For their irrigation, canals are dug so as to strike the rivers where they emerge from the mountains. The channels conduct the water along the water-shed of the plains, finally reuniting with the main streams. Some of these canals are notable both for their great length and capacity. Many of them are remarkable feats of engineering, owing to the difficulties surmounted in their construction, such as the crossing of other streams. Among the most famous of these are the Ganges Canal (q.v.), the Bari Doab Canal, which waters a large district to the northeast of Lahore, and the Western Jumna Canal, generally considered the oldest in India, which waters the region between the Sutlej and Jumna rivers, tributaries, respectively, of the Indus and Ganges rivers.

The following table shows the area in the different provinces irrigated during the years 1899-1900, the relative importance of the different sources of irrigation, and the proportion of irrigated land to the total crop area. It will be seen that the Punjab is the most, and Assam the least, dependent upon irrigation:

AREA IN ACRES UNDER IRRIGATION IN 1899–1900

ADMINISTRATIONS	Total area under crops	Area irrigated					
		By canals		By tanks	By wells	Other sources	Total area irrigated
		Government	Private				
Bengal	65,708,800	754,577	.....	.....	.....	.....	754,577
United Provinces of Agra	30,189,651	1,981,373	5,692	1,215,683	4,478,507	553,595	8,234,850
Oudh	11,413,508	.....	.....	976,394	1,643,178	80,453	2,700,025
Punjab	20,738,687	4,243,524	823,729	20,049	4,154,598	134,083	9,375,983
Lower Burma	6,665,639	310	1,325	.....	.....	3,434	5,069
Upper Burma	3,419,703	252,161	307,198	129,864	7,211	102,587	799,021
Central Provinces	17,043,937	.....	810	176,187	64,188	14,079	255,264
Assam	5,321,818						
Ajmere-Merwara	394,844	.....	.....	7,228	43,776	116	51,120
Coorg	202,541	1,370	.....	.....	.....	.....	1,370
Madras	27,785,796	2,648,160	26,289	1,832,527	1,129,804	146,986	5,783,766
Bombay and Sindh	27,975,223	2,452,262	145,608	30,443	698,794	188,563	3,515,670
Berar	6,787,318	.....	72	.....	66,838	107	67,017
Pargana Manpur	6,868	.....	.....	.....	324	.....	324
Total	223,654,333	12,333,737	1,310,723	4,388,375	12,287,218	1,224,003	31,544,056

CROPS. In 1899-1900 the area actually cropped was 180,150,454 acres, and the current fallow 57,165,960 acres. The estimated area of the cultivable waste for the same year was 106,404,704 acres, besides which there were 135,506,014 acres not available for culture, and 65,843,924 acres under forest. The crop statistics for the year mentioned are given in the table on the next page.

The kind of crops grown is determined largely by the amount of the water-supply. In regions where the rainfall is excessive, or an abundant supply is readily obtainable, rice is almost the only crop. It is therefore confined largely to the Deltaic regions, and especially to the Bengal Delta. Here the annual overflow of the rivers makes irrigation easy. From the table below will be seen the great importance of rice in Bengal, Lower Burma, and Assam. The consumption of rice is not nearly so universal in India as is popularly supposed. It is not the cheapest food, and in many regions only the wealthy classes can afford it, while even in Bengal there are great numbers of the lowest classes who use but little. Sir William Hunter estimates that it is the staple food of less than one-third the total population of India. The main crop is reaped in the early winter—November to January—but in Bengal there is also a summer crop. Throughout the dry, non-irrigated portions of India millet is the commonest food crop, and is the largest item in the food of the lower classes over the greater part of the country, being most used in the southern districts. Practically the

CROPS, IN ACRES UNDER CULTIVATION IN 1899–1900 (ADD 000).

ADMINISTRATIONS	Rice	Wheat	Millets Jawar Bajra & Ragi	Other food grains, including pulse	Other food crops	Sugar-cane	Opium	Coffee	Tea	Cotton	Other fibres	Oil seeds	Indigo	Tobacco	Miscellaneous	Total area under crops	Area cropped more than once	Net area dealt with according to survey
Bengal	39,656	1,541	1,130	9,405	2,518	873	231	...	132	144	162	3,643	452	587	1,419	63,871	10,618	97,481
U. Provs. of Agra	4,592	4,601	3,506	11,443	393	1,023	220	...	8	968	69	516	212	38	767	28,864	4,461	50,874
Oudh	2,899	1,619	607	5,049	104	235	183	...	...	28	16	152	18	10	65	11,052	2,427	15,337
Punjab	482	5,488	1,259	3,844	595	361	4	...	10	735	30	493	74	67	1,647	14,993	2,017	65,811
Lower Burma	6,277	...	...	56	426	9	...	...	...	9	...	30	...	32	14	6,858	...	53,476
Upper Burma	1,818	15	804	337	132	2	...	...	1	153	...	527	1	38	124	3,958	260	47,849
Central Provinces	4,708	1,633	2,043	3,743	207	25	...	...	...	712	42	1,570	...	5	232	14,926	164	49,153
Assam	3,653	...	...	89	502	28	...	...	331	3	3	263	...	4	137	5,117	565	16,403
Ajmere-Merwara	...	...	93	104	2	...	...	...	...	35	...	8	...	...	2	248	17	910
Coorg	...	...	18	...	...	...	...	72	...	...	...	...	...	...	13	200	...	1,012
Madras	6,429	20	8,530	5,714	1,107	58	...	59	9	1,382	21	1,516	276	82	576	25,796	2,674	61,661
Bombay and Sindh	2,149	1,159	12,483	2,660	308	73	...	...	...	2,041	49	1,441	10	41	76	22,594	535	73,514
Berar	44	21	2,762	270	65	2	...	...	...	2,061	8	162	...	4	3	5,405	1	11,332
Pargana Manpur	...	1	2	2	...	...	...	...	...	...	...	600	...	...	...	6	...	38
Total*	72,809	16,104	33,243	42,721	6,426	2,693	640	132	493	8,375	404	10,327	1,046	915	4,981	203,895	23,745	544,858

* Jute and cinchona included in totals.

whole crop is used for domestic consumption, whereas rice is exported in large quantities. The planting and harvesting periods vary with different sections; in some regions two crops are raised, and in others, especially in the northwest, but one crop is produced, the rainfall being the controlling factor. The acreage shown in the table is somewhat less than the average for the decade.

After rice and millet pulse is the most important food product. In the United Provinces of Agra and Oudh it constitutes the largest crop. The figures in the table under the heading "Other food grains, including pulse," include gram, maize, and barley; the average each for the decade being approximately ten, five and one-half, and six million acres respectively.

Wheat is confined largely to the northwestern part of India, being the chief crop in the Punjab. It is a very important factor in the agriculture of the United Provinces of Agra and Oudh, and is produced to a less extent in the Central Provinces and Sindh. While there was formerly much apprehension in the United States that the wheat crop of India would drive that of the former from the world market, recent developments have not justified such fears, since the increase in area devoted to wheat in India was much less in the last fifteen years of the nineteenth century than in the preceding fifteen-year period. The wheat-producing area varies widely from year to year, the figures given in the table being over six million acres less than those for 1895. The average for the decade was a little less than 20,000,000 acres, about half of which is subject to irrigation. The average yield per acre varies with climatic conditions—in the Punjab it is about 13 bushels. The harvest occurs during April and May. Potatoes and other root crops are grown successfully, but they are not as favorite a food in India as in European countries. A large variety of tropical or semi-tropical fruits are grown for local consumption. The cocoanut is the most important export from the southwest coast. There are several kinds of dates having a local and commercial importance. Throughout India the raising of oil-seeds receives much attention, an average of about 12,000,000 acres being devoted to their cultivation. The product has been long an important item in local consumption, and in the last half of the nineteenth century large quantities were exported to Europe—the foreign demand giving an increased impetus to its cultivation.

Sugar-cane is grown in most provinces, but only in the United Provinces of Agra and Oudh and Bengal is it important. The crop requires irrigation and cultivation on a capitalistic scale, which tends to limit the development of the industry. The product has also to compete with the bounty-fed sugars from Austria-Hungary and other European countries, and although contravening duties are placed upon imports from these countries, they failed to prevent their importation. But the local product supplies much the greater part of the home consumption. In Southern India coffee is raised in Coorg, and southward in Madras. The industry enjoyed a period of development following 1860, but during recent years it has remained stationary. The culture of tea and that of opium owe their development to the fostering efforts of the Government. Tea culture was introduced about the middle of the nineteenth century, and has continued to increase to the present time. Requiring an abundance of water, it is best adapted to Assam and Lower Bengal, and is largely confined to these two regions, being grown for foreign markets rather than home consumption.

Opium is a Government monopoly, and its growth is restricted to certain regions, principally Behar, the country around Benares, and

Oudh. The poppy-plant, from which the opium is obtained, requires irrigation and careful attention. Most of the product is exported to China and the Straits Settlements. The area devoted to its culture does not vary greatly and increases slowly. Some tobacco is grown in most parts of the country for local consumption. About half of the total product is grown in Bengal, and part of it is exported. The tobacco is generally inferior to that grown in other countries, and therefore does not compete seriously in the European market. Indigo has ceased to hold its own, even in absolute importance. The acreage for 1900 was one-third less than that for 1895. The industry has suffered from competition with various substitutes, and with the product grown in Java. Bengal (particularly Behar), the United Provinces of Agra, and Madras lead in its production. Spices are raised and exported, but are of minor importance. The last half-century has witnessed a remarkable increase in the production of fibrous plants—cotton and jute.

Cotton had long been raised, but had not been drawn upon to supply the foreign market to any great extent until the Civil War in America stopped the supply from there. A reaction soon followed its rapid and extensive development, and though it subsequently increased again, it never regained the position held in the early seventies. During the last decade of the nineteenth century the area cultivated averaged about 9,000,000 acres. Cotton cultivation is not confined to any distinct region, but is relatively most important about the centre of the peninsula in Berar. The soil of this and the surrounding country is called the 'black cotton soil,' and is noted for the remarkable extent to which it holds moisture. The cotton is a short-staple grade, and therefore inferior to the American and Egyptian products. The production of jute is more restricted in extent, the plant growing best in the flooded lands along the Lower Ganges and Brahmaputra in Eastern Bengal. The average annual acreage for the last decade of the nineteenth century was over 2,000,000 acres. Like cotton, the product is largely exported, though there is not so large a per cent. of it that is exported in the raw state. A considerable part of the product is shipped to the United States. Silk culture is an important industry in the Punjab, Assam, and Lower Bengal.

The methods of cultivating crops in India are such as have prevailed for centuries. The natives show little inclination to take suggestions from the British. The efforts of the latter to accomplish results by means of experimental farms and the holding of fairs have not generally been successful. If better methods or superior kinds of seed, intended to secure greater results, are urged upon the farmer, he suspects the ulterior motive to be that of raising rents; nor is he very willing to show his stock at fairs unless he can secure a reward even if unmerited. But it is claimed that the native has adapted himself to the soil, and understands it better perhaps than his foreign instructors. If he does not plow deep the soil is such that it does not require it. The principle of the rotation of crops is known, though not widely practiced. Manures are utilized, but the necessity of using them as fuel in many places greatly limits their supply available for fertilizing.

Stock-raising. The above table of cultivated crops does not embrace fodder crops. These, however, are not important, as other Government tables show, a fact which suggests the unimportance of the stock-raising industry. During the decade ending with 1900 the area of the fodder crops varied from less than 2,000,000 to nearly 3,000,000 acres, showing some tendency to increase during the decade. A number of conditions are responsible for the undeveloped and unsatisfactory state of stock-raising. As is common in a tropical climate, the people are given almost wholly to a vegetable diet. Religious or caste prejudices prevent the greater portion of the Hindus from eating beef or pork. The period preceding the annual rains is characterized over a large portion of the country by a scarcity of both water and pasturage, and stock are generally reduced almost to starvation. This tends to make the breeds deteriorate. The disregard of proper methods in breeding has a similar influence. The grade of stock, therefore, is generally very inferior. Over the greater portion of British India cattle serve the same purpose that horses do in most countries. The breed of cattle is one that is unknown in this country, being of the humped variety. Buffaloes are also used as work-animals throughout almost all India. They are somewhat hardier than cattle and thrive in districts climatically unfavorable to the latter. Mules and donkeys are about equal in number to horses and ponies, the former being raised in the largest numbers in the Punjab and the latter in the United Provinces of Agra.

In the dry regions of the Lower Punjab and Sindh camels are the principal domesticated ani-

Live Stock in 1899–1900

Provinces	Cows, bulls and bullocks	Buffaloes	Young stock: calves and buffalo calves	Horses and ponies	Mules and donkeys	Sheep and goats	Camels
Bengal	2,076,500	431,600	246,200	35,900	12,700	616,400	30
United Provinces of Agra	11,613,400	2,979,200	6,408,300	434,400	262,700	4,943,300	11,300
Oudh	5,214,400	1,085,500	2,427,800	181,000	50,200	2,050,200	2,100
Punjab	8,197,700	2,495,200	3,712,600	312,700	612,300	9,901,900	271,000
Lower Burma	893,400	508,200	594,000	12,100	.....	41,100	
Upper Burma	1,385,200	208,500	638,700	23,200	2,600	38,600	
Central Provinces	5,356,200	865,900	1,886,200	94,500	17,000	961,000	250
Assam	2,109,200	213,600	1,390,300	9,900	133	412,700	
Ajmere-Merwara	124,600	23,800	21,000	24,000	5,000	280,200	1,700
Coorg	61,300	19,621	19,100	400	300	2,400	
Madras	8,264,700	2,406,700	4,385,600	40,200	120,100	13,415,900	11
Bombay and Sindh	4,479,900	1,062,800	1,902,900	167,100	135,600	4,261,900	129,300
Berar	1,323,100	249,700	249,500	29,600	20,400	500,900	280
Pargana-Manpur	4,000	750	1,400	83	23	400	
Total	51,103,600	12,551,100	23,883,600	1,365,083	1,239,556	37,426,900	415,971

mals. In a few localities elephants are of great value in performing certain kinds of work, but their number and use are much more limited than is popularly supposed. The grazing industry is best represented in the raising of sheep and goats. These animals are valued chiefly for their wool. Some pigs are raised, but their number is not recorded in the Government reports. The preceding table shows the number of domestic animals by provinces for the year 1899-1900. Compared with the figures of a decade earlier a slight increase is found for almost every variety in most of the provinces.

FAMINES. From the earliest historical times India has suffered often and terribly from famines. There is much disagreement, however, in the matter of locating the responsibility among the different factors which have been held accountable for them. While famines are, of course, always preceded by local crop failure, almost every community is said to produce enough in ordinary times to bridge over the occasional period of scarcity, and it would appear that there has never been a year when the whole country did not produce enough food for all its inhabitants. Since crop failure always is at least the local cause of these awful experiences, it is worthy of first consideration. The general cause of crop failure is in the first instance a lack of sufficient moisture for the growing crops, though the period of insufficient crops may be extended because of the want of seed for a new crop, or of animals to till the soil. In limited districts floods sometimes destroy the crops, but the construction of embankments and canals has greatly lessened their destructiveness. In former years, under a less stable form of government, wars were not infrequent, and a shortage of crops and resultant famine ensued. But this factor has been much less conspicuous since the British control. In the paragraph above on climate will be found described the important natural elements which determine the distribution of moisture in India. It is only necessary here to note that there are districts in which the rainfall is always heavy—the chief of these being the region south of Bombay, the Deltaic region of the Ganges-Brahmaputra in the northeast, and Assam. There are other regions in which the rainfall is always very light, the largest being in Sindh and Rajputana. Throughout the remainder and most extensive portion of India the rainfall is subject to more or less uncertainty. In some portions, as in Upper Bengal and in Orissa, the fall is ordinarily heavy. In other regions, i.e. the upper valleys of the Ganges and Indus rivers, and throughout the Deccan and southeast coast—the precipitation is less constant, and failures of crops more frequent. The more densely populated districts, where the rainfall is abundant, are always ill prepared to meet a crop failure, and consequently suffer terribly when it comes. By means of irrigation works (see *Irrigation*) the extent of crop failure, however, has been greatly lessened over many parts of the country, especially where the rainfall is most uncertain and inadequate. Under British administration such works have even been extended into districts where the rainfall is usually sufficient. Irrigation itself sometimes fails, as in Madras, where the precipitation may not be great enough to supply the reservoirs or keep the streams full enough to supply the irrigation canals. Naturally the extent of the area affected by drought and the intensity of the distress and the frequency of occurrence vary greatly. The area may represent a third or more of the total population. The failure of a single season seldom, if ever, brings distress. It is when the second or sometimes the third failure occurs that relief is necessary.

It has been maintained that the destruction of the forests, which has been especially great in recent years, is not a little responsible for the droughts. A policy of reforestation therefore has been advocated, and steps have been taken to preserve the remaining forest areas. The fact that in districts adjacent to those where a famine may prevail a surplus of food crops is usually found, but cannot be transported owing to lack of facilities, has led the Government to construct railways, which would help greatly to solve the famine problem. The beneficial results, however, have been much disputed. The lack of rolling stock, for instance, has sometimes prevented the timely delivery of famine stores. A more serious accusation is that by bringing a district visited by famine in communication with the world's markets the district is annually drained of the surplus food which would otherwise remain in store for a year of scarcity. The main portion of the wheat crop of the Northwest is exported to Europe, though the natives may die of want before another crop is harvested. This criticism is part of a more general charge against the influence of the British Administration. The native, deprived of his manufacturing industries (see MANUFACTURES in this article), and forced to purchase foreign products, as well as being obliged to pay a land tax which many claim is overburdensome, finds it impossible to retain any considerable portion of his produce. On the other hand, it is claimed that the native burdens himself with unnecessary debt; that he lacks thrift and is improvident. Before the British came it was more or less common for both private and public stores of grain to be kept from year to year; the latter were even required by law to be so kept. Latterly, however, the public stores, and to a large extent the private granaries, have disappeared.

The work of mitigating distress from famines has accordingly come to constitute a large part of the work of the British Government in India. Elaborate preliminary preparations are made in fear of their recurrence. The work is carefully systematized and officered. The country is districted, and in each district an examination is made of such matters as the water-supply, the social condition of the people, the probable extent of need in case of famine, and public works. The budget makes annual provision against famines whether they actually prevail or not. In the relief extended the Government policy aims at preventing death and at benefiting the individual. Wages are better for the individual than doles. Accordingly, the able-bodied man is given employment on public works, for which he is paid in money. The amount paid is much less than the normal wage, but sufficient to keep him in working condition. Provisions are supplied by the merchant, and the Government railway makes every effort to facilitate their transportation. For those not able to work hospitals and orphanages are prepared.

The public works are generally such as are

considered of value in affording protection against a recurrence of famine. They are of two classes—those which facilitate transportation, and those which increase the water-supply. Special difficulty is always encountered in the administration of relief in any district, because there are not to be found local organizations whose purpose has been to deal with charitable problems, or individuals trained in the management of men and the superintendence of public works. Nor does the conscience of the native prove to be generally trustworthy. Public relief is not extended until the villagers begin to leave their homes and wander about the country in search of doles, usually toward a large centre of population, the profuse though indiscriminate village charity having been well-nigh exhausted. The people as a rule, especially the agriculturists, are very loath to abandon their homes. The mendicants and the day laborers are the first victims of distress and the first to quit the village. They are soon followed by artisans and agriculturists. The public works are usually many miles away, and the journey thither is likely to be exceptionally critical. At the public works the family unit is not destroyed. When all the members of the family are accustomed to labor outdoors at home they are fitted to work also on the public works. Artisans make or repair tools, weavers make clothing, and the assemblage becomes in many respects a normal community. When climatic conditions are again favorable the farmers especially are eager to return to their lands. And then the final, and ofttimes the most necessary, mission of the Government is to see that they are provided with seed, with cattle, and the necessaries for producing a crop.

The loss of life from starvation is sometimes considerable, but deaths from diseases which so frequently accompany the famine are generally greater. One of the most difficult tasks of the Government during the famine period is to enforce necessary sanitary regulations. However, taking one year with another for the whole country, the loss of life from famines constitutes but a small per cent. of the total death-rate. Their influence in reducing the population is greatly augmented through the very decided decrease in the birth-rate during the famine period. (See POPULATION, below.) The ravages of disease in India are not peculiar alone to famine periods. The climatic and sanitary conditions give rise to pestilences which at intervals carry desolation over the country. Hospitals, richly endowed and admirably regulated, supported by Government as well as by private munificence, exist in all the large towns; and great efforts are constantly made to bring the benefits of medical skill and knowledge within reach of the poorer classes. In all parts of the country dispensaries have been opened where medicines are given out and patients advised. Disease in India is not a little due to bad water and bad drainage. Where a new water-supply has been introduced, and drains have been made, as in Calcutta, the improvement in the health of the inhabitants has been marked. Several millions of persons are vaccinated annually in India. Mortality is aggravated by the passion of the people for pilgrimages. All ages and both sexes each year traverse vast areas for their devotions, and die by hundreds on the route. The Mohammedan pilgrims go in numbers to Mecca, Kerbela, and Jerusalem, and a large proportion never return. The effort of the English to enforce sanitary regulations naturally meets with serious difficulties which grow out of the prejudices and customs of the people. Visits of the sanitary officers to the dwellings of the Mohammedans, as is sometimes necessary during the prevalence of a plague, occasion much complaint on the part of the natives.

MANUFACTURES. For centuries India has been noted for its beautiful fabrics and metal-work, made chiefly in the houses of the natives. They formerly constituted a large proportion of the exports of the country, and competed even with English goods until prohibitory laws were passed by Parliament to protect the British industry. Some Indian products, on account of the exquisiteness of the workmanship, occupy a class of their own, and have not been supplanted. But most native Indian industries are of a primitive type, and in a society so thoroughly impervious to the spirit of progress their modification and improvement have been impossible. Consequently the development of the factory system in England made it possible to manufacture products much more cheaply than could be done by the laborious methods of Indian workmen. In addition, recent improvements in transportation facilities have enabled European manufacturing centres to command a large part of the Indian market, with the result that in the home market in some localities, and in some outside markets, the Indian products have been almost entirely supplanted. The enormous growth of the imports of cotton manufactures is suggestive of the extent to which the native industry has been supplanted. For a further account of these movements, see paragraph on COMMERCE.

Large numbers of native workmen have thus been either thrown out of employment or forced to make a change of occupation, which was discountenanced by the prevailing social order. This has resulted in widespread poverty among the laboring classes and given occasion for one of the most serious charges against the alien administration. The National Indian Congress (see GOVERNMENT) has voiced the prevailing sentiment in numerous resolutions demanding a high tariff on imported manufactures in order to protect the home industry. Another emphatic demand is that the educational system of the country be altered so as to place more emphasis upon industrial training in order that rising generations may be better prepared to assist in the introduction of Western methods. (See EDUCATION, below.) Attempts to establish improved methods have generally depended upon foreign management and untrained native labor, besides having to contend with obstacles growing out of differences of caste. Of disadvantages growing out of a lack of material resources, the great want of fuel and the inferior quality of the coal are the most serious. Under these conditions the progress of improved methods of manufacturing is slow.

The most important manufacture is that of the coarser grades of cotton. The average number of hands employed in the cotton-mills increased gradually from 53,624 in 1883 to 112,000 in 1890 and 163,000 in 1900, while the number of mills increased from 62 in 1883 to 186 in 1900. About three-fourths of this industry centres in the city of Bombay. A similar increase was observed in the jute and hemp industry, which in

1900 employed 101,600 hands, as against 42,797 in 1883. It centres in the region about Calcutta. Among the other more important establishments are woolen, paper, flour, rice, oil, and lumber mills, the breweries, coffee-works and indigo and sugar factories. The total number of factories inspected under the Factories Act in 1899 was 1110, employing 360,000 men, 65,300 women, and 27,400 children. The provinces of Bombay and Madras each employed over a third of the total force. Among other manufactured Indian products are silk (including beautiful figured stuffs), various articles of luxury, such as highly wrought work in ivory, gold, silver, copper, and brass, cashmere shawls, etc. In weaving and in carving and inlaying wood and ivory, the native artisans are unsurpassed.

TRANSPORTATION AND COMMUNICATION. The network of railways to be seen on a map of India presents a decided contrast with the sparsity of railway lines in other parts of Asia. The mileage for British India is three-fifths the total for all Asia. The development of the railway system was prompted by a number of motives, and has been prolific and far-reaching in results. The military exigencies, development of the resources of the country, extension of British trade, and humanitarian sentiments or the desire to lessen the horrors of famine have each played varying parts in determining the location of lines and methods of administration. The results show that each of these efforts has been abundantly justified. Closely allied with the influence of the railway system as an economic factor has been its socializing influence—the beginning of the transformation of the native society, a lessening of the rigors of caste, and at least a portend of a reconstructed civilization along more modern and progressive lines.

Railway development in India has been in the main in harmony with a policy laid down as early as 1850 by Lord Dalhousie. This policy comprehended the construction throughout India of a system of grand trunk lines with a uniform gauge, connecting all the large centres of industry and population, and the construction of subsidiary or feeding lines with a narrower gauge and on a less expensive scale. The grand trunk lines were accordingly begun in the early fifties under a system of Government guarantee. The constructing companies were guaranteed 5 per cent. on the capital invested for a period of twenty-five years, and at the end of the contract period the Government had the right under specified conditions to take possession of the lines. The policy attracted capital to the country, and led to a more rapid railway construction than would have been secured by State construction. The guarantee, however, led to some extravagance in expenditure and became a heavy burden to the Government. A new policy accordingly was taken by the Government in 1863-64, under which assistance was advanced to new lines, which in turn obligated themselves to perform certain duties for the State.

A third policy was introduced in 1870 under which new lines were built and operated directly by the Government. The widespread and disastrous famines a few years later made it evident that new lines should be constructed faster than the Government could assume financial responsibility for their undertaking, and forced it to fall back upon private enterprise. New lines were built without regard to a uniform policy, the Government generally extending a guarantee, but for as brief a period as possible. Meanwhile the contract period of four companies had terminated, and new contracts were made for another twenty-five years, according to which the State, allowing certain concessions, was to share in the surplus income above 5 per cent. But subsequently, at the expiration of other contracts, the lines have been acquired by the State. Though no settled system has yet been adopted for the administration of railways, it will be seen that the greatest mileage is included in the lines belonging to the Government, but controlled by private companies. In 1900 a little less than half of the total mileage, or 11,654 miles, was represented by Government lines operated by companies; 1560 miles were owned by native States and operated by companies; 5884 miles represented State lines operated by the State; 1157 miles were owned and operated by the native States; 2663 miles were owned and operated by guaranteed companies; 1519 miles were owned and operated by assisted companies; 157 miles owned by the native States were operated by State Railway Agency; and there were 74 miles of foreign lines. The total mileage increased from 16,380 in 1890 to 24,668 in 1900. The total capital expended on Indian railways to the end of 1900 amounted to Rx. 332,751,083. Many of the lines net a large profit to the State, but these are more than counterbalanced by the more strictly military or famine-protecting roads, which result in an annual burden to the taxpayers of India, the amount fluctuating widely, but usually exceeding £1,000,000.

The number of post-offices in 1900 was 10,823, which was an increase of 29 per cent. during the last decade of the nineteenth century. The number of letters handled during the same period increased 60 per cent. The Imperial system of telegraph and the railway system have been united, and there is a uniformity of telegraph charges throughout the whole system, including 52,900 miles of line and 170,760 miles of wire (1900). The mileage of wire increased 50 per cent. in the last decade of the nineteenth century. There are three grades of messages—the urgent, ordinary, and deferred. The charges are less for the messages delivered with the less speed. For a period of ten years ending in 1899 the Government realized an annual average of 4.8 per cent. net revenue (based on the capital sum employed) after allowing for all working expenses.

COMMERCE. From the earliest periods of history India has held high rank in the trade of the world, having been a large producer of commodities that were highly prized in general commerce. The attempts of Portugal, Holland, and France to secure the largest share of India's trade form an important chapter not only of its own history, but of that of the world. The desire to find a short route thither by sea furnished much of the impetus given to the spirit of exploration during the fifteenth century, of which the achievement of Vasco da Gama (q.v.) affords a conspicuous example.

In 1600 an English trading company, the East India Company (q.v.), joined in the rivalry, and opened the way for the extension of English influence and power over the whole country. For over two centuries trade between England and India increased slowly. After the Eng-

lish East India Company was deprived of its monopoly in 1834 there began an epoch of rapid trade development. The abolition of the inland duties, the assumption of control by the English Government, the construction of the Suez Canal, and the improvement of inland transportation have been most influential factors in accelerating this trade movement. The magnitude of the increase since 1834, in which year the total foreign exports by sea were less than £10,000,000, is shown *pro tanto* by the following table:

VALUE OF FOREIGN IMPORTS AND EXPORTS BY SEA, EXCLUDING GOVERNMENT STORES AND TREASURES

	Imports			Exports		
	Merchandise	Treasure	Total	Merchandise	Treasure	Total
1869–1870	£32,879,000	£13,954,000	£46,834,000	£52,471,000	£1,025,000	£53,496,000
1889–1890	Rx. 66,560,000	Rx.17.459,000	Rx.84,019,000	Rx.103,396,000	Rx.1,841,000	Rx.105,238,000
1899–1900	£47,141,000	£13,972,000	£61,113,000	£72,650,000	£5,300,000	£77,950,000

The rate of increase has declined somewhat during the last decade. Since 1834, with few exceptions, the exports have annually exceeded the imports. A large proportion of the Indian foreign trade (about four-fifths of the imports and a little less than three-fifths of the exports) passes through the Suez Canal. Of this the greater share is with the United Kingdom. The figures for 1900 are: Imports via Suez Canal, £48,737,000, by other routes £12,376,000; exports via Suez Canal, £44,840,000, by other routes £33,110,000. The following table shows the amount of trade with other countries since 1869:

VALUE OF PRIVATE MERCHANDISE AND TREASURE TRANSPORTED TO AND FROM BRITISH INDIA BY SEA

COUNTRIES	Imports			Exports		
	1869–70	1889–90	1899–1900	1869–70	1889–90	1899–1900
		Tens of Rupees			Tens of Rupees	
EUROPE	£31,353,100	67,403,500	£48,085,300	£33,123,200	64,628,700	£37,774,900
United Kingdom	30,324,900	62,504,100	40,803,300	27,798,700	39,581,000	22,473,200
AFRICA	884,100	2,575,700	2,192,600	772,100	6,937,100	5,774,100
Egypt	** 48,500	269,000	419,200	** 1.128	3,900 500	3,589,600
AMERICA	105,200	1,919,400	846,500	1,629,200	4,705,600	6,297,300
United States	†† 201,400	1,917,800	828,000	1,506,900	3,768,700	5,079,633
ASIA	13,719,800	10,979,100	7,886,800	17,919,500	27,895,000	27,037,170
*China	6,868,800	4,715,600	1,678,100	12,501,400	13,965,400	9,682,000
AUSTRALASIA						
Australia, New Zealand, Tasmania	771,900	1,141,500	2,102,200	52,600	1,072,200	1,067 150

*Including Hong Kong and Treaty Ports. **1871–72.
†Western Hemisphere, not including West Indies. ††1875–76.

It will be noted in the above table that the preëminence of the United Kingdom in the trade with India is waning, particularly in the exports. They have been reduced to less than a third of the total exports, while the imports from Great Britain are almost two-thirds of the total imports. The increase in the exports from India has been largely in the exports to other Oriental countries. The United States is making significant gains in exports from India, but the amount of American products sent to India is still insignificant. The exports accredited to Egypt are probably intended largely for the Mediterranean trade. Among Continental European countries Germany, France, and Belgium are in the lead, the former being first in the amount of imports from India. In Asia the Straits Settlements and Ceylon have a large trade with India.

Two cities, Calcutta on the east and Bombay on the west, have the only good, large natural harbors on the coast, and about three-fourths of the entire trade passes through their ports; the former being more prominent in exports and the latter in imports. Adequate harbor facilities have been secured at great expense at Karachi, and it now serves as a port for the Indus Valley region. A harbor has only recently been completed at Madras and another at Rangoon—the port for the Irrawaddy Valley region.

The large increase in commerce during the last century has been accompanied by a radical change in the quality of the trade, and considered from this standpoint the increase has not meant a corresponding growth in the welfare of the country. A large proportion of the trade during the earlier period was in manufactured products, especially manufactures of metals and textiles. But the factories of Manchester and other foreign places have in a large measure supplanted the hand labor of India. Textiles, once an important export, now far exceed all other imports, and amount to over two-fifths of the total imports. The exports have become predominantly those of raw materials; the imports have become almost wholly manufactured products. As manufactured cotton leads in the imports, so raw cotton for a long time held first place among the exports. Cotton exportation received a great impetus during the Civil War in the United States, but it declined materially after the war, and has continued to do so ever since. Three or four other articles have surpassed it. Nearly all the cotton goods are imported from the United Kingdom, but that country receives only a small part of India's exports of raw cotton. The exports of India were formerly distributed among the European countries, but during the decade ending with 1900 the demand from Japan rapidly increased until it amounted to over half the total, or £3,730,000. The importation of cotton twist and yarn decreased one-half during the decade ending with 1900, and there was a corresponding increase in the exports of that article. These exports in 1900 amounted to £4,671,000, almost all going to China.

The other leading imported commodities, all having about equal rank, are hardware, machinery, iron, steel, and copper, mineral oil, railway plant and rolling stock, woolens, and sugar.

Great Britain has a practical monopoly for India in the supply of railway material and machinery, and it supplies also the larger part of other metal products, Belgium, of the other countries, sharing most extensively in the trade. Mineral oil is the principal import from the United States, but Russia now furnishes the bulk of this article. Among several exports of relatively great importance, rice—the only export upon which export duties are levied—is the most prominent and fluctuates the least, reaching an average value in recent years of about 13,000,000 tens of rupees. Most of the rice goes to Egypt, the United Kingdom, Ceylon, and the Straits Settlements. During the last quarter of a century there has been a great increase in the exports of oil seeds to Europe, averaging for the last decade nearly 11,000,000 tens of rupees. Exports of hides and skins, jute—raw and manufactured—and tea increased very rapidly during the decade ending with 1900, reaching in that year values of £6,975,000, £9,557,000, and £6,117,000 respectively. Raw hides and skins and jute cloth constitute the principal exports to the United States. The amount of each increased enormously during the decade and far exceeds that sent to any other country. Exports of manufactured jute increased 20 per cent. during the last decade of the nineteenth century. Nearly all the tea exported goes to the United Kingdom; it has not yet become a formidable competitor with the Chinese product for the United States markets.

Opium, which is exported to China and the Straits Settlements, is decreasing in amount, the total value for 1900 being £5,469,000. Exports of wheat fluctuate widely; the value for 1900, which was higher than the average for five years previously, was £2,606,000; the total for the last decade was much less than that for the preceding ten years. Most of the product goes to the United Kingdom. From 1890 to 1900, exports of indigo averaged about 4,000,000 tens of rupees annually, with a tendency latterly to decline. For more than two decades, ending with 1900, exports of coffee have varied from about 1,500,000 to 2,000,000 tens of rupees. Spices, which once were a large part of the exports, are now relatively insignificant. Treasure has long constituted one of the most valuable imports, and has annually exceeded in amount the exports of treasure for more than half a century. The value for the decade 1890-1900 averaged over 16,000,000 tens of rupees, over two-thirds of which was silver. Since the Government stopped the free coinage of rupees in 1893 the net imports of gold have been gaining upon those of silver. The exports of gold and silver for the same period averaged over 5,500,000 tens of rupees.

The imports and exports by land are not large, the totals for 1900 being respectively £4,700,000 and £3,759,000, which, however, constituted a considerable increase over the early years of the decade. Over half of the former and nearly half of the latter were to and from Nepal and Kashmir. The most important land imports were grain, pulse, timber, and provisions, while more than one-half the exports were cotton goods. Native craft carry on an extensive coastwise trade, particularly along the coast of Bombay. The traffic along this coast amounts to over one-third of the total coastwise trade. The large inland trade increases with the development of means of transportation. The inland and the local trade are very largely in the hands of natives, there being certain sects or castes, as the Parsis of Bombay, who devote themselves especially to this branch of industry.

The foreign trade of India is done mainly in British vessels, the tonnage of these in 1897-98 amounting to 89 per cent. of the total. This total was greater than that for the corresponding year of either of the two preceding decades. Germany and Austria-Hungary are the most important of the other nations represented.

GOVERNMENT. By an act of Parliament, which received the royal assent August 2, 1858, Queen Victoria was declared sovereign of India, and various regulations were enacted for the better government of the country. In 1877, in virtue of an act of Parliament, passed in 1876, the Queen was proclaimed Empress of India. The Home Government of India is vested in a Secretary of State, who is a member of the English Cabinet. He is assisted by an Under-Secretary and a council of fifteen members. The Indian Executive Government is administered by a Viceroy or Governor-General, appointed by the Crown, and acting under the control of the Secretary of State for India. The Viceroy's term of office is for six years, and he is assisted by a council of five ordinary members, three appointed by the Secretary of State, and two by his Majesty's warrant. Each of them has charge of a department of the executive. The Viceroy himself retains the oversight of foreign affairs, and can overrule a majority vote of his council. The commander-in-chief is an extraordinary member of the council. This council, whenever it acts as a legislative body, is enlarged. It then has from ten to sixteen additional members who are nominated by the Viceroy for terms of two years, half of them being non-officials. Five of these councilors must be individuals who have been recommended, one each respectively by the unofficial members of the councils of Madras, Bombay, Bengal, and the United Provinces of Agra, and one by the Calcutta Chamber of Commerce. Proposals to legislate upon subjects such as finance, religion, military and naval forces, or the relations of the Government with foreign princes or States, must first receive the sanction of the Governor-General.

For purposes of administration, British India is separated into a number of divisions or provinces. They differ in the method of their government. The two governments of Madras and Bombay are under the rule of Governors appointed by the Crown, and assisted by legislative and executive councils. The executive council consists of only two men. From eight to twenty others are added to form the legislative council. These bodies communicate only with regard to important matters with the Home Government through the Governor-General. As regards affairs of minor importance, they correspond directly with the Secretary of State for India. The Provinces of Bengal, the United Provinces of Agra and Oudh, the Punjab, and Burma are administered by Lieutenant-Governors appointed by the Governor-General, subject to the approbation of the Secretary of State for India. These officers act without the aid of any executive councils, but have legislative councils of not more than twenty members, nominated by the Lieutenant-Governor on the approval of the Gov-

ernor-General. There are a number of points upon which the local legislators in India cannot touch, and their proceedings are void if disapproved by the Governor or Lieutenant-Governor, the Governor-General, or by the Home Government. The following divisions, viz.: Assam, Central Provinces, Berar, Ajmere-Merwara, Coorg, British Baluchistan, the Andaman Islands, and the new Northwest Frontier Province, are under chief commissioners. There are no local councils for these provinces, such legislation as they may need being supplied by the Governor-General in legislative council. All the foregoing governmental divisions are subdivided into smaller divisions called districts, of which there are in all 250, varying both in size and population. The executive officer in each district is called the collector magistrate or deputy commissioner. This office is remarkable in that its powers extend over every department of administration. The officer has charge of the collecting of the revenue, of education, roads, sanitation, police, and jails, and he is judge both of first instance and of appeals.

It has been the policy of the British Government to try to awaken a sense of civic responsibility among the natives, and it has encouraged the creation of the necessary machinery for local self-government. Much difficulty has attended the effort, owing to the absolute dominance which class distinction holds over the social order, making almost impossible the development of the idea of a mutual community interest. Some progress, nevertheless, is being made. Every province of India has since 1860 secured laws which place the administration of municipal affairs in the hands of local bodies. In small places these bodies are nominated from among the townsfolk, but in large places they are mostly elected. Under specified regulations, the local bodies may raise funds or receive grants of public money for local purposes. In 1901 there were 764 of these municipal towns, containing an aggregate population of 16,500,000. The total income of these towns for the year mentioned was £4,828,288. The rural regions have also been supplied with district and local boards for purposes of self-government. In 1901 there were 1101 of these boards, including a total of 5553 elected members and 10,661 ex-official and nominated members. The income of these rural regions for the year mentioned was £2,509,829. The probability of the development of a national representative native government is scarcely conceivable. The idea of a common country or a national life does not exist. The masses are ignorant of even the geographical conception implied in the name India. There is, it is true, a national native Congress, which meets annually, but it is scarcely representative in any true sense or indicative of any popular national tendencies.

There are high courts of jurisdiction at Calcutta, Madras, Allahabad, and Bombay, appointments being made to them by the Home Government. These courts have a general oversight of the lower courts and are courts of appeal, but there is an ultimate appeal to the judicial committee of the Privy Council in England. The Punjab has a chief court, and the Central Provinces, Oudh, and Mysore have each a judicial commissioner. Burma has two judicial commissioners, as well as a recorder. The great majority of the magistrates in the courts of original jurisdiction and of the civil judges are natives. Europeans have certain privileges in court not possessed by natives.

FINANCE. In the consideration of Indian finance, regard must be given to the denomination in which the estimates are made. If estimated in pounds, as in the following table, there is an apparent decrease in most of the non-commercial items of revenue and expenditure. On the contrary, if estimated in rupees, most of them show a very decided increase. The depreciation in the value of the rupee, as measured in gold, accounts for this difference; but since the burden upon the taxpayer is determined by the local purchasing power of the rupee, the question of the effect upon the welfare of the native is a subject of dispute.

Leaving out of account the productive enterprises of the Government, which are largely self-supporting, it will be seen that customs and excise play a minor part in the support of the Government, while land revenue has contributed on an average considerably over a fourth of the total amount. The stamp, salt, and opium revenues also play a conspicuous part. The land revenue, however, is not absolutely nor relatively so important as formerly. This revenue partakes of the nature of a rent as well as of a tax. The rent varies with soil and the distance from the town, but averages about 1s. 10d. per acre for the total acreage of cultivated land. The opium revenues are secured mainly from the monopoly of the industry in Eastern India, and the export duty collected in Western India. An increase in the salt duties in 1888 established the present uniform rate of 2½ rupees per maund. The collections from stamps are principally obtained from court fee stamps. The largest item in the excise revenue is that collected from the manufacturer of spirits, but other sources, as, for instance, the monopolies for the sale of liquors and intoxicating drugs, help to swell the amount. The interests of British trade have determined the policy of keeping the import duties—especially those on cotton goods—at a minimum figure, though the natives have at the same time demanded tariff protection. The general customs duties of 5 per cent. existing prior to 1882 were abolished in that year, except those on salt, opium, wine, beer, spirits, and arms. In 1894 a 5 per cent. ad valorem was reimposed, except on machinery and a few other articles; but two years later the duty on woven cotton goods was reduced to 3½ per cent. ad valorem, and cotton yarn was exempted from duty. Since 1886 an income tax has been assessed upon incomes exceeding 500 rupees.

In the last two decades of the nineteenth century the budget yielded a surplus for twelve years of the period, and showed a deficit for eight years. The heaviest drain upon the Imperial Exchequer is made by the military charges. They are followed closely by the cost of the civil service. Both of these items, according to the consensus of native opinion, are unnecessarily burdensome upon the country. The army charges are irritating because the natives consider the army too large, and particularly because of the large proportion of British soldiers who monopolize most of the best positions, and whose salary and pensions are largely taken or sent out of the country. The Civil Service excites native criti-

cism because of the practical monopoly exercised by the English over the higher offices, and the excessive salaries attached to them. A few English officers receive an aggregate remuneration considerably greater than that given to the numerous native minor officials. The control of the opium, customs, post-office and telegraph, tributes, mint and currency, receipts and the expenditure under the heads of army and military works, political relations, public debt, and certain trunk railways, is retained by the Central Government. The management of all provincial revenues and some of the Imperial revenues is delegated to the local governments.

The following table gives a statement of the average annual expenditure for the two decades indicated and the year 1901:

DETAILS	1881–90	1891–1900	1901
Direct demand on revenue	£9,198,111	£6,797,206	£7,552,341
Interest	4,600,546	2,480,488	2,138,946
Salaries and expenses of civil service	12,277,556	9,916,049	10,971,622
Miscellaneous civil charges	4,597,045	4,441,431	3,987,370
Famine relief and insurance (excluding charges on account of protective railways)	931,379	1,141,481	4,156,344
Buildings and roads	5,279,111	3,862,520	4,068,721
Army services	19,484,591	15,585,835	15,082,799
Special defense works	275,255	152,685	6,864
Construction of railways (charged against Revenue in addition to that of Famine Insurance)	199,942	41,373	
Post-office, telegraph, and mint	2,126,871	1,736,072	5,157,660
Railway revenue account	14,953,786	14,487,566	17,968,505
Irrigation	2,380,082	2,025,011	2,320,327

The total average in round numbers for each decade is, respectively, £76,300,000 and £62,600,000. The total for 1901 is £73,400,000.

The following table shows the average annual revenues for each of the three decades indicated and for the year 1901:

DETAILS	1871–80	1881–90	1891–1900	1901
Land revenue	£21,100,759	£22,496,636	£16,869,344	£17,503,031
Opium	8,936,068	9,176,138	4,591,820	5,102,242
Salt	6,383,315	6,885,891	5,764,241	5,967,034
Stamps	2,802,489	3,643,720	3,063,493	3,342,948
Excise	2,463,086	4,088,094	3,638,876	3,937,202
Customs	2,558,202	1,504,890	2,283,491	3,371,597
Interest	520,793	792,203	608,327	651,479
Receipts by civil departments	981,740	1,468,413	1,115,376	1,243,076
Miscellaneous	457,045	1,076,186	525,298	529,492
Building and roads	.....	605,741	447,953	458,470
Receipts by military departments	.....	1,762,080	603,187	817,274
Provincial rates	575,946	2,948,487	2,426,251	2,562,713
Assessed taxes	527,345	905,669	1,198,645	1,322,094
Forest	594,910	1,071,281	1,115,425	1,297,863
Tributes from native States	720,079	721,006	552,748	577,823
Registration	.....	300,133	284,843	312,558
Post-office, telegraph, and mint	1,278,055	1,911,061	1,951,095	5,425,847
Railways	2,519,049	12,997,363	13,922,181	18,293,629
Irrigation	552,189	1,677,791	1,838,804	2,555,919

The total average for the decade 1871-80 was £55,000,000; for 1881-90, £75,000,000; and for 1891-1900, £62,800,000. The total for the year 1901 was £75,200,000.

DEBT. The permanent debt of India gradually increased from £33,577,414 in 1842 to £51,327,958 in 1857, when it rapidly grew in consequence of the Indian mutiny, and stood in 1862 at £97,037,062, and gradually increased to £205,323,315 in 1901. Of this last amount, £76,887,936 was held in India and £128,435,379 in England. The greater part of the debt in India bears interest at the rate of 3½ per cent., and about one-half the debt in England bears interest at the same rate, the remainder paying interest at the rate of 3, 3¼, and 2½ per cent. Besides the above there were an unfunded debt in England of £5,000,000, and other obligations assumed in India for savings banks, departmental and judicial deposits, etc., which brought the total liabilities up to £223,843,244 in 1901. The total interest for that year, amounting to £7,436,973, was distributed as follows: Railways, £4,376,699; irrigation, £921,328; ordinary debt, £1,776,406; and other obligations, £362,540.

CURRENCY. In British India accounts are kept in rupees, annas, and pies—16 annas making one rupee, and 12 pies making one anna. Beginning with the early seventies the rupee was subject to great fluctuation in value, with a general downward tendency. The burden of taxation was greatly increased in consequence of the great fall in the value of silver, the Indian revenues being raised in silver, while the amount spent in Great Britain on account of India was paid in gold. This sum is disbursed in the payment of fixed charges, such as salaries and pensions of civil and military officers. The difference between the exchange value and the market value of the rupee became so great that the number of rupees raised by the Government had to be increased by one-half. The financial embarrassment thus caused led the Government in 1892, when the exchange value of the rupee sank to 1s. 1d., to consider a plan for the closing of the Indian mints to the coining of silver. In June, 1893, a law to this effect was passed, and the rate of 1s. 4d. for the rupee was established as the gold price of silver, provision being made that when the rupee rose to this value the mints should be reopened to the coinage of silver. The value of the rupee gradually rose, and, so far as the Government was concerned, the financial conditions greatly improved. But complaint was made that the native growers and the European planters in India were suffering severely from the change. It was argued that these classes

were obliged to pay labor on the old scale, in spite of the appreciation of the currency. Hence, while industrial expenses remained nominally the same, the employers received lower profits. Heavy losses fell also upon the natives, who as times grew hard were obliged to turn their hoards of silver into money. Finally, in the spring of 1898, a currency committee was appointed to investigate the monetary situation in India. This committee reported, in July, 1899, in favor of maintaining the gold standard, and making it more effective; and to this end a law was passed in September of the same year. Since 1899 the value of the silver rupee has been stable at the rate fixed—1s. 4d. (32.4 cents). The coinage of rupees, which for some years after 1893 almost ceased, became large in 1900-1901, and the profit on the coinage was set aside as a special gold reserve fund to be used in maintaining the rate of exchange between Great Britain and India. There is a comparatively small amount of paper money in circulation in India. It is legal tender within certain limited districts. The amount outstanding in March, 1898, was 298,659,000 rupees, about two-thirds of which was in the districts of Calcutta and Bombay.

According to the Indian money system, 100,000 rupees equal 1 lakh, and 100 lakhs equal 1 crore. Hence a sum that would be read in terms of rupees only, according to the English method, would, according to the Indian method, be differently punctuated and read in terms of both the larger and the smaller denominations. To illustrate: The sum 37884517000 rupees would in English read 37,884,517,000 rupees, but in the Indian notation it would be written 3,788,45,17,000 and read "Three thousand seven hundred eighty-eight crores, forty-five lakhs, seventeen thousand rupees." In Indian money estimates, sums are often given in tens of rupees, the abbreviation being Rx.

Civil Service. The administrative offices are largely filled through civil service appointments. Candidates taking the examination required to secure a position must be under twenty-four years of age. The successful candidate is then on probation for a year in England, during which period certain requirements are to be fulfilled, as, for instance, the learning of the Indian law. A pension is obtainable after twenty-five years of service. Advancement is secured partly by promotion and partly by seniority. After a probationary period of four years a selection may be made between the revenue and the judicial departments, the civilian remaining in the department selected throughout the remainder of his career in the service. There are about 1000 positions to be filled under the covenanted civil service of India. Inasmuch as the examinations are held in London, there are not many natives of India who are able to take them, and nearly all the highly paid positions still go to Englishmen. However, the minor administration, both administrative and judicial, is mostly filled by natives. It is estimated that 90 per cent. of the civil employees of India are natives.

Defense. The supremacy of the British sea power practically guarantees India from invasion by way of the sea, and the Himalaya Mountains perform a like service for a great part of the northern frontier. The main interest in the defense of India centres about the northwest frontier, which is the historic gateway for invasions into India. In the last two decades of the nineteenth century the British adopted a more active frontier policy. They have established outposts and fortifications commanding the mountain passes that communicate with the west and north and more securely defend the Trans-Indus region. The British have a post of observation at Chitral and possess an 'influence' at Gilgit which enables them to keep informed as to the Hindu-Kush passes. Farther south the Swat Valley is in the hands of the British. The important Khyber Pass (q.v.) is open, and the large garrison stationed at Peshawar serves to protect it. Continuing south, the Kuram and the Tochi valleys are controlled by the British, as are also the Gunal Pass and the Zhob Valley. Quetta has been made a strong defensive point, as has also Sakkar—the city on the Indus where the railroad crosses to the westward. A number of posts along the earlier frontier line farther east are still maintained; others have been abandoned. The scheme of defense has led to the construction of railroads for military purposes, one of which extends to New Chaman, the farthest outpost on the Afghan frontier. These lines now make it possible quickly and easily to transport the soldiers to the different frontier strongholds.

The threatening approach of the Russians to the Indian frontier has established an excuse for the British to maintain a large army. The experience of the Sepoy rebellion has led them to increase the proportion which the British troops hold to the total military force, the intention being that the latter shall constitute one-third of the total number, and that the artillery shall be almost wholly British. The native soldiers are drawn largely from a few tribes, such as the Sikhs, Gurkhas, Rajputs, and Jats, who are the warrior races of the country, and are much more efficient as soldiers than are the masses of the population. Class distinctions are recognized, and the different units in the army organization are composed of homogeneous elements. Through the improvement of sanitary conditions, and the exercise of greater caution in locating British soldiers, fatalities are of much less frequent occurrence than formerly. The native States still maintain military forces, but the British have succeeded in their effort to have their number reduced and brought more or less under their own control. For a statement concerning the organization and statistics of the army, see Armies.

Weights and Measures. The unit of weight commonly used is the maund, but it varies greatly in amount, being equivalent to 82⅔ pounds avoirdupois in Bengal, only about 28 pounds in Bombay, and 25 pounds in Madras. The tola, a small unit, is equivalent to 180 grains. In Bengal there is a unit of measure called the guz, equivalent to 36 inches. An act was passed in 1871 to establish a uniform decimal system of weights and measures, but it has never gone into operation.

Population. India is one of the most densely populated countries, containing between one-fifth and one-sixth of the estimated population of the world. In 1901 the number of inhabitants per square mile was 188, as against 283 (estimated) for China, and 25.6 (1900) for the United States. The population is most unevenly distributed, nearly two-fifths being found in the valley of the

Ganges. As shown in the table, the density is greatest in the Province of Bengal. In the Patna division of Bengal, an area of 23,686 square miles, the density is 653 per square mile. The density of the population corresponds in a general way to the capacity of the different regions to support life, yet there are noteworthy exceptions, as in Assam and Lower Burma, each of which could easily support a much more numerous population than it now does. In most districts the population presses closely upon the limits of the means of subsistence, and cannot increase greatly so long as agriculture continues to be almost the sole dependence. There has been generally an increase and in many places a very marked increase of population since the British took possession. Prior to that time numerous wars, together with famine, plague, and pestilence, tended to check augmentation. The instability of the Government discouraged industrial enterprise, and much land possible to cultivate was left waste. Under British protection such land has been largely reclaimed, and the productive capacity of the country greatly increased. So long as an area of cultivation was being extended the local population augmented. When the limits of culture were reached the population became overcrowded and finally reached a stationary point. In most instances the growth of the population depends almost wholly upon the natural increase in the district, immigration from remote localities playing a very minor part. The people dislike to leave their native locality, and particularly dislike to embark upon sea voyages. The most considerable movement has been that from Bengal into Assam. Another movement of some importance has been from Madras into Burma and Ceylon.

The first attempt of the British to secure a complete census was made in 1872, when the total population was estimated to be 240,931,000. The returns for certain regions were only estimated, and were generally rendered uncertain through the lack of confidence on the part of the natives in the purpose of the Government. In subsequent enumerations there have been greater confidence on the part of the people and a corresponding increase in the accuracy of the returns. The total population for 1891 was 287,314,671, and for 1901, 294,360,356. It should be remembered that certain additions of territory have augmented slightly this increase. The gain during the decade 1881-91 was 10.96 per cent. as against an increase of 1.49 per cent. for the same area in the following decade, or an increase for the latter decade of 2.4 per cent., including the population of the new territory added. In the former decade 94.6 per cent. of the population showed an increase, whereas in the latter period only 63.3 per cent. showed an increase. The gain in the provinces of the last decade was 3.87 per cent.; the population of the native States decreased 6.30 per cent. The contrast shown above between one period and the other, and between one region and another, is largely attributable to the variable agricultural conditions. The earlier period suffered little from famines, the latter excessively. The decrease was greatest in Central and Western India, where the famine was most severe.

The following is a table of the area and population of India and its dependencies:

	Area in square miles	1901	1891
Provinces (Total)....	1,106,861	231,898,807	221,239,515
Ajmere-Merwara....	2,711	476,912	542,358
Andamans and Nicobars	3,188	24,649	15,609
Assam	56,243	6,126,343	5,477,302
Baluchistan (Districts and Administered Territories)	45,804	308,246	
Bengal	151,185	74,744,866	71,346,961
Berar.....	17,710	2,754,016	2,897,491
Bombay.....	75,918	15,304,677	15,959,135
Sindh	47 066	3,210,910	2,875,100
Aden	80	43,974	44,079
Burma	256,195	10,489,924	7,722,053
Central Provinces ..	86,614	9,876,646	10,784,294
Coorg	1,582	180,607	173,055
Madras.....	141,726	38,209,436	35,630,440
Northwest Frontier Province.....	16,466	2,125,480	1,857,504
Punjab.....	97,209	20,330,339	19,009,343
United Provinces of Agra (formerly Northwest Provinces)	83,198	34,858,705	34,253,960
Oudh	23,966	12,833,077	12,650,831
Native States and Agencies * *(Total)*.	679,393	62,461,549	66,075,156
Baluchistan Agency	86,511	502,500	
Baroda State.....	8,099	1,952,692	2,415,396
Bengal States	38,652	3,748,544	3,326,837
Bombay States	65,761	6,908,648	8,082,107
Central India Agency.....	78,772	8,628,781	10,318,812
Central Provinces States	29,435	1,996,383	2,160,511
Hyderabad State ..	82,698	11,141,142	11,537,040
Kashmir State	80,900	2,905,578	2,543,952
Madras States	9,969	4,188,086	3,700,622
Mysore State	29,444	5,539,399	4,943,604
Punjab States	36,532	4,424,398	4,263,280
Rajputana Agency .	127,541	9,723,301	11,990,504
United Provinces States (formerly N. W. Provinces).	5,079	802,097	792,491
Grand Total.....	1,786,254	294,360,356	287,314,671

* See article INDIA, NATIVE STATES OF.

To this should be added some territories in India not included in the census, with an area of about 73,000 square miles and a population estimated at about 700,000. Aden, on the Arabian coast, with an Arabian protectorate embracing 15,500 square miles, and Socotra, a dependency of Aden, are officially included within the Empire of India. With these additions the total area of India and its dependencies is about 1,860,000 square miles.

A striking characteristic of the population is that it is so largely rural. Estimates show that about nine-tenths of the total belong to this class. This is true of even the most densely populated regions. The largest city in the densely populated division above referred to (Patna) has but 135,000 inhabitants. It must be understood, however, that the rural population is everywhere gathered together in villages which may contain only a few families or may number thousands. The country had not many large cities until the period of commercial development brought about by the British. Commerce has occasioned an immense growth in Calcutta and Bombay, but except these cities Madras alone exceeds half a million. (See table below.) Another peculiarity is the large proportion of males compared with European countries. The great privacy to which the females are subjected, particularly among the Mohammedans, and the aversion to intrusion on their domestic privacy, may serve partly to account for this discrepancy. Statistics for famine districts show

that in these regions there is a greater decrease in the male population than the female. It is generally accepted that women withstand the deprivations of the famine more successfully than men.

POPULATION OF THE LARGEST CITIES (INCLUDING IN MOST CASES CANTONMENTS)

	Total Population in	
	1901	1891
Calcutta and Fort	847,796	682,305
Bombay City	776,006	821,764
Madras	509,346	452,518
Hyderabad	448,466	415,039
Lucknow	264,049	273,028
Rangoon	234,881	180,324
Benares	209,331	219,467
Delhi	208,575	192,579
Lahore	202,964	176,854
Cawnpore	197,170	188,712
Agra	188,022	168,662
Mandalay	183,816	188,815
Allahabad	172,032	175,246
Amritsar	162,548	136,766
Jaipur	160,167	158,787
Bangalore	159,046	180,366
Poona	153,320	161,390
Patna	134,785	165,192

EDUCATION. Education on the part of England in India has been carried on in the face of many serious obstacles, and under complex conditions peculiar to the country. Social, religious, and racial distinctions, solidified in the system of caste, were so thoroughly interwoven with the whole of the life that they circumscribed the scope and modified the methods of English instruction. British education has never had to deal in India with the implanting of Western culture on an Oriental people having no culture of their own, but the superimposing of one system of culture upon another more philosophically profound in its sphere, and upon a people who cherished an educational lore that antedated by far the one offered them in its stead. A system of education such as it was and restricted to the sanctioned castes—chiefly the Brahmin—had never been wanting in India. When the English began to introduce the new system, a bitter dispute arose as to how much recognition should be given this ancient and native learning; for instance, whether the English classics should supplant the Sanskrit and Arabic, and whether the English or the vernacular should be used as a medium of instruction. These questions were finally decided in favor of European as against Oriental knowledge, and in favor of the vernacular as a medium, though English became prominent in advanced instruction, and generous provisions were made to bring it within reach of all who desired it.

This system, which was finally adopted, and which in the main continues to-day, was outlined by Lord Halifax in 1854. An investigating commission, reporting in 1883, approved the system, but favored emphasizing certain features, such as the encouragement of native schools and of primary and female education, to the end that the masses might share more liberally in the benefits of learning. Religious instruction has never been permitted in the State schools—a policy different from that pursued by the English Government in the schools of England, and which has generally been opposed by the clerical and missionary interests. At the same time the State advances financial aid to missionary schools without discrimination as to sect, and endeavors to avoid competition with them by not establishing schools where the missionary schools already provide adequate facilities. Both missionary and State schools are under the supervision of State inspectors, and must conform to certain regulations. Grants in aid consist of salary grants, results' grants, building grants, etc. The State educational system is complete in scope, including primary, secondary, and collegiate instruction, and is systematically organized and administered. Normal schools are maintained in every province. There are five universities—Calcutta, Madras, Bombay, the Punjab, and Allahabad. They consist of examining bodies only, but have a large number of affiliated colleges. The number of persons receiving instruction has greatly increased during the past half-century. The field of education is, however, limited. The attendance is largely from the middle classes, especially in the State schools, and while the missionaries reach a larger proportion from the lower castes, the entire number is small in comparison with the number of persons to whom opportunities for education never come.

Two criticisms in particular have been urged against the present system. The first is, the relative over-emphasis of higher education. This emphasis has been in accordance with the 'filtering down theory,' under which it was thought that the masses could be reached best through the agency of a highly educated native class. This theory in practice, however, leaves the masses untouched. The other criticism is that too much attention is given to classical and not enough to industrial instruction, and that, accordingly, the pupils are not fitted to take an active part in the industrial transformation which the country needs.

The figures taken from the last quinquennial review, reporting in 1897, show that there were 1,236,000 pupils in the State schools, 2,019,000 in aided schools, 532,000 in unaided schools, and 568,000 in private schools. Of these only 402,000 were females, or 2.3 per cent. of all the females of school age in India, the male attendance being 22.3 per cent. of all males of school age. The percentage of boys in attendance varied from 38.8 per cent. in the Province of Burma to 9.3 per cent. in the United Provinces of Agra and Oudh. The grand total of all pupils in public and private institutions increased during the decade 1890 to 1900 from 3,692,000 to 4,462,000. Native Christian pupils represented 5.16 per cent., Hindu 72.86 per cent., and Mohammedan 14.62 per cent. of the total attendance. In public institutions there were 97 per cent. of the pupils studying the vernacular language; the percentage of those studying the classical languages and the English language was small. Over a third of the proceeds used for education was derived from fees, the remainder being divided between provincial, local, and municipal funds and other sources. The total expenditure on public instruction increased gradually from 3,31,58,447 rupees in 1894-95 to 3,77,29,012 in 1899-1900.

RELIGION.

From the earliest times India has been a land of numerous religions, and the creeds professed there to-day are almost as great in number as they are varied in spirit and character. The

majority of the people acknowledge Hinduism or Brahmanism (q.v.) as their faith. In the census of 1901 their number is given as over 200,000,000. Next in proportion, claiming about a third of this number, is Mohammedanism, which was introduced into India in the eleventh century, and spread with great rapidity. Its adherents claim no less than 60,000,000 souls throughout India, their numbers being largest in the north. Together these religions make up the faith of 90 per cent. of the entire population. The number of Buddhists is given at over 9,000,000; they are nearly all inhabitants of Burma. Statistics show that the number of nature-worshipers, who are roughly classed under the head of animistic, is no less than 8,500,000; while the Sikh religion is professed by over 2,000,000 individuals. Besides these there is a large representation of Jains, over 1,000,000, and a scattering number of Parsis, nearly 100,000. The spread of Christianity among the natives has been considerable, for the number is given at about 3,000,000 souls. There are nearly 200,000 Jews. Separate articles will be found devoted to the most important branches of Indian religions. (See BRAHMANISM; BUDDHISM; JAINISM; MOHAMMEDANISM; PARSIS; SIKHS.) The results of the religious survey of India in the census of 1901 present the following statistics. The first table is itemized by provinces for British India, with totals for native States and agencies. The second is the summary of the Christian population:

ADMINISTRATIONS, PROVINCES	Population and Religion								
	Hindus	Sikhs	Jains	Buddhists	Parsis	Mohammedans	Christians	Animistics	Total
Ajmere-Merwara	380,819	264	19,922	.....	164	72,031	3,712	.....	476,912
Andamans and Nicobars	9,264	370	61	1,860	2	4,207	486	8,399	24,649
Assam	3,429,459	505	1,797	8,911	3	1,581,317	35,969	1,068,334	6,126,295
Baluchistan	21,897	2,947	8	.....	166	279,154	4,026	.....	308,198
Bengal	46,840,661	328	7,457	210,628	388	25,265,342	275,125	2,242,770	74,744,638
Berar	2,388,016	1,449	19,639	.....	530	212,040	2,375	129,964	2,754,013
Bombay	14,200,047	1,122	227,696	547	76,009	3,760,175	208,930	69,930	18,544,456
Burma	284,880	6,525	93	9,184,112	245	339,430	147,525	526,401	10,489,211
Central Provinces	8,171,925	477	47,306	169	969	295,291	24,809	1,335,573	9,876,419
Coorg	159,817	.....	107	.....	41	13,654	3,683	3,305	180,607
Madras	34,048,097	92	27,431	243	356	2,467,351	1,024,071	641,730	38,209,371
North Western Frontier Prov.	134,252	28,091	37	.....	46	1,957,777	5,273	.....	2,125,476
Punjab	7,874,413	1,517,019	42,745	4,182	445	10,825,698	65,811	.....	20,330,313
United Provs. of Agra and Oudh	40,757,137	15,319	84,401	788	578	6,731,034	102,469	.....	47,691,726
Total Provinces	158,600,684	1,574,508	478,700	9,411,440	79,942	53,804,501	1,904,264	6,026,406	231,881,445
Total States and Agencies	48,545,738	620,760	855,448	65,310	14,248	8,653,560	1,018,977	2,684,954	62,461,549
Total all India	207,146,422	2,195,268	1,334,148	9,476,750	94,190	62,458,016	2,923,241	8,584,349	*294,233,345

*Jews, numbering 182,281, are not included in this table. The members of minor religions, and those not returned are not included here.

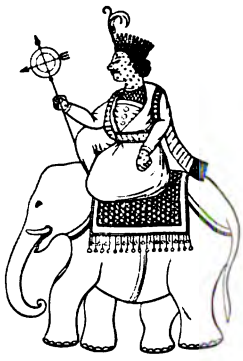
CHRISTIANS ACCORDING TO RACE AND DENOMINATION FOR ALL INDIA

	Church of England	Presbyterian	Baptist	Methodist	Congregationalist	Lutheran and allied	Roman Catholic	Syrian	Others	Total
Europeans	111,764	9,693	2,108	5,998	421	1,400	33,964	6	4,323	169,677
Eurasians	35,781	1,439	2,017	2,420	140	287	45,697	1	1,469	89,251
Natives	305,917	42,799	216,915	68,489	37,313	153,767	1,122,508	571,320	145,284	2,664,313
Total	453,462	53,931	221,040	76,907	37,874	155,454	1,202,169	571,327	151,076	2,923,241

For convenience of treatment the religious development of India may be divided into the following periods: First, the Vedic era, or earliest religious beliefs of the Aryan Hindus; second, Brahmanism proper, or the faith inculcated by the priests in the religious books called Brahmanas, and in the philosophical Upanishads (q.v.); third, the period of the two great religious reforms, Buddhism and Jainism (q.v.), both of which were a reaction against decadent Brahmanism; fourth, the newer Hinduism or Brahmanic counter-reform, a wider and more catholic faith which sprang out of the schismatic reform movement; and, finally, the later Hindu sectarian outgrowths and the tendencies of the popular faiths. The *Rig-Veda* and *Atharva-Veda* represent the literature of the earliest period; the *Yajur-Veda* is nearer to the second religious phase, or the Brahmanism of the priests; the sacred books of the Buddhistic and Jainistic reformations are written respectively in Pali (q.v.) and Prakrit (q.v.); again, the great Sanskrit epic poems of the *Mahābhārata* and the *Rāmāyana* represent both the purer Brahmanic stage and the later sectarian tendencies; for the latter our chief source of information is that class of mythological works known under the name of *Purānas* (q.v.) and *Tantras* (q.v.); the material for the developments after B.C. 1500 must be gathered from various sources. With reference to the time of these eras we can only say in a general way that the Vedic period runs from a very early period down to about B.C. 1000 or a couple of centuries afterwards, and merges into the Brahmanic age, which closes perhaps about B.C. 500. The age of Buddhism was about B.C. 500 to A.D. 500, and the period of epic Hinduism, according to Hopkins, covers about the same centuries. From A.D. 500 to A.D. 1500 is the era of Brahmanic counter-reforms and of sectarianism, while since that

HINDU DEITIES

Krishna.



Indra.

Lakshmī.

Ganēśa.

Agni.

Hanumān.

Brahmā.

Brahmā.

ARCHAIC FORM

Pārvatī.

Vishnu

Śiva.

time unifying tendencies have been more operative than ever before. It is necessary at the outset, however, to guard the reader against attempting to connect dates with the earlier of these periods. It has not been uncommon for writers on this subject to assign thousands of years before the Christian Era as the starting-points of various phases of Hindu antiquity; others, more cautious, marked the beginnings of certain divisions of Vedic works with 1200, 1000, 800, and 600 years B.C. The truth is, that since Hindu literature itself is almost without known dates, owing either to the peculiar organization of the Hindu mind, or to the convulsions of Indian history, the present condition of Sanskrit philology does not afford the scholar the requisite resources for embarking with any chance of success in such chronological speculations. The question of Hindu chronology will be more particularly considered in the article VEDA. In the meantime, the utmost stretch of assumption which in the present condition of Sanskrit philology it is permitted to make is, that the latest writings of the Vedic class are not more recent than the second century before Christ. A like uncertainty hangs over the period at which the two great epic poems of India were composed, although there is reason to surmise that the lower limits of that period did not reach beyond the beginning of the Christian Era. The Puranic period, on the other hand, scholars are generally agreed to regard as corresponding with part of our mediæval history, or roughly from A.D. 500 to 1500, although the material in these writings is often much older in its content.

VEDIC RELIGION. If the Rig-Veda—the oldest of the Vedas, and one of the oldest literary documents in existence—coincided with the beginning of Hindu civilization, the popular creed of the Hindus, as depicted in some of its hymns, would reveal not only the original creed of this nation, but throw a strong light on the original religion of humanity itself. Unhappily, however, the imagination, indulging in such an hypothesis, would have little foundation to work on. There are, of course, numerous traces in the Rig-Veda of survivals of earlier animistic beliefs, of spiritism, fetishism, and ancestor-worship; but the Hindus, as depicted in these hymns, are far removed from the starting-point of human society; they may, in fact, fairly claim to be ranked among those already civilized communities experienced in arts, defending their homes and property in organized warfare, acquainted even with many vices which are found only in an advanced condition of artificial life. Yet in examining the ideas expressed in the greatest number of the Rig-Vedic hymns, it cannot be denied that they are neither ideas engendered by an imagination artificially influenced, nor such as have made a compromise with philosophy. The Hindu of these hymns is essentially engrossed by the might of the elements. The powers which turn his awe into pious subjection and veneration are—*Agni* (q.v.), the fire of the sun and lightning; *Indra* (q.v.), the god of the storm and the thunder; the *Maruts*, or winds (see MARUT); *Sûrya*, the sun (see SÛRYA); *Ushas*, the dawn, whose hymns are among the most beautiful (see USHAS); and various kindred manifestations of the luminous bodies, and nature in general. He invokes them, not as representatives of a superior being, before whom the human soul professes its humility, nor as superior beings themselves, which may reveal to his searching mind the mysteries of creation or eternity, but because he wants their assistance against enemies—because he wishes to obtain from them rain, food, cattle, health, and other boons. He complains to them of his troubles, and reminds them of the wonderful deeds they performed of yore, to coax them, as it were, into acquiescence and friendly help; in fact, he seeks them more for his material than for his spiritual welfare. What we should call the ethical side is less pronounced. Sin and evil, indeed, are often adverted to, and the gods are praised because they destroy sinners and evil-doers; but one would err in associating with these words our notions of sin or wrong. A sinner, in these hymns, is rather a man who does not address praises to those elementary deities, or who does not gratify them with the oblations they receive at the hands of the believer. He is the foe, the robber, the demon—in short, the borderer infesting the territory of the 'pious' man. The latter, in his turn, may injure, and kill, but, in adoring Agni, Indra, and their kin, he is satisfied that he can commit no evil act. Yet some of the hymns, especially those addressed to the supersensuous, transcendental god Varuna (q.v.), the guardian of order and right, seem to imply the strongest sense of moral obligation and of sin as we understand the word. On the whole, it may also be said that the internal condition of the Hindu community, the features of which may be gathered from the hymns, seems to bespeak union and brotherhood among its members; and the absence, in general, of hymns which appeal to the gods for the suppression of internal dissensions or public vices, bears testimony apparently to the good moral condition of the people whose wants are recorded in these songs.

It may be imagined that the worship of elementary beings like those we have mentioned was originally a simple and harmless one. It is true that the sacrifice of sheep and goats, bulls, and even horses, was known, but it was not general. By far the greatest number of the Rig-Veda hymns know of but one sort of offering made to these gods; it consists of the juice of the soma (q.v.) or moon-plant, which, pressed out and fermented, was an exhilarating and inebriating beverage, and for this reason, probably, was deemed to invigorate the gods, and to increase their beneficial potency. It was presented to them in ladles, or sprinkled on the sacred Kusa grass. Clarified butter, too, poured on the fire, is mentioned in several hymns as an oblation agreeable to the gods, and it may have belonged to the primitive stage of the Vedic worship. There were no temples of the divinities, and in early times no images. The altar, if used, was very simple. The gods easily gathered from the atmospheric region roundabout.

There is a class of hymns, however, to be found in the Rig-Veda which already depart materially from the simplicity of the conceptions we are referring to. In these the instinctive utterance of feeling makes room for the language of speculation; the allegories of poetry yield to the mysticism of the reflecting mind; and the mysteries of nature becoming more keenly felt, the circle of beings which overawe the popular mind becomes enlarged. Thus, the objects by which Indra, Agni, and the other deities are propitiated become gods themselves; soma, espe-

cially, the moon-plant, with its juice, is invoked as the bestower of all worldly boons. The animal sacrifice, the properties of which seem to be more mysterious than the offerings of soma, or of clarified butter—is added to the original rites. Mystical allusions and symbolic expressions begin likewise to crop out in the later portions of the Veda, revealing the fact that the Hindu mind was no longer satisfied with the adoration of the elementary or natural powers, and giving evidence that the religion was beginning to deal with the problem of the mysteries of creation. In the tenth and last book of the Rig-Veda, speculations are found with regard to the origin of the universe, the whence and the whither, the who and the what. As soon as the problem implied by hymns like these was raised in the minds of the Hindus, Hinduism must have ceased to be the worship of only elementary powers. Henceforward, therefore, we see it either struggling to reconcile the latter with the idea of one supreme being, or to emancipate the inquiry into the principle of creation from the elementary religion recorded in the oldest portion of Vedic poetry.

BRAHMANISM PROPER. The development from the older into the newer, from the elemental and natural into the artificial, ritualistic and philosophic, or from the early Rig-Veda stage of religion into Brahmanism, may be traced through the *Yajur-Veda*, or book of knowledge of the sacrifice and the ritual. The priestly power of the Brahmans is supreme in this sacred book, and in the *Yajur-Veda* may be seen the beginnings of Brahmanism, as shown in its fuller development in the branch *Brâhmaṇas* (see VEDA) and in the philosophical writings termed *Upanishad.* (See UPANISHAD.) In the *Brâhmanas*—a word of the neuter gender, and not to be confounded with the similar word in the masculine gender, denoting the first Hindu caste—the mystical allegories which now and then appear in what we have called the second class of Vedic hymns, are not only developed to a considerable extent, but gradually brought into a systematic form. Epithets given by the Rig-Veda poets to the elementary gods are made the bases of legends, assuming the shape of historical narratives. The simple and primitive worship mentioned in the hymns becomes highly complex and artificial. A ponderous ritual, founded on those legends, and supported by a far more advanced condition of society, is brought into a regular system, which requires a special class of priests to keep it in a proper working order. Some of the Vedic hymns seem to belong already to the beginning of this period of the Brahmana worship, for in the second book of the Rig-Veda several such priests are enumerated in reference to the adoration of Agni, the god of fire; but the full contingent of sixteen priests, such as is required for the celebration of a great sacrifice, does not make its appearance before the composition of the Brahmanas and later Vedas. Yet, however wild many of these legends are, however distant they become from the earlier veneration of the elementary powers of nature, and however much this ritual betrays the gradual development of the institution of castes—unknown to the hymns of the Rig-Veda—there are still two features in them, which mark a progress of the religious mind of ancient India. While the poets of the Rig-Veda are chiefly concerned in glorifying the visible manifestations of the elementary gods, in the Brahmanas their ethical qualities are put forward for imitation and praise. Truth and untruth, right and wrong—in the moral sense which these words imply—are not seldom emphasized in the description of the battles fought between gods and demons; and several rites themselves are described as symbolical representations of these and similar qualities of the good and evil beings, worshiped or abhorred. A second feature is the tendency, in these Brahmanas to determine the rank of the gods, and, as a consequence, to give prominence to one special god among the rest; whereas in the old Vedic poetry, though we may discover a predilection of the poets to bestow more praise, for instance, on Indra and Agni than on other gods, yet we find no intention, on their part, to raise any of them to a supreme rank. Thus, in some Brahmanas, Indra, the god of the firmament, is endowed with the dignity of a ruler of the gods; in others, the sun receives the attributes of superiority. This is no real solution of the momentous problem hinted at in the Vedic hymns, but it is a semblance of it. There the poet asks 'whence this varied world arose'—here the priest answers that 'one god is more elevated than the rest;' and he is satisfied with regulating the detail of the soma and animal sacrifice, according to the rank which he assigns to his deities.

A real answer to this great question is attempted, however, by the theologians who explained the 'mysterious doctrine,' held in the utmost reverence by all Hindus, and laid down in the writings known under the name of *Upanishad* (q.v.). It must suffice here to state that the object of these important works is to explain, not only the process of creation, but the nature of a supreme being, and its relation to the human soul. In the Upanishads, Agni, Indra, Vayu, and the other deities of the Vedic hymns become symbols to assist the mind in its attempt to understand the true nature of the one absolute being, and the manner in which this being manifests itself in its worldly form. The human soul itself is of the same nature as this supreme or great soul; its ultimate destination is reunion with the supreme soul, and the means of attaining that end is not the performance of sacrificial rites, but the comprehension of its own self and of the great soul. The doctrine which at a later period became the foundation of the creed of the educated—the doctrine that the supreme soul, or (the neuter) Brahman, is the only reality, and that the world has a claim to be noticed only in so far as it emanated from this being, is already clearly laid down in these Upanishads, though the language in which it is expressed still adapts itself to the legendary and allegorical style which characterizes the Brahmana portion of the Vedas. The Upanishads became thus the basis of the enlightened faith of India. They are not a system of philosophy, but they contain all the germs whence the three great systems of Hindu philosophy arose; and like the latter, while revealing the struggle of the Hindu mind to comprehend the one supreme being, they advance sufficiently far to express their belief in such a being, but at the same time acknowledge the inability of the human mind to understand its essence.

From the Brahmanic religion with its theology,

its sacrifice, its stifling ritual, and widespread priestcraft there was bound later to come a revolt. Premonitory symptoms of this are plainly to be seen in the Upanishads, which prepared the way for emancipation. The reform wave swept over India in the two great reactionary movements of Buddhism and Jainism. The character and extent of these reformatory movements are spoken of under special articles, and need not be discussed here. The eastern part of India was the source from which they sprang, but Jainism gradually spread westward especially, and Buddhism expanded itself over other parts of India to Ceylon and far beyond the borders of Hindustan.

HINDUISM. In spite of the reform movements, the old Brahmanism was not destined to disappear. But it was forced to undergo changes which were largely due to the influence of the protesting faiths of Buddhism and Jainism. During the very time while they were flourishing it quietly but firmly held its own, was consciously or unconsciously being remodeled and adjusted to altered conditions and environments, and was gradually but surely changing into the newer Hinduism, with all that restoration meant. It is this changing Brahmanism and earlier Hinduism in its sectarian developments that is presented to us in the great Hindu epics.

The Epic period of Hinduism is marked by a similar development of the same two creeds, the general features of which we have traced in the Vedic writings. The popular creed strives to find a centre round which to group its imaginary gods, whereas the philosophical creed finds its expression in the ground-works of the *Sānkhya*, *Nyāya*, and *Vēdānta* systems of philosophy. In the former, we find two gods in particular who are rising to the highest rank, Vishnu and Siva; for Brahma (the masculine form of Brahman), though he was looked upon, now and then, as superior to both, gradually disappears, and becomes merged into the philosophical Brahma (the neuter form of the same word), which is a further evolution of the great soul of the Upanishads. In the *Rāmāyaṇa*, the superiority of Vishnu is admitted without dispute; in the great epos, the *Mahābhārata*, however, which, unlike the former epos, is the product of successive ages, there is an apparent rivalry between the claims of Vishnu and Siva to occupy the highest rank in the pantheon. It is one of the difficult problems of Sanskrit philology to unravel the chronological position of the various portions of this work, to lay bare its groundwork, and to show the gradual additions it received, which must be done before it will be possible to determine the successive formation of the legends which are the basis of classical Hindu mythology. A great deal has been done, however, and this much seems to be clear even already, that there was a predilection during this epic period for the supremacy of Vishnu, one of whose incarnations was the much-beloved Krishna (q.v.), and that the policy of incorporating rather than combating antagonistic creeds led more to a quiet admission than to a warm support of Siva's claims to the highest rank.

The philosophical creed of this period adds little to the fundamental notions contained in the Upanishads; but it frees itself from the legendary dross which still imparts to those works a deep tinge of mysticism. On the other hand, it conceives and develops the notion that the union of the individual soul with the supreme spirit may be aided by penances, such as peculiar modes of breathing, particular postures, protracted fasting, and the like; in short, by those practices which are systematized by the Yoga doctrine. The most remarkable epic work which inculcates this doctrine is the celebrated poem *Bhagavadgītā*, which has been wrongly considered by European writers as a pure Sankhya work, whereas Sankara, the great Hindu theologian who commented on it, and other native commentators after him, have proved that it is founded on the Yoga belief. The doctrine of the reunion of the individual soul with the supreme soul was necessarily founded on the assumption that the former must become free from all guilt affecting its purity before it can be remerged into the source whence it proceeded; and since one human life is apparently too short for enabling the soul to attain its accomplishment, the Hindu mind concluded that the soul, after the death of its temporary owner, had to be born again, in order to complete the work it had left undone in its previous existence, and that it must submit to the same fate until its task is fulfilled. This is the doctrine of metempsychosis, which is a logical consequence of a system which holds the human soul to be of the same nature as that of an absolute God. The beginning of this doctrine may be discovered in some of the oldest Upanishads, but its development belongs to the epic time, where it pervades the legends, and affects the social life of the nation. See TRANSMIGRATION.

PURANIC HINDUISM. The Puranic period, with its various cults, comprises the development of the newer Hinduism from about the sixth century of our era to the sixteenth century. The *Purāṇas* (q.v.) and the *Tantras* (q.v.) represent this phase of the religion, which succeeded epic Hinduism and supplanted Buddhism. The old Brahmanic vigor was not dead, but was ready to revive. In the eighth century Kumarila strengthened it on the ritualistic side and the great Vedantist Sankara, in the ninth century, added to its power on the philosophic side. But the Puranic period of Hinduism was a period of decline, so far as the popular creed is concerned. Its pantheon is nominally the same as that of the epic period. Brahma, Vishnu, and Siva remain still at the head of its imaginary gods; but whereas the epic time is generally characterized by a friendly harmony between the higher occupants of the divine spheres, the Puranic period shows discord and destruction of the original ideas whence the epic gods arose. Brahma withdraws, in general, from the popular adoration, and leaves Vishnu and Siva to contest in the minds of their worshipers for the highest rank. The elementary principle which originally inhered in these deities is thus completely lost sight of by the followers of the Puranas. The legends of the epic poems relating to these gods become amplified and distorted, according to the sectarian tendencies of the masses; and the divine element which still distinguishes these gods in the *Rāmāyaṇa* and *Mahābhārata* is now more and more mixed up with worldly concerns and intersected with historical events, distorted in their turn to suit individual interests. Of the ideas implied by the Vedic rites, scarcely a trace is visible in the

Purāṇas and *Tantras*, which are the text-books of this creed. In short, the unbridled imagination which pervades these works is neither pleasing from a poetical nor elevating from a philosophical point of view. Some Puranas, it is true—for instance, the *Bhāgavata*—make in some sense an exception to this aberration of original Hinduism; but they are a compromise between the popular and the Vedantic creed, which henceforward remains the creed of the educated and intelligent. They do not affect the worship of the masses as practiced by the various sects; and this worship itself, whether harmless, as with the worshipers of Vishnu, or offensive, as with the adorers of Siva and his wife Durga, is but an empty ceremonial, which, here and there, may remind one of the symbolical worship of the Vedic Hindu, but, as a whole, has no connection whatever with the Vedic Scriptures, on which it pretends to rest. It is this creed which, with further deteriorations, caused by the lapse of centuries, is still the main religion of the masses in India.

The philosophical creed of this period, and the creed which is still preserved by the educated classes, is that derived from the tenets of the Vedanta philosophy. It is based on the belief in one supreme being, which imagination and speculation endeavor to invest with all the perfections conceivable by the human mind, but the true nature of which is, nevertheless, declared to be beyond the reach of thought, and which, on this ground, is defined as not possessing any of the qualities by which the human mind is able to comprehend intellectual or material entity. See VEDANTA.

HINDU SECTS AND MODERN POPULAR FAITH. Under this designation may be comprised the sects which arose during the last period of Hinduism and the beliefs which are common to the Hindus to-day. These believers suppose that their religion is countenanced by the Vedas; but its source in reality is to be found in the *Purāṇas* and *Tantras*. They have in common a general sort of recognition of the Hindu trinity or triad—Brahma the creator, Vishnu the preserver, and Siva the destroyer—but in practice they are either Vishnuites or Sivites; for Brahma is little more than an abstraction, and plays a very subordinate part to-day contrasted with his rivals. Sivaism may loosely be said to be more popular in the northeast and south of India; Vishnuism rather in the northwest, but also in the south. The wives or female energies of these two gods also receive adoration. (See VAISHNAVAS; SAIVAS; SAKTAS.) Common to them all are certain acts of worship; the offering of votive gifts, adoration in the temples, and the performance of special ceremonies, such as the fulfillment of vows by going on religious pilgrimages for the purpose of acquiring merit. The caste system also has a strongly religious bearing, although it tends to break down through association with Occidentals. (See CASTE.) Beside the great sects there are likewise some of limited extent and total insignificance, such as the worshipers of Agni, the god of fire; of Surya, the sun god; of Ganeśa, the god of wisdom and remover of obstacles. Some of these latter sects were looked upon as partly unorthodox, partly heterodox, as early as the ninth and fourteenth centuries of our era. Regarding the sect of the Sikhs, which arose in the fifteenth century, reference may be made to the special article on that topic. Reform movements in India have been familiar since the early days of Buddhism and Jainism, down through Sikhism to the modern times. In the nineteenth century a special religious agitation was set on foot by Rammohun Roy (1774-1833) (q.v.), which resulted in the establishment of the Brahmo-Somaj (q.v.), a sort of national church of the Hindus. The movement has extended widely throughout India, and, like the Arya-Somaj, it is eclectic in its tendencies, seeking to combine the teachings of the Veda with the tenets of the Bible and the sacred books of other faiths. There are also in India some 17,000 believers in the Jewish religion, and allusion has been made above to the presence of some 90,000 Parsis, who made their home in India more than a thousand years ago. These topics are treated under separate headings, and need only be referred to here.

CHRISTIANITY IN INDIA. With reference to the spread of Christianity in Hindustan, as mentioned above, it may be stated that India was one of the earliest fields of Christian missions. Tradition assigns it as the scene of the Apostle Thomas's labors and martyrdom. Whether this was the case or not, we find a Syrian church planted in Malabar in Southern India, which undoubtedly had a very early origin. The Jesuit missionaries, from the middle of the sixteenth century onward, had a large success in India. (See XAVIER, FRANCIS.) The earliest Protestant missionaries in India came from Holland and Denmark. With the latter mission the eminent Schwartz was connected. England's first missionary effort was made by the Society for the Propagation of the Gospel, and the Christian Knowledge Society, which commenced in the beginning of the eighteenth century, by aiding the Danish mission already established in Southern India. Subsequently, the East India Company adopted the policy of excluding missionaries altogether from their territories; but since the beginning of last century, when these restrictions were withdrawn, great activity has been manifested, in which all denominations are represented. In the proclamation to the princes, chiefs, and people of India, read in the principal cities, on November 1, 1858, it was declared "that none shall be in any wise favored, none molested or disquieted, by reason of their religious faith and observances, but that all shall alike enjoy the equal and impartial protection of the law." The fullest toleration in matters of faith is the rule throughout British India. Fanaticism only, as when it sought to enforce the burning of widows or suttee (q.v.), or to offer human beings in sacrifice, is curbed by the ruling power. There is no exclusively endowed State Church, but Government continues to pay the State grants made to Hindu temples and to Mohammedan mosques. Clergymen of the Church of England, the Church of Scotland, and the Roman Catholic Church, are retained on the Government establishment as civil or military chaplains. There are Church of England bishops at Calcutta, Madras, and Bombay. The number of Christians in India, in 1891, was given in the census as 2,284,380, of whom the majority (1,315,263) were Roman Catholics. The members of the Church of England numbered about 295,000: the Dissenters nearly 297,000; and the Armenian and Greek sects over 201,000.

For a study of the entire religious development of the Hindus, consult Hopkins, *Religions of India* (Boston, 1895); Barth, *Religions of India* (3d ed., London, 1890); Monier-Williams, *Hinduism*, in the series of *Non-Christian Religious Systems* (London, 1900); Hardy, *Indische Religionsgeschichte* (Leipzig, 1898); Wilkins, *Modern Hinduism* (2d ed., London, 1887).

ARCHÆOLOGICAL REMAINS. The antiquities and the archæological remains in India are largely of an architectural character. (See INDIAN ART.) From the prehistoric age there are no monuments surviving beyond possibly some cairns and cromlechs; and the same is true of the Vedic period of Aryan India, because the structures were mostly of wood or of destructible material. Indian archæology begins practically with the age of Buddhism and Jainism. Connected with these faiths there are characteristic shrines, temples, and monuments in various parts of India, dating from B.C. 250 onward. Most famous from the standpoint of archæological research is the great cave at Karli, and also the caves at Ajanta, Ellora, and Lena, constructed with their assembly halls or churches (*chaityas*) and their monastic cells (*vihāras*). Of like interest are the huge mounds or tumuli (*stūpas, tōpes*), like that at Sanchi, near Bhilsa, erected to contain in a shrine (*dāgoba*) some relic of Buddha. The rails about these structures are well known because of their artistic value and because of the light they throw on scenes connected with Buddhist life. (See GAUTAMA BUDDHA; JATAKA.) Of particular antiquarian interest, likewise, are the various columns or shafts (*stambhas, lāts*), set up in various parts of India by King Aśoka (q.v.). The inscriptions on these, like his rock-cut edicts, are of special importance. Under a slightly different category, but of similar antiquarian interest, are the famous Gandhara sculptures, representing incidents in Buddha's life. The influence of Græco-Bactrian art is plainly evident in these. Of a much later date, but quite Hindu in character, are the cave temples of Elephanta (q.v.), near Bombay, with their sculptured figures of Brahma, Vishnu, and especially Siva. These may not, however, antedate the ninth century of our era. The remaining groups of antiquarian remains, chiefly architectural, are grouped under the head of Dravidian architecture, the Bengali and Chālukyan style of temple structure, and the artistic building of the era of Mohammedan rule. For details regarding these consult Fergusson, *History of Indian and Eastern Architecture* (London, 1876), and Le Bon, *Les monuments de l'Inde* (Paris, 1893). In 1897 arrangements were made in connection with the International Congress of Orientalists to establish an Association for Archæological Research and Exploration in India, and special archæological work under the supervision of the French Government has since been carried on in Cambodia, besides the researches conducted by various scholars individually in India itself.

LANGUAGE. With its hundreds of millions of inhabitants, there is as great a diversity of languages in India as there is variety in the peoples themselves. By far the larger majority, over 210,000,000, speak languages or dialects belonging to the Indo-Germanic group of tongues, and related, though perhaps not by direct descent, to the ancient Vedic dialect. This Indo-Aryan division is therefore first in importance, and three periods or stages may be recognized in its historical development. The earliest of these is sometimes called the Old Indic speech, and includes the Vedic dialect, Pali, in the broad sense now given to this term, and the literary or classic Sanskrit. The second period embraces the Middle Indian Prakrits. (See PRĀKRIT.) The third, termed New Indian, includes the modern Indian vernaculars, which are in the main descended from popular Prakrit dialects, and are spoken largely in the north, east, and central provinces of India. Under this designation are comprised Punjabi, Kaśmiri, and Sindhi, the speech of over 20,000,000 people, on the north and west; next, the Hindi, spoken by 80,000,000, and called Urdu or Hindustani when admixed with Persian and Arabic; again Gujarati and Marathi, the chief languages of the Bombay Presidency, and claiming nearly 30,000,000 speakers; furthermore, Bengali, the vernacular of more than 40,000,000 individuals in the east, together with Uriya and Behari, likewise in Eastern India; also Nepali, the language of Nepal, and Assami, still farther to the east. Separate articles regarding the characteristics of these various Indo-Aryan vernaculars will be found under the individual names. Among the non-Aryan languages the most important family is the Dravidian (q.v.), the tongue of some 50,000,000 people, inhabiting the peninsular portion of India. The Kolarian or Munda branch numbers about 3,000,000 speakers, while the Tibeto-Burman family has more than twice as many. The Khasi group (Assam) and the Mon-Annam and Shan families aggregate together over half a million speakers. In addition to this the division of Iranian languages (q.v.) is represented on the borders of Afghanistan and Baluchistan, and in the speech of the Gypsies; the linguistic statistics of India include, moreover, the languages, like English, German, French, etc., which are used by Europeans resident in India, and similarly such other languages as may be used by various Asiatics living at the time in Hindustan. (See INDIAN PEOPLES.) In addition to the bibliographical references given under the various separate articles, consult: Cust, *Modern Languages of the East Indies* (London, 1878); Constable, *Hand-Atlas of India* (Westminster, 1893); Beames, *Comparative Grammar of the Modern Aryan Languages of India* (London, 1872-79); Hoernle, *Comparative Grammar of the Gaudian Languages* (London, 1880); Baines, "The Language Census of India," in the *Transactions of the Ninth International Congress of Orientalists* (London, 1893); Grierson, *Linguistic Survey of India* (London, 1898).

HISTORY.

The early history of India is wrapped in legend. Only by references in native or in foreign writings and by inscriptions can the story of the ancient period be reconstructed. The Indian mind is essentially an unhistoric one. We have, indeed, many sovereigns mentioned, and even whole dynasties given in the *Purānas* (q.v.), in the epics, and in other Sanskrit writings; but of history, in the real sense of the word, there is practically none. The accounts which are given are so interwoven with myth and fancy that they have almost no value to the historian. From other sources, however, much of India's past may be outlined. Indian history falls rough-

ly into three periods: The Hindu period (c.2000 B.C. to 1001 A.D.), the Mohammedan period (A.D. 1001-1757), and the period of the establishment of European dominion (1757—).

HINDU PERIOD. The Aryans (q.v.) entered the Punjab perhaps as early as B.C. 2000. They came from the Iranian country, apparently by two routes, through the mountain passes in Southern Afghanistan and by way of Chitral, and gradually forcing their way east and south, expelled or subdued the aborigines, such as the Dravidians, and occupied the entire territory north of the Vindhya Mountains. There are but few historic allusions in the earliest part of this period, although the Rig-Veda (q.v.) mentions a battle of ten kings against Sudas, King of the Tritsu clan, evidently a tribal war, and contains a number of references to Aryan victories over the aboriginal tribes. The epics of the *Mahābhārata* and the *Rāmāyana* contain legends of wars which must have been of much importance. The former epic narrates almost as its main theme the strife between the Kurus and Panchalas, both on the Upper Ganges, while the latter tells of the war waged by the Kosalas of Oudh against the demoniac armies of Lankia, supposed to be Ceylon. By the close of the period described in the former epic there were ten great Hindu kingdoms: Magadha (South Behar), Anga (West Bengal), Vanga (East Bengal), Kalinga (Orissa), Avanti (Malwa), Saurashtra (Gujarat), and the kingdoms of the Andhras (Deccan), the Cholas (Coromandel), the Cheras (Malabar), and the Pandyas (extreme south). Of these Magadha became the chief before the dawn of authentic history in India. The earliest historic Indian date thus far known is B.C. 557, the reputed birth-year of Buddha. Bimbsara (q.v.) of the Saisunagar dynasty began to rule soon after this (died 485 B.C.), and this line reigned until the early part of the fourth century. In B.C. 315 during the reign of the Maurya king Chandragupta, called by the Greeks Sandracottus (q.v.), who brought all Northern India under the sway of Magadha, India for the first time in the historic period came into relations with the Occident. The invasion of Alexander the Great was to be the forerunner of a long series of inroads, which were to end two thousand years later in the final surrender of India to the West. The stay of Alexander in India was short, but Sandracottus entered into an alliance with the Greek ruler of Persia and Bactria, Seleucus Nicator, whose daughter he married, and to whose ambassador, Megasthenes (q.v.), we are indebted for our earliest non-Indian information on Hindustan. The great Sandracottus was succeeded by his son Bindusara in B.C. 291, and his grandson, Aśoka, whose reign lasted approximately from B.C. 259 to 222, is famous as the royal promulgator of Buddhism. A series of weak kings followed, and the foreign influence on India steadily gained strength. A half-century after Aśoka's time the Græco-Bactrian dynasty extended its power over the Upper Ganges and the Punjab, only to be driven out by the Indo-Scythians about B.C. 100. The greatest monarch of this line was Kanishka, a Kushana king, who founded the Saka (or Salivahana) era (q.v.) in A.D. 78. The northwestern (Kabul) Indo-Scythian princes gave way in the second century A.D. to the western (Gujarat) Kshatrapas, who in turn were overthrown by the Guptas toward the end of the third century. The name of Chandragupta I. (about 319) is one of the most important in this dynasty. He made his house supreme over practically all Northern India, and his son, Samudragupta, was equally powerful. The power of the Guptas was finally broken in the early part of the sixth century, having previously been weakened by invasions of the Huns. During the Gupta period the Hindus flourished in arts and in religion, and the so-called Renaissance of Sanskrit literature came in the reign of Vikramaditya (about 455-480). It was about this time that Buddhism attained its acme in India. To this fact we are indebted for some of our best information regarding the condition of the land. Chinese travelers, notably Fa-Hien (400), Hiouen-Thsang (643), and I-Tsing (671), came to India seeking for a knowledge of Buddha's teachings in their purity, and the records which they left form the only non-Indian information on Hindustan which we possess from the time of the Greeks until the coming of the Arabs. In the first half of the sixth century Harshavardhana, the hero of the one historical romance in Sanskrit (see NOVEL), extended his sway over all Northern India, even conquering Nepal. From this time the Hindu power began gradually to decline. Of the succeeding dynasties the most important were the Chalukja and Chola, but the day of native monarchy over India was past. Petty kings came and went, warred with each other, and by their lack of harmony helped to prepare the way for the second great epoch of India, the Mohammedan period. The subject of early Hindu eras and dates is very involved, and only the chief epochs can be given here. Hindu chronology begins with the Kaliyuga (q.v.), B.C. 3102; Chandragupta established the Maurya dynasty B.C. 315; Aśoka was crowned B.C. 259; the Samvat (q.v.) era (attributed wrongly to Vikramaditya, who lived much later) begins B.C. 57. This is the chief era of India. The Saka (q.v.) or Salvahana era begins A.D. 78; the Gupta or Vallabhi era A.D. 319; the Harshavardhana era A.D. 606; the modern Burmese era, A.D. 639. According to a new theory of Bhandarkar (not yet accepted by scholars generally), the Saka and following dates have to be increased by 200.

MOHAMMEDAN PERIOD (1001-1757). *House of Ghazni* (1001-1186).—The Sultan Mahmud of Ghazni (q.v.), founder of the House of the Ghaznivides (q.v.), was the first conqueror who permanently established the Mohammedan power in India, and the Hindu princes fell one by one before a succession of Mohammedan dynasties. The House of Ghazni succumbed to the *House of Ghor*, which was supplanted by the *Slave Kings of Delhi* (1206-88). One of these sovereigns, Altamsh, who ascended the throne in 1211, added the greater part of Hindustan proper to his dominions. He died in 1236. *The Khilji Dynasty* (1290-1320).—Under Ala ud-Din (1295-1316), of the House of Khilji, the Afghan power in India reached its highest point. He crushed the Hindus in Gujarat, defeated the Moguls in several battles on their invading the Punjab, and, most important of all, invaded the Deccan. Like so many Oriental conquests, however, his success was but temporary. *House of Tughlak* (1320-1414).—Ala ud-Din's descendants having been slain, Tughlak, Governor of the Punjab, seized the throne in 1320. The Tughlak dynasty

was short-lived; and in 1398, during the reign of the last of the Tughlak kings, the Tatar Timur, or Tamerlane (q.v.), sacked Delhi, and proclaimed himself Emperor of India. Two short-lived and unimportant dynasties followed the Tughlaks, the *House of Sayyid* (1414-50), and the *House of Lodi* (1450-1526). To the kings of this dynasty succeeded the *Great Moguls of the House of Timur* (1526-1707). Baber (q.v.), a descendant of Timur, who had for twenty-two years been sovereign of Kabul, invaded India for the fifth time toward the end of the year 1525, and after defeating Sultan Ibrahim Ludi on the plain of Panipat, April, 1526, he entered Delhi in triumph, and established himself as Emperor of the Mohammedan dominions in India. He died in 1530, and was succeeded by his son, Humayun. Akbar (q.v.), son of Humayun, one of the greatest of Mohammedan monarchs, became Emperor in 1556, and reigned for nearly fifty years. His son, Jehangir, ascended the throne in 1605, and his grandson, Shah Jehan (q.v.), at the beginning of 1628. Shah Jehan is celebrated as the builder of the Taj Mahal at Agra (q.v), one of the most splendid monuments of Oriental architecture. In 1658 Shah Jehan was imprisoned by his son, the famous Aurungzebe (q.v.), who usurped the Imperial power. This remarkable man raised the Mogul Empire to the highest pitch of greatness and splendor. The death of Aurungzebe took place in 1707, and the decay of the Empire, which had begun a few years before, proceeded rapidly. In 1739 the Persian Nadir Shah invaded India, sacked Delhi, and carried away the famous peacock throne, as well as a vast amount of treasure. Viceroys of the Great Mogul formed their provinces into independent States; while Hindu and Mohammedan adventurers carved out kingdoms with the sword. Of these the most important were the nizams of the Deccan, the rajahs of Mysore, the peshwas of the Mahrattas, and the Rajput and Sikh princes. The Mahrattas reached the height of their power about the middle of the eighteenth century, but in 1761 they sustained a crushing defeat at the hands of the Afghan ruler, Ahmed Shah (q.v.), in the battle of Panipat. The dismemberment of the Mogul Empire opened a wide field for admission and enterprise to the nations of Europe. The Venetians, the Genoese, the Portuguese (the first to reach India by way of the Cape of Good Hope in 1498), and the Dutch had by turns traded with India; and in 1602 the English appeared on the scene. See EAST INDIA COMPANY.

In 1653 Madras was erected into a presidency, and in 1668 the island of Bombay, which was the dowry of Charles II.'s Queen, the Infanta Catharine of Portugal, was transferred by the Crown to the East India Company. The year 1686 witnessed the foundation of Calcutta. The French East India Company was chartered in 1664. See GAMA (VASCODA), ALBUQUERQUE, GOA, PONDICHERRY, CHANDERNAGAR.

BRITISH RULE (1757). Great jealousy existed between the English and the French. The war for ascendency began in 1745, and did not end with the Peace of Aix-la-Chapelle in 1748. (See DUPLEIX.) The struggle in the Carnatic continued with ardor under the pretext of supporting the claims of rival native princes to sovereignty. Clive (q.v.), one of the most famous persons in Anglo-Indian history, turned the contest in favor of the English. His memorable defense of Arcot in 1751 broke the spell of French invincibility. Five years afterwards, however, Siraj-ud-Daula, Nawab or Governor of Bengal, attacked and captured Calcutta. The English prisoners, 146 in number, were confined in the small military prison known as the Black Hole, and only 23 survived till morning. Clive quickly took command of an expedition fitted out at Madras, recovered Calcutta (1757), and, assisted by Admiral Watson, prosecuted the war vigorously, till, after a hollow peace and a renewal of hostilities, he thoroughly defeated Siraj-ud-Daula in the battle of Plassy, June 23, 1757. This victory gave the English the provinces of Bengal and Behar, and from this year is dated by the English themselves the foundation of their Empire in India. From Mîr Jafar, whom the East India Company appointed to succeed the defeated Nawab, they exacted vast sums of money. The government of an empire by a commercial corporation was a strange political experiment. Naturally the members had no thought of administering affairs for the benefit of their subjects, or even of far-reaching improvements in their own interest, but were guided throughout by the narrowest and most sordid selfishness. After the victory of the English at Baxar in 1764, over the united forces of Shuja-ud-Daula, Nawab of Oudh, and the Mogul Emperor (Shah Alam), the latter asked protection of the English. He confirmed the Company in its possessions and granted it the collectorate (*dîwânî*) of Bengal, Behar, and Orissa, on condition of receiving the sum of £300,000 as tribute to himself from Bengal, and £600,000 as an annual allowance to his Nawab. These enormous grants were soon cut down by Clive, and were eventually repudiated by the Company, which also failed to fulfill other engagements which it had entered into with Shah Alam. On the other hand, the cost to the Company of maintaining its authority and standing army prevented it from undertaking public works and from developing the resources of the country. Clive purged the Indian Government of oppression, extortion, and corruption; from the work he did during his last visit (1765-67) began a purer administration of the British Empire in the East. The Regulating Act, passed in 1773, substituted a new council of four at Calcutta in place of the far larger council which had hitherto managed affairs for the Company. The new body was to assist and check the Governor-General, instituted in the same year. It was also given a limited control of the actions of the Madras and Bombay presidencies, and was thus made the political head of the British possessions. To Warren Hastings (q.v.), the first Governor-General (1774-85), the new council was exceedingly hostile. Hastings, on his part, used unscrupulous means of replenishing the Company's exchequer, but by his talent and energy he averted dangers which threatened the British supremacy in India. The powerful Mussulman sovereigns, Hyder (Haidar) Ali, ruler of Mysore, and the Nizam of the Deccan, assisted by French officers, combined with the Mahrattas against the English. Sir Eyre Coote broke up the confederacy, and defeated Hyder Ali in 1781. Next year the Supreme Court of Justice, which had always harassed the Governor-General, was deprived of its independent powers,

and the policy of Hastings was successful, both in the council and in the field. In 1784 Pitt instituted the Board of Control under a Cabinet Minister. By this act the English Government began to deprive the Company of its monopoly of political power in India. Lord Cornwallis (q.v.), who succeeded Hastings in 1786, was both Governor-General and commander-in-chief. To check the corruption of the English revenue officials, he made the *zemindars* (native collectors of revenue) proprietors of their districts on condition of paying a fixed annual sum to the Company. He also improved the judicial administration by forbidding a revenue official to act as a judge. These were his chief reforms. With the Nizam, the Mahrattas, and the Rajah of Coorg as allies, Cornwallis in 1790 made war on Tippu, Sultan of Mysore, who had invaded Travancore, then under British protection. Terms were dictated to Tippu at his capital, Seringapatam, and he was compelled to cede half of his domains to the Company. Cornwallis was succeeded by Sir John Shore (1793-98), whose rule was in no respect memorable. Shore was followed by the Marquis of Wellesley (1798-1805). The British Empire in the East, like that of Napoleon I. in Europe, could be maintained only by constant fighting. Tippu broke his faith by intriguing against the English, both with the French and with native princes. His bad faith cost him his crown and life; in May, 1799, Seringapatam was stormed and Tippu killed. The Hindu dynasty displaced by Hyder Ali was restored, and the administration was carried on successfully for the young Rajah by Sir Arthur Wellesley, afterwards Duke of Wellington. In the famous battle of Assaye in 1803, he defeated the Mahrattas under Sindhia, and the victories of Lord Lake in Northern India extended considerably the dominions of the Company. As Lord Wellesley's policy was too aggressive to suit the views of the East India Company, he was superseded by Lord Cornwallis, who returned to India only to die. Lord Minto, who governed from 1807 to 1813, organized the districts conquered by Wellesley. This administration was peaceful—a reaction of the profit-seeking Company against the ambitious policy of Minto's predecessor.

The Marquis of Hastings (1813-23) conquered the Gurkhas of Nepal, forced the Mahratta ruler of Indore to cede a great part of his territories, crushed the robber gangs called Pindaris, and made the British power supreme in India. The next administrations were those of Earl Amherst (1823-28) and Lord William Bentinck (1828-35). The first was signalized by the first Burmese War, the second by the suppression of suttee and the thugs. It was Bentinck, in fact, who introduced the idea of governing India for the good of the governed. The Earl of Auckland (1836-42) followed Bentinck. He is known chiefly by his unjustifiable and disastrous attempt to make British influence paramount in Afghanistan (q.v.). An unexpected insurrection in Kabul compelled the retreat of the British army, which was overwhelmed in the Kurd-Kabul Pass (1842). Auckland was succeeded by the Earl of Ellenborough (1842-44). The 'army of retribution' proceeded to Kabul soon after Lord Ellenborough took the reins of government. Kabul was sacked and several public buildings razed to the ground, after which the country was evacuated and Dost Mohammed allowed to reoccupy his throne. The conquest of Sindh by Charles Napier, followed by its annexation, also belongs to this administration. Lord Ellenborough having been recalled by the East India directors, from alarm at his martial tendencies, Sir Henry Hardinge (1844-48) was sent to take his place. The attention of the new Governor-General, however, was soon diverted from works of peace to battle with the bravest people of India. Ever since the death of Runjit Singh, the ally of the English in 1839, the Punjab had been in a state of disorganization. The Sikhs, uneasy at the conquests made by the British in Sindh and Gwalior, resolved to invade British territory. The first Sikh war (1845-46) commenced on the part of the Punjab by the passage of the Sutlej, and was followed by the bloody battles of Mudki, Firozshah, Aliwal, and Sobraon, in which, after hard fighting, the Sikhs were defeated with great slaughter. The result of the war was that a British Resident and British troops were stationed at Lahore, although the boy prince, Dhulip Singh, was acknowledged as Maharajah under a protectorate. The Cis-Sutlej States, the Jalandhar Doab, and the region between the Ravi and the Sutlej were annexed.

The administration of the Marquis of Dalhousie (1848-56), who succeeded Hardinge, is memorable for the commencement of superb public works, the introduction of cheap uniform postage, railways, telegraphs, improvements in government, and social progress generally; a second Sikh war, ending in the victory of Gujarat, February 21, 1849; a second Burmese war, finished in 1852; and the annexation of four kingdoms—the Punjab, Pegu, Nagpur, and Oudh, besides lesser territories, such as Satara. The organization of the Punjab into a model province, soon to become notable for prosperity as well as for its faithfulness to England, was a splendid achievement, of which Dalhousie had reason to be proud. When Lord Canning (1856-62) assumed office, everything promised peace and prosperity. With the early days of 1857, however, came the first mutterings of the storm that was to sweep over a large portion of British India. At the commencement of the year cakes of flour were circulated mysteriously through the region of the Upper Ganges; by this means the natives were concerting rebellion. Treasonable placards appeared at Delhi, and other suspicious occurrences gave warning of native disaffection or conspiracy. The chief causes of discontent seem to have been the annexation policy and the rapid introduction of modern European improvements, which, by threatening to destroy the whole native civilization of India, roused the fears and superstitions of Hindus and Mohammedans alike. At the same time the English civil and military officials failed to respect the religious feelings of their subjects. For instance, the Enfield rifle with its cartridge, greased with tallow and lard, was at this time put into the hands of the Sepoys without explanation or precaution; and General Anson, the commander-in-chief, snubbed caste, and was against all concession to the 'beastly prejudices' of the natives. It must be remembered that the Hindu considered the cow sacred, and he would lose caste by tasting anything prepared from its meat, while the Mohammedan was not permitted by his religion to eat pork. Suddenly the dis-

affection broke out into open revolt before the English were aware of the impending danger. On May 10, 1857, the Sepoy Mutiny began at Meerut, a town in the neighborhood of Delhi, with a frenzied uprising of the native troops, who had been exasperated by the imprisonment of a number of their men who had refused to handle English cartridges. The mutineers liberated their comrades and proceeded to massacre the Europeans. The British troops failed to act promptly, and the Meerut Sepoys rushed to Delhi to raise the standard of the fallen Mogul. His person, invested with the traditions of native sovereignty, naturally became the centre of rebellion. Delhi at once fell into the hands of the mutineers. Nana Sahib of Bithur, whose claims as the adopted son of the Peshwa of the Mahrattas had not been recognized by the British Government, fanned the insurrection. At the end of June General Wheeler was forced to surrender to him at Cawnpore; and, in spite of the promise of safe conduct to Allahabad, all the men were immediately massacred. The women and children were butchered on July 15th, by order of Nana Sahib, when he heard of Havelock's march from Allahabad. Nana Sahib was unable to withstand Havelock, who entered Cawnpore. The Europeans in the residency at Lucknow were besieged on June 30th. Four days afterwards, the commandant, Sir Henry Lawrence, died of his wounds, and his place was taken by Inglis, who bravely held out till he was relieved, on September 25th, by the heroic Havelock. The final relief was achieved by Sir Colin Campbell, and on November 17th the city was again in complete possession of the British. In the meanwhile, in September, Delhi was retaken by General Archdale Wilson. By June, 1858, no city or fortress of any importance remained in the hands of the mutineers. Oudh was entirely reduced by the beginning of the year 1859. The able rebel leader, Tantia Topi, a Mahratta Brahman, was taken, tried by court-martial, and hanged. During the mutiny valuable assistance and protection were received from many native chiefs. On the other hand, it was the fate of the last representative of the East India Company to sentence the last Great Mogul and heir of the House of Timur 'to be transported across the seas as a felon.' He died in Pegu in 1862. The transfer of the Government of India to the British Crown (1858) was the immediate consequence of the mutiny. Under the system then inaugurated, the Government of India is vested in a Principal Secretary of State, responsible to the Crown, and assisted by a council sitting in London. Subject to this authority is the Governor-General, henceforth termed the Viceroy, aided by an Executive Council, corresponding to the old Council of Calcutta, and by a new Legislative Council, composed in part of non-official members, native as well as European. The first Viceroy was Lord Canning. The two following Viceroys were the Earl of Elgin (1862-63) and Sir John Lawrence (1863-69). Toward the close of Lord Elgin's administration, a Mohammedan rising in Northwest India was apprehended, and it was considered most desirable that the new Viceroy should have practical experience of Indian affairs. Sir John, afterwards Lord Lawrence, was accordingly appointed Viceroy. He conducted the Government with prudence and zeal; but unfortunate events occurred during his term of office. A war in Bhutan terminated unsatisfactorily for England in 1865; and a dreadful famine in Orissa, resulting from a drought, caused the death of 1,500,000 people. He was succeeded by the Earl of Mayo (1869-72). This administration was inaugurated by a great demonstration at Ambala, March 27, 1869, when the Ameer of Afghanistan was received in state and given a supply of arms, and the first installment of a money subsidy of £120,000 a year. In returning from Rangoon to Calcutta, the Earl of Mayo was assassinated by a convict, February, 1872. Lord Northbrook (1872-76) was the next Viceroy. The chief events of his administration were 'the Bengal famine,' which, however, was foreseen and provided for, and the visit of the Prince of Wales to India (1875). Northbrook was followed by Lord Lytton (1876-80). The most important events in the tenure of office of Lord Lytton were the proclamation of the Queen as Empress of India (1877), another famine, and the Afghan War (1878-80). The Marquis of Ripon (1880-84), the Earl of Dufferin (1884-88), and Lord Lansdowne (1888-93) were the next three Viceroys, under whose administrations much was done for the improvement of the natives. In 1885 King Thebau of Burma was dethroned, and on January 1, 1886, the country was formally annexed by the English. The Earl of Elgin became Viceroy in 1893. During his term of office the demarcation of the boundary between Afghanistan and India, as determined by the Durand Treaty of 1893, was practically completed. In 1895 the region called Bashgal, in the basin of the Chitral River, was taken from the British sphere of influence, and annexed to Afghanistan. In 1895-96 the Government was called upon to deal with a mutiny of the fanatical Moplahs in Southwest India. They held out stubbornly, but were at last put down. In 1897 there was a far more serious outbreak of the Afridis on the Afghan frontier, and several sharp engagements between them and the British occurred during the summer. In addition to these difficulties, the administration had to contend with famine and plague. Notwithstanding all discouragements, however, Elgin made substantial progress in internal improvements. In 1899 Lord Curzon of Kedleston became Viceroy. In that year the gold standard was established. The famine, continuing through the year, affected 30,000,000 people. Some disaffection appeared among the Mahrattas and at Poona violent demonstrations were made against the Government. But the country, as a whole, was loyal; and on the outbreak of the South African War, several native chiefs offered their services to the British Government.

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INDIA, FRENCH. Possessions of France in India, comprising the five towns of Pondicherry, Chandernagar, Karikal, Mahé, and Yanaon (see these respective titles), with a total area of about 196 square miles. Population, in 1901, 275,094. For history, see under EAST INDIA COMPANY, FRENCH; CLIVE; DUPLEIX; and LA BOURDONNAIS.

INDIA, FURTHER, or FARTHER. See INDO-CHINA.

INDIA, NATIVE STATES OF. The native States of India consist of over 600 States, which do not come under the administrative system of British India, but have varying degrees of independence, and are mostly governed by native princes. Many of the States are quite small, but some are very large. The total area is 679,393 square miles, with a population of 62,461,549. It is noteworthy that, excepting Travancore, these States are located in the interior of the country. The population is very heterogeneous. In many of the States the ruler belongs to a minority or alien race and religion.

The early policy of the East India Company was to make alliances with the different States, recognizing the native princes as its equals. The plan did not prove satisfactory, as it was impossible to preserve harmony while the native princes were not subject to more positive restraint. The policy was then introduced of recognizing them as subordinates, and limiting their military forces, the British themselves guaranteeing protection, and taking charge of the external relations of these States. In the middle of the nineteenth century the policy of annexation was followed for a short time—Oudh, for example, being annexed in 1856. But since the Sepoy Mutiny (1857) the policy has been to allow the States to enjoy a share of independence under native rulers. The extent to which the British authority is exercised over the native States varies greatly between different States and at different times in the same State. They are not permitted to make wars or to receive foreign consuls. The commercial treaties made by the British embrace also the native States, their interests being recognized as identical with those of the provinces. The guaranty of protection implies the right to establish such military forces within the native territories as the purposes of defense demand, and to have control of railroads and telegraph lines which are not 'local,' i.e. do not begin and end within the States. Each State is thus protected from external attack and internal revolt, and a large local army is not necessary.

Since the peace of the Empire is in danger of being broken by disputes over the succession to the rulership in any State, or the rule of certain candidates may be deemed prejudicial to the Imperial welfare, the British may intercede to determine who the successor shall be, and no one to whom they object can be advanced to the chieftaincy. If flagrant and intolerable instances of misrule arise, the right of interference is presumed to follow as a further consequence from the rôle the Imperial Government plays as guarantor of the protection of the States' general welfare. Under special circumstances, as, for instance, the murder of a British commissioner, the British have resorted to some extraordinary methods of interference. But ordinarily in the important States the rulers are given a free hand in determining the State policy and execut-

ing it. In the numerous small States the Imperial jurisdiction is usually much more extensive, and many of them are administered by a British officer in the name of the chieftain. The British at times have exercised absolute rule even in some of the larger States. Their rule in Mysore had extended over half a century when (1881) it was restored to native rule. Some of the States pay a tribute to the British, but it is always small, and usually by way of compensation for special services. The policy of allowing native States to exist alongside of British provinces has its advantages and disadvantages. Eminent Indian officials hold that as far as British interests are concerned it would be better to annex a number of the leading States. The fact that this is not done is assumed to be an evidence of the unselfish motives of the Imperial policy. The proximity of the native States causes such inconveniences as rise out of the different prevailing systems of currency, limitations in the development of the Imperial irrigation system, and violations of the regulations concerning the growing of the poppy. It also tends to render certain laws inoperative—as, for instance, those against infanticide.

In order to facilitate the relations with the native States, to watch over the course of affairs within their territories, and be in a position to exert a needful influence, the British appoint political agents to the various States. With rare exceptions, the agent resides within the territory to which he is accredited. The agents to the principal States are under the immediate jurisdiction of the Imperial Government. The general condition of affairs in the native States compares unfavorably with that prevailing in regions under British administration. The British claim that the burden of taxation upon the masses falls heavier in the States than in the provinces. At the same time the public is benefited much less, for the expenditure is largely for the unnecessary wants of the ruler and his coterie of adherents, while roads, irrigation, schools, and other public needs are sadly neglected. Freedom of the press is not tolerated. It is claimed that communities which have been transferred from native to provincial administration have invariably protested against being transferred back under a native administration. Laws are made or revoked as it suits the whim of the ruler. Mysore, the most progressive of the States, has a so-called 'representative assembly,' but its members have no vote in making the laws or appropriations. Rural boards have also been established in this State, but they have no money at their disposal. Consult the authorities referred to under INDIA, paragraphs *History* and *Government;* and for a more detailed statement concerning the different States, see the articles under their respective titles.

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INDIA, PORTUGUESE. Possessions of Portugal in India, comprising Goa, Daman, and Diu. (See these respective titles.) Area, 1558 square miles. Population, in 1881, 420,868; in 1894, 494,836. For history, see under INDIA; EAST INDIA COMPANY; DIAZ; GAMA; ALMEIDA; and CASTRO.

INDIA INK. A black pigment, formed by mixing lampblack and gum into a paste and then pressing it into molds where it dries into sticks of various shapes. It was originally made in China and Japan, and the best grades are still produced in those countries, the common lampblack of Occidental countries being too coarse for many purposes. It is said that the Chinese collect the lampblack used in its manufacture from the oil of sesame. In China India ink is applied with a brush, both for writing and painting. In Europe and America it is chiefly used for black-and-white drawings, it being possible to regulate the depth of the shade by the amount of water used in mixing the ink. India ink is the only true black ink produced, all other grades having a tinge of some other hue.

INDIA MUSEUM. A collection in London, illustrating the antiquities, history, and resources of India. In 1880 it was placed under the management of the South Kensington Museum, and has been much enlarged.

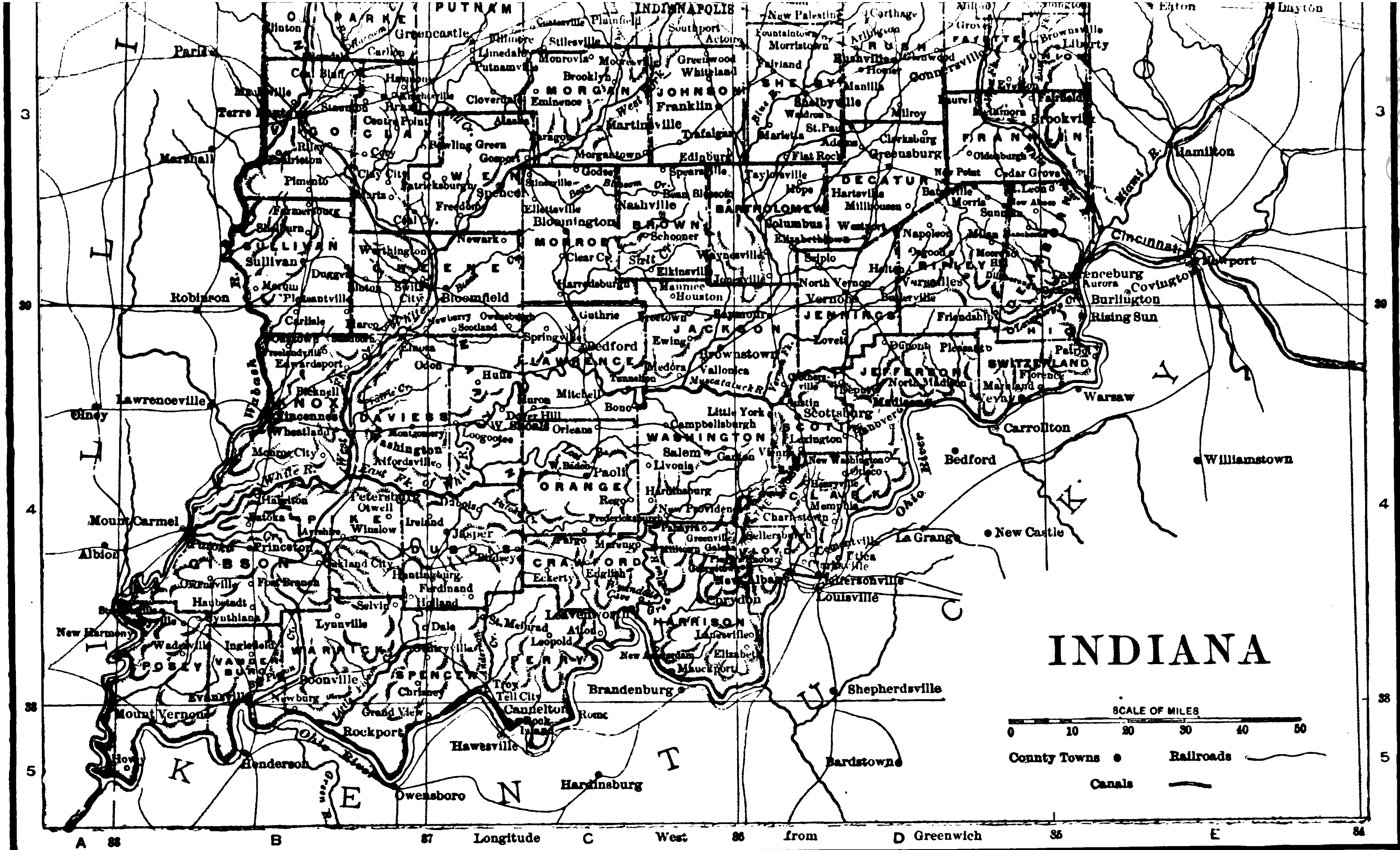
INDIANA. 'The Hoosier State.' One of the North Central States of the American Union; bounded on the north by Lake Michigan and the State of Michigan, on the east by Ohio, on the south by the Ohio River, separating it from Kentucky, and on the west by Illinois. It lies between latitudes 37° 47′ and 41° 50′ N. and longitudes 84° 49′ and 88° 2′ W. The extreme length is 277 miles; greatest breadth, 145 miles; area, 36,350 square miles, of which 440 square miles are water.

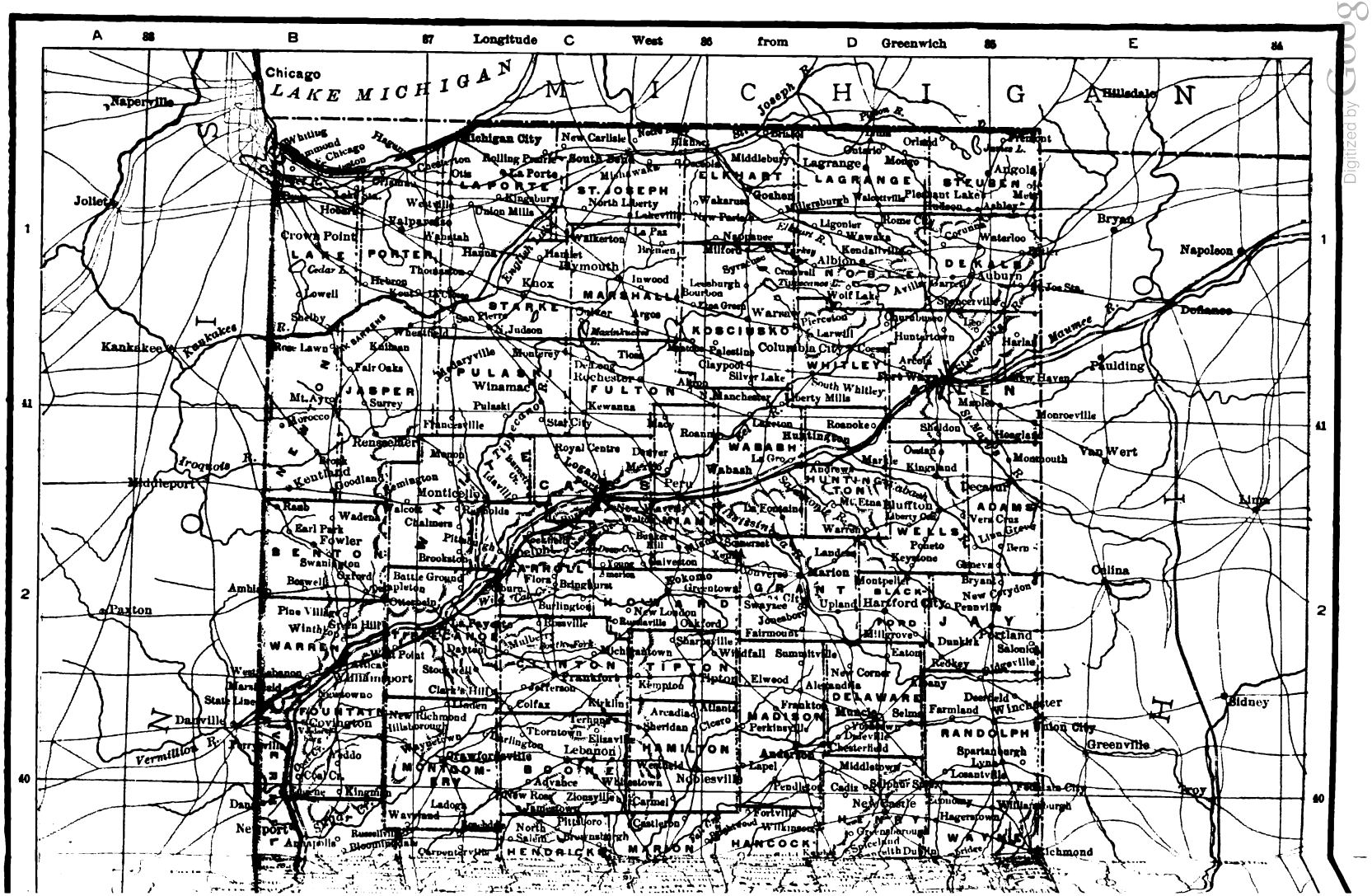
TOPOGRAPHY. Indiana resembles Illinois in its physical features. Lying within the prairie region, it has a gently undulating surface which slopes by imperceptible stages toward the southwest. The northeastern part has an elevation of 1000 to 1200 feet, the northwestern 500 to 700 feet; along the Ohio River the elevations are about 500 feet in the southeast and 300 feet in the southwest. There are sandy hills near Lake Michigan, and a series of low elevations of glacial origin occurs in the southern part, extending from the Ohio, in Clark County, northwestward to Parker County on the Wabash. A portion of northern Indiana is drained into the Mississippi through the Kankakee and Illinois, into Lake Michigan through the Calumet and Saint Joseph, and into Lake Erie through the Maumee, but most of the streams have a southerly or southwesterly course into the Ohio and Wabash. The last-named rises in western Ohio, and crossing northern Indiana it is joined by the Salamonia, Mississineva, Wild Cat, Eel, and Tippecanoe. Near the western border the Wabash receives the Vermilion from Illinois, while its most important tributary, White River, joins it 50 miles above the confluence with the Ohio. The southern border is drained directly into the Ohio through the White Water, Blue, Little Pigeon, and other short streams. There are several small lakes in northern Indiana, the largest being English Lake on the headwaters of the Kankakee.

CLIMATE AND SOIL. The mean annual temperature for the State is about 52° F., ranging from 48° in the northern to 56° in the southern counties. Cold northerly winds lower the winter temperatures to an extreme of —25°. At Indianapolis the thermometer shows an average

AREA AND POPULATION OF INDIANA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Adams	D 2	Decatur	335	20,181	22,232
Allen	D 1	Fort Wayne	660	66,689	77,270
Bartholomew	D 3	Columbus	400	23,807	24,594
Benton	B 2	Fowler	410	11,903	13,123
Blackford	D 2	Hartford City	167	10,461	17,213
Boone	C 2	Lebanon	427	26,572	26,321
Brown	C 3	Nashville	317	10,308	9,727
Carroll	C 2	Delphi	370	20,021	19,953
Cass	C 2	Logansport	420	31,152	34,545
Clark	D 4	Jeffersonville	375	30,259	31,835
Clay	B 3	Brazil	357	30,536	34,285
Clinton	C 2	Frankfort	402	27,370	28,202
Crawford	C 4	English	304	13,941	13,476
Daviess	B 4	Washington	490	26,227	29,914
Dearborn	E 3	Lawrenceburg	309	23,364	22,194
Decatur	D 3	Greensburg	384	19,277	19,518
Dekalb	D 1	Auburn	369	24,307	25,711
Delaware	D 2	Muncie	395	30,131	49,624
Dubois	C 4	Jasper	425	20,253	20,357
Elkhart	D 1	Goshen	465	39,201	45,052
Fayette	D 3	Connersville	215	12,690	13,495
Floyd	D 4	New Albany	150	29,458	30,118
Fountain	B 2	Covington	383	19,558	21,446
Franklin	D 3	Brookville	394	16,366	16,388
Fulton	C 1	Rochester	382	16,746	17,453
Gibson	B 4	Princeton	490	24,920	30,099
Grant	D 2	Marion	416	31,493	54,698
Greene	B 3	Bloomfield	482	24,379	28,530
Hamilton	C 2	Noblesville	402	26,123	29,914
Hancock	D 3	Greenfield	290	17,829	19,189
Harrison	E 4	Corydon	470	20,786	21,702
Hendricks	C 3	Danville	408	21,498	21,292
Henry	D 3	Newcastle	395	23,879	25,088
Howard	C 2	Kokomo	295	26,180	28,575
Huntington	D 2	Huntington	385	27,644	28,901
Jackson	C 4	Brownstown	520	24,139	26,633
Jasper	B 1	Rensselaer	565	11,185	14,292
Jay	D 2	Portland	370	23,478	26,818
Jefferson	D 4	Madison	362	24,507	22,913
Jennings	D 4	Vernon	380	14,008	15,757
Johnson	C 3	Franklin	312	19,561	20,223
Knox	B 4	Vincennes	510	28,044	32,746
Kosciusko	D 1	Warsaw	521	28,645	29,109
Lagrange	D 1	Lagrange	393	15,615	15,284
Lake	B 1	Crownpoint	465	23,896	37,892
Laporte	C 1	Laporte	563	34,445	38,386
Lawrence	C 4	Bedford	460	19,792	25,729




A
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C
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Longitude West from Greenwich
LAKE MICHIGAN
MICHIGAN
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Naperville
Joliet
Michigan City
New Carlisle
South Bend
Elkhart
Goshen
Middlebury
Lagrange
Angola
Hillsdale
Jonesville
Coldwater
Bryan
Napoleon
Defiance
Paulding
Van Wert
Monroeville
New Haven
Fort Wayne
Auburn
Kendallville
Albion
Wolf Lake
Avilla
Waterloo
Orland
Pleasant Lake
Hudson
Ashley
Metz
Ligonier
Wawaka
Rome City
Waterloo
Corunna
Shipshewana
Lagrange
Steuben
Dekalb
Noble
Whitley
Columbia City
Churubusco
Huntertown
Arcola
Harlan
Leo
Woodburn
Monmouth
Hoagland
Ossian
Roanoke
Huntington
Andrews
Marion
Kingsland
Decatur
Monroe
Berne
Geneva
Bluffton
Mt. Etna
Liberty Mills
South Whitley
Warren
Wells
Adams
Jay
Randolph
Union City
Greenville
Spartanburg
Lynn
Losantville
Fountain City
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Miami R.
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Tippecanoe R.
Wildcat Cr.
Eel R.
Deer Cr.
Mississinewa R.
Salamonie R.
Mississinewa R.
Whitewater R.
Big Blue R.
Mud Cr.
Big Walnut Cr.
Sugar Cr.
Eel R.
Mill Cr.
Raccoon Cr.
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Little Vermillion R.
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Lafayette
Monticello
Rensselaer
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Remington
Morocco
Mt. Ayr
Surrey
Francesville
Winamac
Pulaski
Star City
Monterey
Tiosa
Rochester
Argos
Plymouth
Bremen
Walkerton
Hamlet
Knox
Lowell
Crown Point
Hobart
Gary
Hammond
Whiting
Chesterton
Otis
La Porte
Rolling Prairie
Kingsbury
Westville
Wanatah
Hanna
Union Mills
Kouts
Valparaiso
Hebron
Thayer
Shelby
Roselawn
Wheatfield
San Pierre
Judson
Kalthan
Fair Oaks
Wolcott
Reynolds
Chalmers
Wadena
Raub
Earl Park
Fowler
Swanington
Boswell
Oxford
Otterbein
Brookston
Battle Ground
Dayton
Pine Village
Green Hill
Winthrop
West Point
Stockwell
Clark's Hill
Romney
Colfax
New Richmond
Waynetown
Darlington
Thorntown
Terhune
Jefferson
Kirklin
Frankfort
Kempton
Tipton
Elwood
Atlanta
Arcadia
Sheridan
Cicero
Perkinsville
Anderson
Lapel
Pendleton
Fortville
Wilkinson
Greenfield
Cumberland
Maxwell
Dublin
Milton
Hagerstown
Williamsburg
Richmond
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Middletown
Chesterfield
Daleville
Muncie
Selma
Farmland
Winchester
Deerfield
Albany
New Corner
Eaton
Summitville
Windfall
Sharpsville
Alexandria
Frankton
Elwood
Pipton
Tipton
Kempton
Jonesboro
Gas City
Upland
Sweetser
Fairmount
Hartford City
Montpelle
Bryant
New Corydon
Penville
Dunkirk
Salonia
Portland
Redkey
Hagerstown
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Metz
Millersburg
Wakarusa
New Paris
Ligonier
Wawaka
Rome City
Waterloo
Corunna
Shipshewana
Albion
Kendallville
Wolf Lake
Avilla
Auburn
Garrett
Butler
Stryker
Edgerton
Hicksville
Farmer City
Pioneer
Alvordton
Montpelier
Bryan
Edon
Stryker
Archbold
Fayette
Delta
Wauseon
Swanton
Berkey
Holland
Toledo
Sylvania
Monclova
Waterville
Whitehouse
Maumee
Perrysburg
Rossford
Bowling Green
Portage
Woodville
Gibsonburg
Fremont
Clyde
Green Springs
Tiffin
Fostoria
Findlay
Bluffton
Mt. Etna
Liberty Mills
South Whitley
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Randolph
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Spartanburg
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Kingsbury
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Wanatah
Hanna
Union Mills
Kouts
Valparaiso
Hebron
Thayer
Shelby
Roselawn
Wheatfield
San Pierre
Judson
Kalthan
Fair Oaks
Wolcott
Reynolds
Chalmers
Wadena
Raub
Earl Park
Fowler
Swanington
Boswell
Oxford
Otterbein
Brookston
Battle Ground
Dayton
Pine Village
Green Hill
Winthrop
West Point
Stockwell
Clark's Hill
Romney
Colfax
New Richmond
Waynetown
Darlington
Thorntown
Terhune
Jefferson
Kirklin
Frankfort
Kempton
Tipton
Elwood
Atlanta
Arcadia
Sheridan
Cicero
Perkinsville
Anderson
Lapel
Pendleton
Fortville
Wilkinson
Greenfield
Cumberland
Maxwell
Dublin
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Hagerstown
Williamsburg
Richmond
Cadiz
Middletown
Chesterfield
Daleville
Muncie
Selma
Farmland
Winchester
Deerfield
Albany
New Corner
Eaton
Summitville
Windfall
Sharpsville
Alexandria
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Elwood
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Tipton
Kempton
Jonesboro
Gas City
Upland
Sweetser
Fairmount
Hartford City
Montpelle
Bryant
New Corydon
Penville
Dunkirk
Salonia
Portland
Redkey
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Millersburg
Wakarusa
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Wawaka
Rome City
Waterloo
Corunna
Shipshewana
Albion
Kendallville
Wolf Lake
Avilla
Auburn
Garrett
Butler
Stryker
Edgerton
Hicksville
Farmer City
Pioneer
Alvordton
Montpelier
Bryan
Edon
Stryker
Archbold
Fayette
Delta
Wauseon
Swanton
Berkey
Holland
Toledo
Sylvania
Monclova
Waterville
Whitehouse
Maumee
Perrysburg
Rossford
Bowling Green
Portage
Woodville
Gibsonburg
Fremont
Clyde
Green Springs
Tiffin
Fostoria
Findlay

AREA AND POPULATION OF INDIANA BY COUNTIES.

(*Continued.*)

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Madison	D 2	Anderson	460	36,487	70,470
Marion	C 3	Indianapolis	400	141,156	197,227
Marshall	C 1	Plymouth	440	23,818	25,119
Martin	C 4	Westsboals	340	13,973	14,711
Miami	C 2	Peru	375	25,823	23,344
Monroe	C 3	Bloomington	414	17,673	20,873
Montgomery	C 2	Crawfordsville	508	28,025	29,388
Morgan	C 3	Martinsville	415	18,643	20,457
Newton	B 2	Kentland	380	8,808	10,448
Noble	D 1	Albion	417	23,359	23,533
Ohio	D 4	Risingsun	87	4,955	4,724
Orange	C 4	Paoli	400	14,678	16,854
Owen	C 3	Spencer	380	15,040	15,149
Parke	B 3	Rockville	453	20,296	23 000
Perry	C 4	Cannelton	393	18,240	18,778
Pike	B 4	Petersburg	336	18,544	20,486
Porter	B 1	Valparaiso	418	18,052	19,175
Posey	B 4	Mount Vernon	410	21,529	22,383
Pulaski	C 1	Winamac	437	11,238	14,083
Putnam	C 3	Greencastle	482	22,335	21,478
Randolph	D 2	Winchester	450	28,085	28,658
Ripley	D 3	Versailles	447	19,350	19,881
Rush	D 3	Rushville	406	19,084	20,148
St. Joseph	C 1	South Bend	500	42,457	56,881
Scott	D 4	Scottsburg	190	7,833	8,307
Shelby	D 3	Shelbyville	408	25,454	26,491
Spencer	B 4	Rockport	406	22,060	22,407
Starke	C 1	Knox	314	7,339	10,431
Steuben	D 1	Angola	311	14,478	15,219
Sullivan	B 3	Sullivan	440	21,877	26,005
Switzerland	D 4	Vevay	225	12,514	11,840
Tippecanoe	C 2	Lafayette	488	35,078	38,659
Tipton	C 2	Tipton	260	18,157	19,116
Union	E 3	Liberty	162	7,006	6,748
Vanderburg	B 4	Evansville	236	59,809	71,789
Vermilion	B 2	Newport	255	13,154	15,252
Vigo	B 3	Terre Haute	402	50,195	62,085
Wabash	D 2	Wabash	418	27,126	28,235
Warren	B 2	Williamsport	366	10,955	11,871
Warrick	B 4	Boonville	397	21,161	22,329
Washington	C 4	Salem	523	18,619	19,409
Wayne	E 3	Richmond	409	37,628	38,970
Wells	D 2	Bluffton	367	21,514	23,449
White	C 2	Monticello	500	15,071	19,138
Whitley	D 2	Columbia City	336	17,708	17,328

temperature of 28° for January, and 76° for July. The mean rainfall for the year over the whole State is about forty-three inches. With the exception of sandy areas around Lake Michigan, the soil is generally fertile, and some of it remarkably so. In the northern and central parts the soil is composed of drift materials, more or less assorted by water action into beds of sand and clay. Without the drift region in the southern tier of counties, the soil has been derived by weathering of sandstones and limestones, and is generally less fertile than that of the prairies. The richest soils are found in the river valleys, particularly in those of the Wabash and the White Water.

Flora and Fauna. See these topics under United States.

Geology. The geological relations are greatly obscured by the heavy covering of glacial materials. North of the Wabash the prevailing strata are of Devonian age and mostly limestones. The eastern part of the State between the Ohio and the Wabash is underlain by Silurian and the western by Carboniferous rocks.

Mineral Resources. The coal-fields of Indiana cover an area of 6500 square miles in the western and southwestern counties. They are of Carboniferous age and yield bituminous coal suitable for heating. The chief producing counties are Clay and Vigo, each with an annual output of more than 1,000,000 tons, and Sullivan, Vermilion, Greene, and Parke counties. The total output in 1901 was 6,918,225 short tons, valued at $7,017,143. Petroleum, one of the most valuable products of the State, is found in the Lima district of Adams, Wells, Jay, Blackford, and Grant counties. From 1889 to 1901 inclusive, the output was 38,355,000 barrels; in the last year it amounted to 5,757,086 barrels, valued at $4,822,826. Natural gas is obtained in many of the central counties, including Hancock, Henry, Hamilton, Tipton, Madison, Grant, and Delaware, the area of the field being about 3000 square miles. In 1901 there were 4600 wells in operation, and the output was valued at $6,954,566. A large quantity of gas is transported to Chicago. Indiana has a valuable quarry industry, producing sandstones and limestones suited for building and ornamental purposes. The Bedford oölitic limestone, which comes from southern Indiana, is one of the best-known building-stones in the country. Brick-clays are widely distributed, and marls adapted to the manufacture of hydraulic cement are found along the Ohio River.

Agriculture. According to the census of 1900, 94.1 per cent. of the land area of the State was included in farms. The farm area increased in every decade but one—1880 to 1890—of the last half of the nineteenth century, making a total gain in the half-century of 69 per cent. In the same period the improved land increased more than twofold, amounting, in 1900, to 77.2 per cent. of the total farm area. The most extensive non-arable lands are in the hilly region of the south-central section, and in the swamp lands of the northern part. Formerly the land that was too wet for successful cultivation constituted in the aggregate a very considerable portion of the total area, but by an extensive system of drainage the greater part of it has been reclaimed, and now constitutes the most productive land in the State. The average size of farms had decreased from 136.3 acres in 1850 to 97.4 acres in 1900, every decade of that period having witnessed a decrease. The rented farms amount to 28.6 per cent. of the total number, over four-fifths of which are rented according to the share system.

Agriculture has the advantage of a very superior system of railroad transportation, and of numerous city markets within the State. Besides, proximity to such great centres in adjoining States as Chicago, Cincinnati, and Louisville opens up a wider field. Indiana is not divided into crop belts, nor does any one crop have a monopoly. The three-crop rotation system is commonly in vogue, and for a long time the State was one of the leaders in the production of corn, wheat, and hay (timothy and clover). Recently, with the great development of some of the Western States, that place has been lost, though a high rank is still held. The census for 1900 showed a larger acreage for corn, wheat, and hay than was reported at any previous census. Potatoes and oats are grown everywhere, but in somewhat larger quantities in the northern part of the State. Barley, buckwheat, and rye are raised, but not in large quantities. All kinds of fruits and vegetables common to the temperate zone are raised. Much attention is being given to the production of tomatoes for canning, and no other State west of the Alleghany Mountains equals Indiana in this respect. Of the total number of orchard trees, apple-trees (8,624,593) constitute 61.1 per cent. Large quantities of peaches are grown in some of the southeastern counties. The number of peach, pear, and plum trees each more than trebled during the decade ending with 1900.

Stock-Raising. Stock-raising is important, attention being evenly divided between horses, cattle, and swine. Every decade since 1870 has witnessed an increase in the number of all varieties of farm animals except sheep, which suffered a corresponding decrease. (The decrease shown in the table in the number of dairy cows is due to a change in the method of enumeration, and is, therefore, only apparent.) Sheep-raising is largely confined to the northeastern part of the State. In 1899, $8,027,370 was realized from the sale of dairy products, about half of which was from sales of butter and the remainder principally from sales of milk. The receipts from poultry products are also very large. The following tables, taken from the census returns of 1890 and 1900, show the relative importance of the different crops and varieties of farm animals and the changes which have occurred during the decade:

Crop (acres)	1900	1890
Corn	4,499,249	3,586,190
Wheat	2,893,293	2,570,017
Oats	1,017,385	1,102,479
Rye	43,562	62,890
Hay	2,442,414	2,330,504
Potatoes	84,245	113,509

Live Stock	1900	1890
Dairy cows	574,276	579,287
Other neat cattle	1,110,202	932,621
Horses	751,715	720,035
Mules and asses	67,725	59,644
Sheep	1,010,648	1,081,133
Swine	3,763,389	3,320,817

MANUFACTURES. Indiana is somewhat less fortunate than some of its sister States in respect to natural facilities of transportation and the possession of cities favorably situated to draw trade. It has no manufacturing centres of the first rank. Nevertheless, the highly developed state of railroad transportation gives Indiana an easy access to the markets of the country; and this, together with the superior resources of the State, is resulting in a rapid development of manufacturing. In 1900 there were 155,900 wage-earners engaged in manufactures, an increase of 41 per cent. for the decade ending with that year, as against an increase of 59.1 per cent. for the preceding decade. The percentage of the population engaged in manufacturing grew from 3.5 in 1880 to 5.0 in 1890 and 6.2 in 1900. Among the factors which are accountable for this recent growth, the most important is the development of the natural-gas resources of the State. From about 1886 the production of gas increased steadily until 1899, when it exceeded in amount that of any other State. The nature of this fuel confines its use to the region of production and to the immediately surrounding territories, where it may be secured by piping. Consequently, its benefits have been greatest to such towns as Elwood, Anderson, Muncie, and other places located in the natural-gas belt. The industries which have been attracted to this district are those which require an abundance of cheap fuel, such as iron and steel and glass manufactures. These two industries now take rank among the most important of the State, the increase of each during the decade 1890 to 1900 being respectively 307 and 392 per cent. The Indiana glass-factories now send shipments to Norway and New Zealand.

The manufacture of tin and terne plate has developed as a branch of the iron and steel industry. Another group of industries, and one that includes the three most important manufactures of the State, owes its development to the abundant local agricultural resources. Wheat and corn respectively give rise to the flour-milling and the distilling industries; and the feeding of stock, especially hogs, is largely responsible for the development of an important slaughtering industry. From the table appended it will be seen that there has been a slight decrease in the value of the flouring and grist mill products; but this is due to the decline of prices rather than in the amount of the output of the mills. The value of the production of liquors and of slaughtering and meat-packing products, on the contrary, increased respectively 134.9 and 57.1 per cent. Three-fourths of the liquors produced are distilled. The distilling interests are centred largely in Terre Haute. The slaughtering and meat-packing industry is the most extensive at Hammond (not far from Chicago) and at Indianapolis. During the decade 1890 to 1900 there was a decided decrease in wholesale slaughtering, not including meat-packing. This decrease has been much more than counterbalanced by the growth in that branch of the industry which includes meat-packing.

Another important group of manufactures has developed as a result of the extensive local timber resources. The forests contain valuable hardwood timbers, which are extensively used in the manufacture of carriages and wagons, furniture, and agricultural implements. South Bend is noted for the manufacture of carriages and wagons. To the supplies of hard-wood also is partially due the prominence attained in car-construction. The wood-pulp industry is likewise dependent upon the forests for its raw materials. Although the resources of the forests are rapidly diminishing, the industries which depend upon forest products continue to thrive, the necessary supplies being obtained from the adjoining States to the north and the south. Among other industries the manufacture of foundry and machine-shop products is the most important. The gain during the decade amounted to 80.5 per cent. The printing and publishing output and the manufacture of pottery, terra-cotta and fire-clay products also showed decided gains during the decade. The census figures on the next page show the relative importance of the leading industries for the years indicated.

TRANSPORTATION. Indiana's natural means of transportation consists of the Ohio River, forming the entire southern boundary of the State; its tributary, the Wabash, navigable at high water as far as Lafayette; and Lake Michigan on the north, with the single port of Michigan City. The National Road, running east and west through the central part of the State, played an important part during the pioneer period, as did also two canals—one, the Wabash and Erie, entering the State at the northeast corner and running diagonally across it to Evansville in the southwest corner; the other, the White Water Canal, extending from Lawrenceburg in the southeast corner of the State, north to Hagerstown. But these have been superseded by railroads, and for a number of years have been abandoned. Railroads have come to be the principal means of communication, the State being most advantageously placed in this respect. All lines from the east centring in Chicago pass through the State, as do most of the lines connecting the great commercial centres of the East with those of the West, besides some important northern and southern lines. Of a total mileage of 6459, less than 1000 miles of road have terminals within the State. There are 1.93 miles of railroad per 100 square miles of territory, and 24.91 miles for every 10,000 inhabitants. Recently there has been a remarkable development of cross-country electric car lines, and apparently these will become common in districts where local passenger traffic is great, or where railroad accommodations are wanting. Indiana has, in addition to one port of entry, two ports of delivery, Evansville and Indianapolis.

BANKS. In 1902 there were 145 national banks in the State. Their capital stock was $16,774,000; cash, etc., $8,998,000; loans, $62,453,000; and deposits, $76,079,000. There were 110 State banks with a capital of $4,914,000; cash, $1,618,000; loans, $17,991,000; and deposits, $23,316,000. There were 68 private banks with a capital of $1,639,000; cash, $659,000; loans (not including loans on real estate and other collateral security), $5,472,000; and deposits, $9,692,000. In the savings banks of the State there were $6,561,000 deposits, the average deposit being $267.93.

GOVERNMENT. Indiana has its second Constitution, the present one having been ratified by a vote of the people in 1851. An amendment may be proposed by either House, and after being approved by a majority of the members elected to each House of two consecutively chosen assemblies

INDUSTRIES	Year	Number of establishments	Wage-earners, average number	Value of products, including custom work and repairing
Total for selected industries for State	1900	5,441	98,470	$247,207,994
	1890	4,920	75,564	165,736,153
Increase, 1890 to 1900	.....	521	22,906	$81,471,841
Per cent. of increase	.....	10.6	30.3	49.2
Per cent. of total of all industries in State	1900	30.2	63.1	65.4
	1890	39.8	68.3	73.1
Glass	1900	110	13,015	14,757,883
	1890	21	3,010	2,995,409
Iron and steel	1900	27	7,579	19,338,481
	1890	15	2,648	4,742,760
Flouring and grist mill products	1900	897	2,124	30,150,766
	1890	723	2,785	31,239,627
Liquors: Total	1900	66	1,281	22,738,105
	1890	54	1,032	9,677,973
Slaughtering. Total	1900	36	3,597	43,862,273
	1890	21	2,107	27,913,840
Lumber and timber products	1900	1,849	9,503	20,613,724
	1890	1,633	15,021	20,278,023
Lumber, planing-mill products, including sash, doors, and blinds	1900	205	2,115	5,088,669
	1890	178	2,122	4,787,974
Paper and wood pulp	1900	39	1,816	4,170,497
	1890	29	805	1,776,016
Agricultural implements	1900	45	3,419	6,415,081
	1890	54	3,078	5,756,131
Carriage and wagon materials	1900	61	2,289	3,149,588
	1890	38	1,856	2,282,810
Carriages and wagons	1900	275	6,490	12,742,243
	1890	394	4,508	8,248,873
Cars and general shop construction and repairs by steam-railroad companies	1900	54	8,081	10,242,422
	1890	48	6,613	7,289,382
Cars, steam railroad, not including operations of railroad companies	1900	4	3,337	9,006,577
	1890	4	3,310	7,073,329
Furniture, factory product	1900	129	7,149	8,769,509
	1890	131	6,096	7,662,650
Foundry and machine shop products	1900	337	10,339	17,228,096
	1890	206	5,904	9,542,499
Printing and publishing, newspapers and periodicals	1900	638	4,084	6,093,191
	1890	505	2,628	3,589,513
Clay products: Total	1900	607	4,859	4,222,529
	1890	784	5,926	3,142,454
Clothing, men's, factory product	1900	31	2,908	3,367,831
	1890	22	1,874	2,570,179
Textiles: Total	1900	31	4,485	5,250,529
	1890	60	4,241	5,166,711

it becomes a part of the Constitution. Voters must be twenty-one years of age, and have resided in the State six months, the township sixty days, and the ward or precinct thirty days. General elections are held on the first Tuesday after the first Monday in November; the time of holding township elections is determined by law.

LEGISLATIVE. The Senate cannot exceed fifty, nor the House of Representatives one hundred members. The former are elected for four, and the latter for two years, from districts composed of contiguous counties, and no county can be divided for Senatorial apportionment. The regular sessions of the Legislature meet biennially on the Thursday after the first Monday of January in odd years, but the time of meeting may be changed by law. If an organization of either House is not effected in five days, compensation to the members of such House stops until its organization has been accomplished. Ordinary sessions are limited in length to sixty-one days, and special sessions to forty days. Revenue bills must originate in the Lower House.

EXECUTIVE. The Governor and Lieutenant-Governor are elected for four years, the former being eligible but for four in any period of eight years. A majority of the members in the two Houses may override the Governor's veto. Bills sent to the Governor become law if not returned within three days. The Governor exercises the usual pardoning power, subject to legal regulations. A secretary, auditor, and treasurer are elected for two years.

JUDICIAL. The Superior Court judges (from three to five) are elected for six years from districts by the State at large. A clerk of the Superior Court is elected for four years. The State is divided into judicial circuits, in each of which a judge is elected to serve six years, but the law makes it possible for a judge elected on one circuit to hold court in another. A prosecuting attorney is elected in each judicial circuit for two years. Justices of peace are elected in townships for four years. Other courts or tribunals of conciliation may be established by law.

LOCAL GOVERNMENT. At the general elections each county elects a clerk of the Circuit Court, auditor, and recorder to serve four years each, and a treasurer, sheriff, coroner, and surveyor to serve two years each. A new system of local government aiming at a more complete separation of the executive and legislative functions became operative in 1899. Legislative boards are

elected for each of the townships and for the county as a whole. They control expenditure and the levying of taxes. The local executive officers cannot create debts without the permission of these legislative bodies.

FINANCE. In January, 1901, the total State debt amounted to $4,504,615. Of this $1,085,000 cannot be paid off until 1915, and $144,000 cannot be paid off until 1937, and bonds held by Purdue University representing an additional $340,000 run perpetually. In October, 1901, there was a balance in the treasury of $611,649. For finance of education and charitable and penal institutions, see paragraphs under those headings.

POPULATION. In one or two respects Indiana differs much from other Northern States in point of population. It has been less affected by immigration, the native-born population being proportionally greater than that of any other Northern State. Furthermore, the population is peculiar in that a large per cent. came from the South—Kentucky, North Carolina, and Virginia—while generally being unaffected by the westward wave from New England and New York. Again, the proportion of urban population—30.6 per cent. in cities of only 4000 inhabitants (1900)—is less than that of any other of the Northwest Territory States. Of the 146,000 foreign born, the Germans constitute about one-half. The following shows the growth of population: In 1800, 2517; 1820, 147.178; 1840, 685,866; 1860, 1,350,428; 1880, 1,978,301; 1890, 2,192,404; 1900, 2,516,462—males, 1,285,404; females, 1,231,058; colored, 57,960. Indianapolis (the capital) in 1900 had 169,164; Evansville, 59,007; Fort Wayne, 45,115; Terre Haute, 36,673; South Bend, 35,999.

The State has thirteen Representatives in the National House of Representatives.

RELIGION. The Methodists from the pioneer days to the present have been the leading denomination, having more members in Indiana in proportion to the total State membership of all churches than in any other Northern State. In recent years the Christian Church has had a phenomenal growth. The Catholics are proportionally weaker than in any other Northern commonwealth. Altogether 55 different denominations are represented. Besides those mentioned, the most important are the Lutherans, Baptists, Presbyterians, United Brethren, and Friends.

EDUCATION. In recent years the educational status of Indiana has improved very rapidly. The percentage of illiteracy for the age period of ten years and over decreased from 7.5 per cent. in 1880 to 4.6 per cent. in 1900. The percentage of illiteracy of the colored population was 22.6. In 1899 there was 73 per cent. of all persons between the ages of six and twenty-one enrolled in the State schools, as against 71 per cent. in 1879, and the per cent. of attendance on the basis of enrollment increased during the same period from 61 per cent. to 76 per cent. This increase is partially the result of the recent compulsory education laws, which compel children between the ages of six and fourteen to attend the full term of the local school. The average length of the school term increased from 132 days in 1879 to 152 in 1900. A State law now requires a minimum term of six months, but there is still a decided contrast between the average length of the rural and the city schools. A carefully graded system is now universal throughout the State, and through the agency of a competent corps of county superintendents an efficient supervision of schools is effected. A serious problem has arisen in consequence of the very general decrease in the attendance at the rural schools. In 1899 there were 1848 schools having less than 15 pupils each. The solution of the problem is being found in the abandonment of the small schools and the transportation of the pupils to one centrally located school.

The greatest progress has been made in the high-school system of the State. Township high schools are now common. In 1899 there were 717 high schools, with courses of from two to four years in length, and 150 other schools in which some high-school work was done. High schools giving four-year courses and maintaining a certain standard of proficiency are granted commissions upon the approval of the State Board of Education. In the above year there were 156 commissioned high schools.

A considerable number of the teachers of the State have received collegiate and normal-school training. A more satisfactory system of examinations for teachers' certificates has been introduced, extending the jurisdiction of the State in the granting of certificates. At present life licenses are granted by the State Board of Education, as are also licenses for eight years and for sixty months. State licenses are issued by the State superintendent of public instruction for periods ranging from sixty to twelve months in length, while the county superintendent issues certificates for terms of from thirty-six to six months. The State maintains a normal school at Terre Haute, which in 1900 had an enrollment of 1672. Among the private normal schools are the Northern Indiana Normal School, at Valparaiso; the Tristate Normal, at Angola; Rochester Normal University, at Rochester; and the Eastern Indiana Normal University, at Muncie. In 1900 the total number of male teachers was 7208; female, 8409.

The total expenditure for schools in 1900 was $8,188,089, of which $4,800,965 went to teachers and superintendents. A comparative study of the last few decades of the nineteenth century shows that the rate of the State tax for common schools is decreasing, necessitating heavier local burdens, the sum raised by local taxes having increased fourfold during that period ($2,542,552 in 1899). It is also found that the per capita cost of education has greatly increased in the rural districts and decreased in the cities. Indiana has fortunately provided a large permanent school fund, amounting in 1900 to $10,359,959. Of this $2,467,655, called the Congressional Township Fund, was secured from the sale in each township of the sixteenth section of land. The remainder ($7,892,303), called the Common School Fund, is composed of the county seminary fund, saline fund, bank-tax fund, surplus-revenue fund, and the sinking fund.

Higher education is provided by the State University at Bloomington, and technical instruction by Perdue University at Lafayette. There are numerous higher denominational institutions, including Depauw University (Methodist), at Greencastle; Notre Dame University (Roman Catholic), near South Bend; Indianapolis University (including Butler College, Christian); Earlham College, at Richmond (Friends); Wa-

bash College, Crawfordsville; Hanover College (Presbyterian); and Franklin College (Baptist). Vincennes University, at Vincennes, and Rose Polytechnic Institute, at Terre Haute, are non-sectarian.

CHARITABLE AND PENAL INSTITUTIONS. Indiana has only recently begun a serious study of correctional and charitable problems. Formerly the township trustees distributed alms without let or hindrance, the burden of which was borne by the county. At present the township bears the expense of caring for its own poor, outdoor relief is discouraged, and uniform and detailed reports are made to county and State officers. Judges of the Circuit Court are now authorized to appoint boards of county charity, whose members are unsalaried. The State has pursued a policy of placing children in families rather than retaining them in institutions, and all children not defectives have been removed from the poor asylums. In 1900 the number of children in orphans' homes was 1682. The former prison at Jeffersonville has been transformed into a reformatory for first-offense cases, and is conducted very much on the 'Elmira' plan. The State has a parole law. There is a State board of charities appointed by the Governor, which has the power to investigate and supervise the charitable and correctional institutions of the State. These institutions are as follows: Hospitals for the insane at Richmond, Logansport, Evansville, and Indianapolis; a State Soldiers' Home, at Lafayette; School for the Deaf, Dumb, and Blind, at Indianapolis; School for Feeble-Minded Youths, at Fort Wayne; Soldiers' Orphans' Home, at Knightstown; Girls' Reform School, at Indianapolis; Boys' Reform School, at Plainfield; Woman's Prison, at Indianapolis; State prison, at Michigan City; and the State Reformatory, at Jeffersonville. Of these, all but the State prison are under the control of non-partisan boards. The expenditure incurred by these institutions in 1900 was $1,648,455, of which $1,290,790 was for maintenance. The earnings of the institutions for the same year amounted to $132,489. The expenditure for outdoor relief for the year ending in October, 1900, was $209,956, or only one-third as great as it was in 1895. The number of inmates (3096 in 1900) in the county poor asylums decreased relative to the total population during the same period. In 1900 the expenditure for gross maintenance of county poor asylums amounted to $345,496.

HISTORY. French trappers and fur-traders appeared within the present limits of Indiana as early probably as 1679. It is certain that La Salle, on his way to the Illinois Indians, crossed the northwestern part of the State by way of the Kankakee in 1680. The Miamis and Ouabachi (or Wabash) Indians then occupied the region, and welcomed the French, who built Fort Ouatanon, on the Wabash, in 1720, and Fort Vincennes in 1727. The first permanent settlement was founded in 1734-35, by a number of families who made their home in the neighborhood of Fort Vincennes. The population increased slowly; but, owing to the richness of the soil, the inhabitants (French entirely, together with negro and Indian slaves) enjoyed ease and great plenty. The territory came into the possession of England in 1763, but the English occupation was too brief to effect any change in the people or the laws. In 1778-79 George Rogers Clark (q.v.), with a handful of men, wrested the country from Great Britain. Hostilities with the Indians, continuing from 1781 to 1795, when a peace was conquered by General Wayne, brought great distress upon the settlers at Vincennes. In May, 1800, the Indiana Territory was organized, comprising all that portion of the Northwest Territory lying west and north of Ohio. Michigan and Illinois were subsequently set off, reducing Indiana to its present extent. Vincennes was the capital till 1813, when the seat of government was removed to Corydon. In 1811 Gen. William H. Harrison (q.v.), at the head of a force of regulars and militia, crushed the Indian tribes under the brother of Tecumseh at the battle of Tippecanoe (q.v.). When the war with England broke out the Indians renewed hostilities, but they were speedily subdued, and never more troubled the settlers. As in the case of Illinois, a large proportion of the immigrants into Indiana came from the South, and before 1816 repeated attempts were made to legalize slavery in the Territory, in spite of the ordinance of 1787. In 1816, the year of the State's admission into the Union, the question was definitely settled against slavery by the first constitutional convention, though a law prohibiting negroes and mulattoes from immigrating into the State remained in force till after the Civil War. The growth of the State in wealth and population was accelerated greatly by the construction of the National Road and the Wabash and Erie canals. Wild speculation in lands and railroads led to a general bankruptcy in 1837; but after 1846, when a compromise with the public creditors was effected, the economic and financial condition of the State improved steadily. Its prosperity since the Civil War has been due in great measure to the discovery of extensive coal, iron, and gas fields, and valuable deposits of building-stone, in different parts of the State. Conditions have been monotonously peaceful, except for spasmodic eruptions of mob violence (see WHITECAPS) in 1869 and 1888, and the disorders around Hammond attending the great railway strike of 1894, when strikers and Federal troops came into conflict. As a result of the strike, a board of labor commissioners was created in 1897, to act as a permanent tribunal of arbitration. In the same year an anti-trust law and a factory-inspection law were passed, and primary education was made compulsory. For more than twenty years after 1878 the State balanced almost perfectly between the two great political parties, vacillating, in State elections especially, from side to side by minute majorities in a total vote of several hundred thousand. The opportunity for political manipulation was correspondingly great, and in national elections every device known to practical politics was brought into play to gain the electoral vote of the State. Law-making was carried on frequently in a partisan spirit, and it was a favorite manœuvre with the minority in the Legislature, Republican or Democrat, whenever it was hopelessly outnumbered on an important question, to resign in a body, so as to prevent a quorum and thus block legislation. In national elections the State was Democratic up to 1860, excepting in the years 1836 and 1840, when it cast its vote for William H. Harrison, the Whig candidate. It was Republican from 1860 to 1872, Democratic in 1876, 1884, and 1892, and Republican again in 1880, 1888, 1896, and

1900. The Governors, since its organization as a Territory, have been as follows:

TERRITORIAL		
William H. Harrison		1800–1811
John Gibson		1811–1813
Thomas Posey		1813–1816
STATE		
Jonathan Jennings,	Democrat-Republican,	1816–1822
William Hendricks,	" "	1822–1825
James B. Ray,	" "	1825–1831
Noah Noble,	" "	1831–1837
David Wallace,	Whig,	1837–1840
Samuel Bigger,	"	1840–1843
James Whitcomb,	Democrat,	1843–1849
Joseph A. Wright,	"	1849–1857
Ashbel P. Willard,	Republican,	1857–1861
Oliver P. Morton,	"	1861–1867
Conrad Baker,	"	1867–1873
Thomas A. Hendricks,	Democrat,	1873–1877
James D. Williams,	"	1877–1881
Albert G. Porter,	Republican,	1881–1885
Isaac P. Gray,	Democrat,	1885–1889
Alvin P. Hovey,	Republican,	1889–1891
Ira J. Chase,	"	1891–1893
Claude Matthews,	Democrat,	1893–1897
James A. Mount,	Republican,	1897–1901
Winfield T. Durbin,	"	1901–

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INDIANA. (1) A romance by George Sand (1832), and the name of the heroine, a young Creole, ignorant of the world and married to a husband much older than herself. Her love is gained by Raymon, a man of leisure, who, when she yields to his ascendency, refuses to compromise himself and repulses her offer. After Raymon's marriage and the death of her husband, she becomes the wife of an English lover. The novel was written after the author had separated from her husband, and voices her indignation at the results of ill-assorted marriages. *Indiana*, which was George Sand's first novel, had a great success from the social question involved and the intense individuality which the author put into her work. (2) A character in Steele's comedy, *The Conscious Lovers*.

INDIANA ASBURY UNIVERSITY. See DE PAUW UNIVERSITY.

INDIAN AFFAIRS. The position of the Indian tribes within the limits of the United States is anomalous. Strictly speaking, they are not a part of the body politic, but are regarded as 'domestic dependent nations,' and are officially spoken of as the 'wards' of the nation. So long as they maintain their tribal relations, their right to regulate their domestic affairs has been generally conceded. Recently this right has been restricted by acts of Congress enlarging the jurisdiction of the Federal courts in respect to crimes committed by Indians. The tribes inhabiting the Indian Territory, namely, the Cherokees, Chickasaws, Choctaws, Creeks, and Seminoles, are officially known as the 'five civilized tribes.' They have adopted the habits of civilized life and live under well-ordered governments. Each nation has its own popularly elected executive, legislature, and judiciary. They may enact such laws for the regulation of their internal affairs as do not conflict with the Constitution and laws of the United States, while the decisions of their courts receive the same recognition as to faith and credit as those of the Territories. The title to land occupied by them is not in the individual members of the tribe, but in the nation as a whole, and it can be alienated only with the consent of the Government. White men may become members of an Indian nation by adoption, and are then subject to the jurisdiction of the tribal courts, although they still retain their citizenship. The Supreme Court has held that an Indian born within the jurisdiction of a tribe can become a citizen of the United States only by naturalization. By an act of Congress, however, passed in 1887, it was provided that Indians residing on lands allotted to them in severalty should be considered as citizens of the United States without the formality of naturalization. The immediate effect of the act of 1887 was to confer citizenship upon 10,122 Indians to whom allotments had already been made under special laws and treaties. Every year from 1000 to 2000 Indians signify their desire of becoming citizens by taking allotments. The right of Indians to sue and be sued in both Federal and State courts is well recognized, and they are frequently given the right of suffrage by the States in which they reside. At the present time there are estimated to be over 20,000 Indian voters in the United States. The Constitution confers upon Congress the power to regulate commerce with the Indian tribes, and until the year 1871 the common method of dealing with them was by treaty through the agency of special commissioners. In that year, however, an act of Congress abolished this practice, and placed under the immediate control of Congress all commercial or diplomatic intercourse with the Indians.

From an early period it has been the practice of the Government to conclude treaties with the Indians for the extinction of their possessory right to the lands occupied by them and for their removal to certain territories specially set apart for their occupation. These lands are known as Indian reservations, the largest and most important of which at the present time is the Indian Territory (q.v.), created in 1834. Whenever the United States sets apart an Indian reservation, whether within the territorial limits of a State or not, it has full authority to protect the Indians in their persons and property and to provide for the punishment of all offenses committed within the reservation. An Indian reservation lying within the limits of a State is, however, subject to its jurisdiction also except so far as concerns the government and protection of the Indians themselves, unless otherwise provided by treaty with the Indians. While all territory officially known as 'Indian country' is subject to the jurisdiction of the United States, and while it belongs to Congress to enact laws for the regulation of intercourse of Indians with one another and with citizens of the United States, it is the policy of the Government to leave to the Indians the regulation of their own domestic concerns as far as practicable. By acts of 1885 and 1890 Congress curtailed the jurisdiction of the Indian tribal courts. By the act of 1885 the authority to administer their own criminal laws among themselves, so far as certain enumerated crimes committed by Indians are concerned, was withdrawn and vested in Territorial courts. By the act of 1890 the Federal courts were given jurisdiction of all civil cases in the Indian Territory except those over which the tribal courts have exclusive jurisdiction, and over all cases of con-

tract between Indians and citizens of the United States, and all controversies between members of different tribes, as well as certain other cases specially enumerated. By the same act certain laws of Arkansas were extended over the Indian Territory. State courts have no jurisdiction over offenses committed by tribal Indians upon a reservation within the State.

It is the policy of the United States to exercise a general supervision over the affairs of the Indians and to protect them from the encroachments of unscrupulous whites, as well as from the evil consequences of their own ignorance and improvidence. Many statutes have been passed by Congress to prohibit hunting on their lands, to prevent cutting timber from their lands, or pasturing stock on them, to prevent the sale of intoxicating liquors to them, etc. Citizens of the United States of good moral character are permitted to trade with Indian tribes, upon giving bonds. The power of appointing and licensing Indian traders, as well as prescribing rules concerning the kind, quantity, and prices of goods to be sold, belongs to the United States Commissioner of Indian Affairs. This officer is further empowered to remove from Indian reservations all persons found there contrary to law or whose presence is deemed detrimental to the peace and good order of the Indians.

Until 1832 the supervision of Indian affairs was intrusted to a bureau in the War Department. In that year Congress authorized the President to appoint a commissioner charged with general superintendence of Indian affairs. He has the direction of eight inspectors and a large number of superintendents, agents, teachers, mechanics, etc. Since 1849 the business of Indian affairs has constituted a bureau in the Department of the Interior. The most numerous officials in the Indian service are the agents, appointed by the President for a term of four years, who are required to give bonds. Their duties are to superintend the intercourse among Indians within their respective agencies and to execute the orders of the commissioner. An important feature of the Indian service is the educational work. The President is empowered to employ capable persons to instruct the Indians in agriculture and to teach their children reading, writing, and arithmetic. By an act of 1882 he was authorized to appoint an inspector of Indian schools. The schools under Government control are the non-reservation training-schools and the reservation boarding and day schools. Besides these there are contract schools under the supervision of religious associations which receive Government aid. By an act of Congress passed in 1890, provision was made for field matrons who organize sewing-schools, weekly clubs, and Sabbath-schools among the Indians. In 1893 more than 21,000 Indian children were receiving the benefits of education, about two-thirds being enrolled in Government schools. The number of Indians occupying reservations is 134,476. The annual appropriation by Congress for the Indian service usually exceeds $10,000,000. The policy now being pursued by the Government will result in the incorporation of all Indians in the body politic as citizens, and with it the Indian reservations will disappear, the individuality of the Indian will be recognized, and the paternal care and control now exercised by the United States will cease.

Consult: *Annual Reports of the United States Commissioner of Indian Affairs;* Weil, *The Legal Status of the Indian* (New York, 1888).

IN'DIANAP'OLIS. The capital of Indiana and its largest city, and the county-seat of Marion County; on White River, in the centre of the State, 183 miles southeast of Chicago and 111 miles northwest of Cincinnati (Map: Indiana, C 3). It lies 700 feet above sea-level, in a broad, rolling plain. The surrounding region is rich in agricultural and mineral resources, and in forest trees of exceptional beauty. Large natural-gas and oil fields are tributary to it, and near by are coal-lands 7000 square miles in extent. Besides there are found in the vicinity of the capital building-stone, marl, iron, and other minerals. Wholly an inland city, Indianapolis relies on railways for its commerce. Within 50 miles of the centre of population of the United States for the past two decades, its location has made it a great railway centre. Here terminate seven divisions of the Big Four system, six divisions of the Pennsylvania Railroad, two divisions of the Cincinnati, Indianapolis and Western Railway, the Lake Erie and Western, and the Monon, besides ten interurban electric systems. The railways bring their passenger trains into a handsome union depot, and the interurban lines have contracted to erect a large union terminal station to cost over $1,000,000. Freight passing Indianapolis is carried over a belt railway, 15½ miles long. It encircles the city. The street-railway system represents an outlay of about $9,000,000, with 125 miles of tracks, and a park (Fairview) containing 200 acres.

The city is noted for the beauty of its streets, ranging from 40 to 120 feet in width, and shaded mainly by hard maples and elms, and crossing at right angles. In the heart of the city is a circular plaza, once known as 'the Governor's Circle,' and now called Monument Place, from which radiate four avenues to the four corners of the city. The park system comprises 1250 acres, and includes Riverside, extending for five miles along both sides of White River; the Indiana Central Canal and Fall Creek; Garfield, Brookside, Military, Saint Clair, and University parks, and Woodruff Place. The most notable structure in Indianapolis is the Soldiers' and Sailors' Monument, designed by Bruno Schmitz, of Berlin. It was erected by the State to commemorate the part Indiana bore in the wars of the Union. The monument is a shaft of stone and bronze 285 feet in height, surmounted by a figure of Indiana Triumphant. About the base are allegorical groups in stone representing war and peace, and beneath these are two great fountains. Near the monument are four subsidiary bronze statues of Gen. George Rogers Clark, Gen. William Henry Harrison, Gov. James Whitcomb, and Oliver Perry Morton. There is also a statue of Schuyler Colfax in University Park, and in the Capitol grounds one of Thomas A. Hendricks. A large fund has been raised for a memorial to Benjamin Harrison. The buildings most worthy of note are the Capitol, 492 by 185 feet, built of Indiana limestone at a cost of $2,000,000; the court-house, city hall. Federal arsenal, new post-office (to cost $2,500,000), Christ Church, Manual Training High School and some of the common-school buildings, Columbia Club, Commercial Club, the Claypool Hotel, the Propylæum, a wom-

an's building devoted to literary and social purposes, and, perhaps the finest of all, the public library, with 100,000 volumes. Three of the city's bridges possess more than ordinary beauty; they span Fall Creek at Illinois and Meridian streets and at Central Avenue, and are of stone.

Indianapolis is the seat of the University of Indianapolis, with an academic department known as Butler College, and departments of law, medicine, and dentistry. Here are also a Roman Catholic theological seminary, a negro Baptist college, a college under the control of the United Brethren Church, the Heron Art Museum and Art School, the State institutions for the education of the deaf and dumb and for the blind, a number of medical, dental, and law schools, etc. Public philanthropic institutions are numerous—a State reformatory for women, a State hospital for the insane, and many smaller hospitals, homes, and refuges for the sick and unfortunate. The public-school system includes, besides common schools, an academic high school and a manual-training high school, and a normal training-school. Its inventory of assets amounts to $2,398,766; its indebtedness (July 1, 1902), $868,000; its annual budget (1901), $934,337. Although far inland, Indianapolis is a port of entry and a point for the receipt and distribution of foreign as well as domestic commerce. Its chief articles of trade are grain and its products, live stock, meats, and the output of its extensive manufactories—milling machinery, engines, drugs, vehicles, furniture, bags, woolens, starch, and terra-cotta.

The government of the city is vested in a mayor, a council of twenty-one members (fifteen elected by wards and six at large), and a police judge, all chosen biennially. Appointments to the subordinate administrative departments are made by the Mayor. A school board of five, elected by popular vote and serving four years, governs an independent school corporation through an educational executive, the superintendent and a business executive (termed business director) each serving four years. The municipal budget (1901), including school expense, balances at about $2,700,000, the main items being: For fire department, $194,000; for police, $160,000; for parks, $100,947; for light, $113,273; for public health, $54,154; for water, $90,000. The tax valuation of all property, at perhaps three-fourths actual value, is $129,000,000, and the total debt of the city, exclusive of school debts, is about $2,300,000. Population, in 1850, 8091; 1860, 18,611; 1870, 48,244; 1880, 75,056; 1890, 105,436; 1900, 169,164. The population in 1900 included 17,100 foreign born and 15,900 negroes.

Settled in 1819, Indianapolis received its name in 1821, and became the capital on January 1, 1825, the seat of government being removed from Corydon. The opening of the first railroad in the State from Madison, on the Ohio River, occurred on October 1, 1847, and gave the little town its first impetus. The growth since 1889, when the introduction of natural gas revolutionized manufacture in Indiana, has been remarkable. Here Henry Ward Beecher served as pastor of the Second Presbyterian Church (1839 to 1847); Benjamin Harrison made Indianapolis his home from 1856 until his death, in 1901. Consult: *Indiana Gazetteer* (Indianapolis, 1849); Nowland, *Early Reminiscences of Indianapolis* (Indianapolis, 1870); Sulgrove, *History of Indianapolis and Marion County* (Philadelphia, 1884).

INDIAN ARCHIPELAGO, ärˈkĭ-pĕlˈă-gō. See MALAY ARCHIPELAGO.

INDIAN ARMY. See ARMIES, section on *British Empire*, and EAST INDIAN ARMY.

INDIAN ART. India cannot compete with the peoples of Western Asia in the antiquity of its existing monuments, largely because the earliest constructions were of wood, as is shown by the report of Megasthenes, Greek Ambassador of King Seleucus (c.300 B.C.) to the Court of Pataliputra, who admired the vast halls of the wooden palace of the Indian King, with their gilded columns. Stone and brick came into use c.250 B.C., under Asoka, and here Indian architectural history begins. It falls into three main periods: (1) BUDDHIST (B.C. 300 to c.700 A.D.), in which architecture begins to decline in the fifth century; (2) NEO-BRAHMANIC, ruling alone, in harmony with Buddhism in certain regions, from A.D. 700 to 1000, and then dividing the field with the (3) MOHAMMEDAN style, which began with the Afghan invasion in the early eleventh century. Since the English conquest Indian architecture has lost all vitality. There is no unity in India under these periods or styles. Local differences are enormous. The two main geographical divisions are North India, which was the earlier to develop, and South India. At the same time Indian art as a whole has a very characteristic style. It far excels in architecture at least the art of China and Japan, and it governs the art of neighboring regions like Tibet, Cambodia, Burma, and Siam, and islands like Java and Ceylon, which owe their civilization to India.

ARCHITECTURE.

In seeking to explain the origin of Indian architecture, some traces of Greek influence have been found in the north, filtering through the Greek Kingdom of Bactriana, and visible in early monuments of Kabul and Kashmir in the Ghandara monasteries of Jamalgiri and Takht-i-bahi, and in India proper at the Amravati Stupa; but both Egypt, and especially Assyria, exercised far more fundamental influence, through the intermediary of Persia, which was flourishing when Indian art commenced. But whatever suggestions were received, they serve but to bring out the originality of Indian art, which stands at the antipodes of Greece in its exaggeration of forms, its multiplication of details, its love of complicated and confused lines. At the beginning comparative simplicity reigned, and it was not until long after the Christian Era that the richness of design was reached which remained characteristic. This was partly due to the use of brick, instead of stone or marble, in nearly all open-air structures before the tenth century A.D., which diminished the opportunity for elaborate surface ornamentation. The principal classes of monuments are the *chaityas*, or temples, the *viharas*, or monasteries, and the *stupas*, or mound sanctuaries. The temples are at first excavated in the rock; not until the fifth century were any built above ground (except that of Buddha Gaya), to judge from remaining examples.

BUDDHIST PERIOD. Of the earliest monuments, those of the Buddhist period, aside from the memorial columns or *lats* (e.g. those of Asoka),

the important works were some thirty rock-cut temples and about a thousand monasteries, also cut out of the mountain-side. The temples are large, single, oblong halls, divided into nave and aisles by two rows of heavy columns, approached by a vestibule with an arched façade, richly carved, and having at the apsidal end a colossal statue of Buddha. There is a series of these covering a period of nearly a thousand years. The earliest—at Bhaja—are the smallest and simplest. At Karli (second century B.C.) the nave has a stilted tunnel vault, and the heavy columns are octagonal, with bases and capitals surmounted by elephants, making the interior somewhat resemble a dark, tunnel-vaulted French Romanesque church. Even more impressive are the largest cave temples at Ajanta and Ellora (q.v.), where temples and monasteries are multiplied side by side in the face of the rock. The massive piers, the wonderfully varied sculptures, and the frescoes at Ajanta are of special interest. The monasteries are more modest: they are often grouped about these temples, and consist of a large central hall, out of which open the individual cells of the recluses, all cut out of the rock. One of those at Ajanta is 65 feet square, and is supported by twenty pillars. The cells are on two sides, the entrance porch at one end and the sanctuary at the other, the whole being richly carved and painted. The third class, the *stupas*, or *topes*, are great brick memorial mounds of circular form. They were at first of domical outline, surmounted by a little chapel or shrine, and surrounded by a marble rail or balustrade entered by four gates. The Bharhut stupa (c.150 B.C.) has been demolished, but that of Sanchi is in splendid preservation. The Amravati stupa is remarkable for its elaborate and beautiful figured sculptures. Finally, the only temple built above ground during the Buddhist period, Buddha Gaya (c.100 B.C.), is in the form of a pyramid with square base, at the corners of which rise four small pyramids. It is 52 meters high, in nine stories, and with three inner superposed sanctuaries. Like all the other early monuments, it is built of brick. Originally it was surrounded by a marble rail like the *stupas*. The pyramidal form is exceptional in the north at this period, though later it became common in the south. Evidently there is little of constructive value in this period, as Buddha Gaya is the only example of the builders' art, the rest being cut out of the mass or mere mounds.

Neo-Brahmanic Period. The next period, the Neo-Brahmanic, almost entirely abandons the impressive rock-cut temples and monasteries, and develops decorative details. Indian art, which has hitherto been confined to the North, spreads not only southward, but far beyond the borders of India, and had previously been carried to China. The principal branch of this art is mistakenly called Jaina by some authorities. Its most interesting examples are perhaps in the Province of Orissa. The southern school asserts its independence. In the North the Brahman temples consist of one or more rectangular halls approached by porches and surmounted by curvilinear pyramids, while the temples of the South are immense rectangular inclosures entered through pyramidal doorways of several stories. Even now no true vaults are used in construction, but spaces are covered by false vaults of overhanging courses, and there are no vast interiors as there were in the earlier rock-cut temples. The central halls of the monasteries become open cloisters with their cells. A curious class of buildings at Ellora shows the transition to this period from the Buddhist, for they are in the open instead of cut in the mountain; but are entirely hewn out of the rock instead of being constructed. The Neo-Brahmanic monuments can be classified under five heads: (1) In the Northeast, Orissa; (2) in Bundelkhand and Rajputana; (3) in Gujarat; (4) in the Central Provinces; (5) in the South.

The style in Orissa, as it flourished for 700 or 800 years, differs from that of the South in having no storied towers or columnar halls or *gopurams*. The numerous temples at Bhuvaneswar are its highest expression. The tower of the larger temple (c.600 A.D.) is 180 feet high, and near it is the 'Black Pagoda,' whose superb decoration marks a new era. But in general these temples are small. They are built of stone, which has entirely replaced brickwork in this region. Much later (c.1200 A.D.) is the temple of Jagamath at Puri, which shows the absolute decadence of this style.

Quite distinct is the contemporary school of Rajputana, whose ruined city, Khajuraho, with its several miles of ancient buildings, including some forty temples, is unsurpassed in India. The plan of these temples is more elaborate, being made cruciform by the projection of wings and porches, and the elevation being elaborated by the grouping of many subordinate pyramids and spires around the central pyramid. Each temple stands on a stone platform, and ordinarily measures about 40 meters in height and 35 meters in width. Like the preceding, the remarkable temples at Gwalior date from the tenth to the eleventh century. Decorative and figured sculpture now spreads luxuriantly over every inch of surface. The interiors are small and dark, the supports heavy and broken, and the decoration of the pyramidal exterior has become the most effective part of the style. The style of contemporary towers is shown by the rich examples at Chittur. Perhaps the extreme of delicacy of design and minute care in execution appears in the two temples of Mount Abu (eleventh to twelfth century), built entirely of white marble, and each standing on a raised platform. The carved inside surface of a dome in the earlier of these temples (c.1030) is a more astonishing piece of work than the most elaborate English late-Gothic fan-vaulting. The use of false domes is an interesting feature of a whole group of these temples, including those at Nagda recently discovered.

Passing to the centre of India, we find few but important works. The temples of Ellora (q.v.), famous the world over, exemplify the fusion of Buddhism and Brahmanism. There are about thirty excavated in the rock over a distance of two kilometers, during a period of about three centuries (A.D. 500-800); others, again, as mentioned above, are cut in the rock above ground. The earliest and greatest temple is that of Viswakarma (see Ellora), 26 × 13 × 10 meters, divided into three aisles by 38 pillars. The temple of Indra is remarkably rich decoratively, but less so than the Kailasa, which is largely in the open (eighth century), cut out of a single mass of rock, and one of the most fantastic and

brilliant creations of Indian art. Another group of subterranean temples is on the island of Elephanta (q.v.), dating approximately from the eighth century, and easily visited from Bombay. The absorption of Buddhism by Brahmanism, seen during its earlier stages at Ellora, is almost complete at Elephanta, as shown by the sculptures and ritual. Some of the colossal statues are very impressive.

In the South Buddhism never had a strong hold, and its monuments begin after Jaina and Brahmin supremacy. Here also are, however, some subterranean rock-cut temples, the earliest monuments in the region. There are two groups, at Mahabalipur and at Badami. At the former is a most interesting series of small monolithic temples in the open, similar to the Kailasa at Ellora, and apparently the prototypes of the later pagodas of the South. Both groups are thought to belong to the sixth century A.D., and are among the earliest known Brahmin temples. The finest temple at Badami, though small—as are all these monuments—is beautifully executed in every detail, and unusually symmetrical. The sculpture is very profuse, particularly if we consider their early date; but it is less riotous than in the North. All these buildings are better lighted than the earlier rock-cut temples, which received light only through a big arched opening over the entrance, while here the entire façade is open.

There seems now to be a gap of about four centuries in the art of the South, until we reach the earliest pagodas. Pagoda architecture is characteristic of this region. Its most striking example is at Chidambaram. The plan is a large rectangle about 500 × 400 meters, having a *gopuram* at each cardinal point. These gopurams are rectangular truncated pyramids in several stories; the largest is about 50 meters high and has seven stories. There is a large sacred pond 100 × 60 meters, and the main temple has a thousand columns and measures 103 × 60 × 13 meters. In contrast with the buildings of the North is not only the enormous scale of such monuments, and their elaborate accessories, but also a radical difference in the proportions. The piers are far more slender and higher, with simpler outlines, and the interior effects are better. Even earlier is the pagoda at Tanjore (eleventh century), with a great gopuram tower in fifteen stories directly over the sanctuary; the *mantapam* or temple of the sacred bull, an open colonnaded shrine in three aisles, is a beautiful example of delicate lofty proportions and wide interiors. Another group of extremely sacred pagodas—inaccessible to Europeans—is at Tripetty; still another at Conjeveram.

But the greatest group in the entire South is at Vijayanagar (q.v.), which has remained a deserted city since 1565. Its monuments are comparatively late, dating mostly from the fifteenth and sixteenth centuries, and they belong to the culminating period of art in this region. The great pagoda of Liva and the temple of Vitoba illustrate the grandiose and monumental character of the buildings, although their taste is less pure than that of previous centuries. Still later is the great pagoda at Madura, an immense and imposing composition (seventeenth century). One of the best portions is the present Bazar or 'Puthu Mantapam,' 100 × 30 meters, with a roof supported by an imposing avenue of 128 piers, mostly in the form of realistic monsters and divinities, in a style much used in the South, but never with such richness and life-like detail as here.

In the matter of size and imposing composition nothing equals the great pagoda of Srirangam, one of the most gigantic edifices in the world. In the construction of the great pagodas it was the custom to make any additions by throwing out another concentric quadrangle, with its series of gopuram pyramids, the original sanctuary remaining in the centre; and, peculiarly enough, every time another quadrangle was erected its gopurams were higher than the preceding, so that the central gopurams ended by seeming insignificant. At Srirangam successive rulers had added to the original pagoda until there were seven concentric rectangles, the outer one measuring 880 × 760 meters. Aside from its size, there is little merit in the structure, as it is bare or poor in detail and design. As a whole these Southern pagodas are the most impressive buildings in India.

There is a region in the South, Mysore, which remains an architectural mystery. Hardly touched by explorers, it promises a rich and original harvest, if we can judge from the temples of the deserted cities of Baillur and Hullabid, wonderful and delicate creations, showing a sense of proportion and restraint unusual in India.

Buddhist Style in Neighboring Lands. Passing now to outlying parts of India and neighboring provinces, we find in the sequestered province of Nepal, between India and Tibet, an archaic style that explains some of the origins of Indian art and illustrates the connection with China. A first type of monument is that of the large circular domical stupas of earth and brick, surrounded not by a balustrade, but a simple plinth, and dedicated to Buddha. These are the earliest (Sambunath, Buddnath). A second and far commoner type is that of the pagoda-like temples in brick and wood formed of several stories of superposed roofs, each one in retreat and raised at the corners, in perfect analogy to Chinese monuments (Bhatgaon, Patan). A third type is that of stone temples of quite a different style and of admirable design. Chronologically all these buildings are late—not more than two to five centuries old—but they represent earlier types in a region that remained in a prehistoric undeveloped condition. So the class of pagoda-like temples of brick and stone is of extreme interest. It is the same in Burma, where many monasteries were built of wood or brick, and forms of Babylonian origin are perpetuated.

Of even greater architectural interest is Cambodia, whose ruined cities have only recently been discovered, with buildings dating between 950 and 1350. Here brick construction and stonework are very successfully combined. The ancient capital, Angkor, has a superb series of temples, particularly that of Nakhon Wat. Its inclosure measures about one mile each way, and the buildings are well composed. As in Southern India, there is a large pond surrounded by courts, corridors, and temples. Grouped pyramids are used, in stories of decreasing size. Monumental staircases most effectively connect the buildings. The sculpture is exceedingly rich, but is symmetrically arranged, and the lines are not broken up, but compose simply in a manner quite un-Indian.

The Renaissance character of some of the ornamentation is startling. In quality of detail the Angkor buildings are unsurpassed in India.

In Java, also, there is an interesting offshoot of Buddhist art. Its chef-d'œuvre is the famous Boro-Buddor (q.v.), built in the seventh century, a perfect epitome of Buddhist art before its fall. It is a stupa or dagoba in seven stories, approached by five processional paths, along which are seventy-two small domes surmounting separate dagobas which surround the central one. Nothing like this remains in Northern India among Buddhist monuments, so that for comparison one must go to Gandara, in the Northwest, to Jamalgiri and Takht-i-Bahi, which are its prototypes.

Still another little-explored region is the island of Ceylon, which also contains a mass of Buddhist monuments. The ancient capital, Anuradhapura, is unique among Buddhist cities in having a series of monuments illustrating this cult throughout nearly a millennium, it having lasted here for centuries after Brahmanism had displaced it on the mainland. There remain seven separate stupas, with processional paths, as in Java. Two of these stupas have three rows of high columns surrounding the central mound, monoliths about 26 feet high, reminding of the columns of a Persian palace. There is but little sculpture used in the decoration, and in some of it the lines of hieratic animals give additional points of resemblance to Western Asia.

Mohammedan Style. The superb Mohammedan architecture of India is treated under Mohammedan Art. It belongs to two stages—the Afghan and the Mongol. In some cases, as at Ahmedabad, the fusion with pure Indian art is so thorough as to leave only part of the credit to imported ideas from Persia and Bagdad. But at Delhi and Bijapur the style is fundamentally foreign.

DECORATIVE ARTS.

General Character. The religious character of Indian art is quite as prominent in other branches as it is in architecture. A knowledge of the intricacies of the Hindu pantheon is a necessary prerequisite to the study of the sculpture and painting, the pottery and even the lacquers, bronzes, and goldsmith work. There is little æsthetic value to the representations of the human figure in India; they interest in the mass, as decoration; and for their subject, as illustrative material for the study of Indian thought. The endless repetition of the same theme in the same monument is characteristic of its symbolic use, as it is, indeed, of the Oriental spirit. This impersonal character has favored the extraordinary tenacity of tradition and continuity of style still to be observed in the various provinces. This has been made possible by the hereditary nature and continuous life and organization of the different crafts, not only in the guilds of the cities, but especially in the groups of artisans which, organized as guilds, have for some 3000 years formed an integral part of the village communities of India, supplying its inhabitants by perpetual contract. The sumptuary arts fostered by the aristocracy naturally flourished in the cities and not in these village communities. Although originality vanished centuries ago, no fundamental damage had been inflicted on Indian arts until under British rule the incongruous architecture of Europe, the degrading methods of machine manufactures came into fashion in place of the native methods of hand work. This tenacity makes it possible to study some of the methods of antique art in modern India, because the continuous overland trade during antiquity and the Middle Ages kept India in constant relations with Persia, Babylonia, and Assyria, Egypt, and the late Hellenic States after Alexander's time, and later with the Mohammedan powers. The stepped temples of Baylonia, the filigree gold jewelry of Etruria and Greece, the enameled tiles of Persia, the products of the looms of Mesopotamia, and, later, the arts of the Mohammedans of Egypt, Syria, and Persia, were all echoed in India, with greater or less purity. Yet there was always enough of a transformation to give an aspect of Hindu unity to whatever was borrowed. Indian art has always been full of a character of its own. Its greatest successes have been in its decorative work, both on a small scale and in masses, and in the imposing compositions of its architecture. Its failures are due to a poor sense of form both in line and composition.

Sculpture. The three centuries before and after the Christian Era saw the development, under Buddhist influence, of the most artistic schools of sculpture that India ever saw. In certain parts of the North and Northwest, especially, there are strong traces of Greek and Persian influences, as in several monuments of the region of Peshawar. The famous Asoka edict-pillars and the encircling marble rails of the Buddhist *topes* of Bharhut, Buddha Gaya, and Sanchi (Bhilsa), all belong to the earliest stage (c.250-200 B.C.). Somewhat later are the rich series of the Amravati type and the sculptures of the earliest cave temples of Ellora, Kanheri, and Ajanta. The Buddhist style was continued in Ceylon after it had decayed on the mainland, as is shown at Anuradhapura. Most of these sculptures can be studied in the South Kensington Museum (London) or the Indian Museum (Calcutta), and in the British Museum and the Madras Museum. The subordination of sculpture to architecture is evident even at this early period: the human figure, though used in colossal size in statues and high reliefs, especially in representations of Buddha, is usually in rather minute proportions, and in confused and intricate compositions. Line upon line of reliefs are superposed, in which architectural detail and decorative design play an important part. The rock-cut figures of the caves are hardly as delicate as the earlier sculptures of the rails or the later work on the open-air temples. The almost classic style of Muttra, of which echoes even survive at Amravati, is gradually replaced by one given to grotesque and exaggerated forms: the female figure especially is treated with undue emphasis. No ideal types were created. The prevalent realism expressed itself more successfully in animal forms, which were plentifully interwoven with human and decorative motifs.

After the decay of Buddhist art, sculpture did not revive till the Jaina period of the eleventh century, whose temples at Gwalior, Mount Abu, and Khajuraho show the existence of a style of exquisite delicacy and profuse richness. Every part of the surface of the temples at Mount Abu, both within and without, is carved, and the later style of Hindu sculptures finds here its prototype. Horizontal lines are emphasized: decora-

tive design is given more importance than purely figured compositions. Then and even earlier the art of sculpture received great development in outlying regions, in Kashmir, Tibet, and the French sphere of influence. There probably never existed a style of art in which sculptured ornament was so profuse as the art of India and its neighbors. A second decadence came with the Mohammedan conquest: decorative design still flourished, but the Moslem dislike for the portrayal of the figure had its effect. Hindu traditions, however, were stronger than the Mohammedan belief: the recent sculpture of Delhi, Bombay, and Madras is directly derived from the eleventh century style through intermediary stages. Martand and Avantipore in Kashmir, Madura, Ellora, Puri, and Khajuraho contain the foremost works of the old Hindu school. Cole's *Catalogue to the Objects of Indian Art in the South Kensington Museum* (London, 1874) gives a good classification of the sculptures, which are also described in Fergusson's works, and in special monographs and volumes of the Government surveys and reports. The three divisions of the Brahman style—Dravidian, Chalukyan, and Indo-Aryan—all afforded great scope for sculpture by the elaborate plans and colossal proportions of their sacred buildings. The most extensive and magnificent sculptured effects in the Dravidian style are found at the temple of Rameswaram, in the Chalukyan style (with great prevalence of animal and bird friezes) at that of Hullabid, in the Indo-Aryan (Hindu) at Bhuvaneshwar.

The lack of æsthetic qualities in composition and form, which prevented monumental sculpture from reaching a high level of achievement, were not noticeable in the smaller branches of sculpture, such as carving in wood, marble, soapstone, and ivory, metal-work, clay figurines, as well as inlaying and enameling. The naturalism and exquisite detail here appear to advantage. Work in black wood, ebony and sandalwood is still carried on in many villages, for small objects, and in teakwood for the details of house decoration. Carved ivory is as popular as in China and Japan, both for statuettes and for reliefs of religious and genre scenes, hunts, animals, and birds.

PAINTING. There is not the same continuity in the use of painting as in the other larger arts. The developed Buddhist art of the period after Christ appears to have used wall-painting on a monumental scale, as in the caves of Ajanta and Bagh in Malwa, but then, as well as later, the impulse came from abroad, usually from Persia. At later times painting was spasmodically employed and became popular in the decoration of sculpture. The identification of the numerous gods by means of their symbols or emblems, and the emblematic use of different colors in their dress, made color an essential element in statuary and relief work. The Mohammedans introduced the illumination of manuscripts from Persia, and later still miniature painting became popular, especially at Delhi. The *Shah Jahan Nameh* and others in the Royal Library at Windsor, and the *Life of Timur*, belonging to Earl Amherst, are beautiful examples of illuminations.

JEWELRY. Of all the smaller arts in India, jewelry is the most universally interesting and beautiful. In it we see survivals of early and late Etruscan, Greek, and Asiatic forms, undoubtedly descended from imported originals. The techniques of filigree and granular work, only recently rediscovered in Europe after antique models, never were lost in India. There are at least three very primitive types of jewelry: (1) The heavy gold wire twisted into collars, girdles, bracelets, anklets, and necklaces, used originally throughout India; (2) the chopped gold style made of flat or cubic pieces, strung together, and either solid or hollow, all of general use, but now most popular in Gujarat; (3) the flat beaten silver type of many primitive tribes, similar to early Celtic work. There evidently is great similarity between the Indian races and the Etruscans in the profusion of jewelry that was always worn, as is evident from the earliest literature, such as the *Rig-Veda;* and the sculptures show that its forms have remained unaltered for over two thousand years. The present schools are those of Ahmedabad, with its archaic style; of Mysore, Vizianagram, and other towns, in thinnest pieces of beaten gold; of Kashmir and the Punjab, for the use of gems and enamels in richest but always tasteful variety; of Sindh and Beluchistan, similar but more solid and severe; of Oudh, formerly centred in Lucknow, similar to that of Delhi and Lahore; of Cuttack in Orissa, famous for silver filigree work; and a multitude of minor centres, like Dacca and Dinajpur in Bengal, the work of the last-mentioned place being extremely primitive. The Parsis of Bombay long held on to antique Persian forms, and the South used mythological subjects. The school of Trichinopoly, with very rich chains, necklaces, and bracelets, has long been a favorite one with Europeans. In fine, India has sounded every extreme and form of jewelry, from the most simple and primitive to the richest. See JEWELRY.

POTTERY. Even more than jewelry the pottery of India, especially in its unglazed varieties, preserves the ancient forms shown in the early sculptures and paintings. The potters of the villages have never changed these forms since very early times. Unglazed pottery has been made everywhere in India, and still survives quite generally, especially in the Punjab. Decorative pottery for commercial purposes, painted, gilt, glazed, or even pierced, is made in special varieties in different provinces: for instance, the gilt pottery at Amroha, the black and silvery ware at Azimghar, whose meretricious art is in great contrast to the simply beautiful glazed ware of Sindh, of Madura, and of the Punjab. The special preeminence of the best Indian pottery has always been the strict subordination of color and ornament to form and the conventionalizing and repetition of natural forms in the decoration. The glazed ware of these three schools only is worthy of standing beside the beautiful primitive unglazed pottery. Their knop and flower patterns, and other favorite floral designs, imitate classic and even Assyrian, Persian, and Egyptian originals; the shapes of the vases are also those of antique examples found in Oriental, Etruscan, and Greek tombs. The turquoise blue, golden brown, dark green, or purple colors are the most beautiful. The exquisite color tones and combinations can be studied even better in the glazed tiles which came into fashion with the Mohammedan conquest after the eleventh century. These encaustic tiles, when used to cover large wall spaces, or even entire buildings such as mosques,

produce an unparalleled effect of splendor. Here especially is Persian influence predominant. The potter was also the image-maker, producing innumerable painted clay figurines, mainly of the gods, to be worshiped in families and shrines.

METAL-WORK. Among the branches of artistic metal-work that of the arms and equipment of the great chieftains is prominent. The Buddhist, Hindu, and Jaina sculptures show how antique are many of the forms still in recent use, but of actual works that are preserved the finest do not date back of the great Mahratta warriors. There are two main schools, the Hindu and the Persian. The Punjab and Rajputana were among the main centres of the art. A comparison of the three great schools of the mediæval Orient shows that the most delicate and simple was the Arab, with its fine filigree work; richer and more highly colored was the Persian with its damaskeening, enameling, and carving; but richest of all was the Indian, which indeed sinned, perhaps, by excess of decoration, breaking the outlines and color scheme by high relief, hammered and cut goldwork, and a multitude of gems. The collection of King Edward has the finest examples of damaskeened suits, of crusading blades carved in relief, and of early matchlocks. The use of carved ivory often gives added brilliancy. Diamonds, rubies, and emeralds are the principal stones used, and the designs are largely floral. The collection of the India Museum ranks next to that of King Edward. Of the chieftains' swords valued as heirlooms and State possessions the finest are those of Swaji, Sultan Chand, and Polygar Katabomma Naik.

Damaskeening in gold and silver wire is a process probably imported during the Middle Ages into India from Persia and Syria. It is practiced in Kashmir, the Punjab, and the Nizam's dominions, though originally of wider use. The ornamentation is in floral patterns, either naturalistic (Bider) or conventional (Purniah). The boxes, bowls, vases, and caskets with this decoration often equal the best Mohammedan work of Egypt and Persia, and are among the most harmonious of Indian industrial works for form and well-composed ornament. The relief work in metal is less chaste and admirable, whether in brass, copper-gilt, bronze, or the precious metals, where the high relief technique and human and animal figures are often used. The gold and gilt work, however, is usually exquisite. The oldest examples are Buddhist pieces found in the Punjab and Afghanistan with Greco-Roman characteristics. The later work in chased parcel-gilt and gold sometimes pierced, especially that of Kashmir, is beautiful in shape, the gold being often given a ruddy hue or olive-brown. Lucknow, Dacca, Cutch, and Gujarat have been famous goldsmith centres.

Images or idols of gold and silver, brass and copper, or of an elaborate alloy, have always been profusely used in private houses for worship. Some are of gold, as those of Krishna and Saraswat; others of silver, as those of Shitala; others of copper, such as those of Surya and the serpent Naga. The larger figures are always cast and finished by hand.

ENAMEL. The art of enameling in *champlevé* is still practiced in greatest perfection at Jaipur in Rajputana, unique for the beauty of its ruby reds, coral reds, emerald greens, and turquoise and sapphire blues. Somewhat less perfect are the products of the schools of Lucknow, Benares, and Lahore. Indian enamels are combined remarkably with precious stones. Transparent enamels are used with success, and sometimes a thin plate of gold cut in elaborate scenes of figures and ornamentation and etched with a graver is superposed over an enamel ground melted on a gold back.

WOVEN FABRICS. The brocades, embroideries, woven tissues, laces, tapestries, and the like, so long one of the greatest prides of India, have suffered more than any other branch of art industry. The most sumptuous brocades come from Ahmedabad, Benares, and Murshidabad. The gold embroidered velvets for state canopies, housings, and caparisons are especially rich. But their designs are not as purely Oriental as are those of the appliqué-work on cloth and the early rugs and carpets with their Persian compositions of birds and animals. The jail industry and the so-called schools of industry have done even more than the rush orders from Europe to degrade the quality—both material and artistic—of India carpets.

BIBLIOGRAPHY. An excellent general view of Indian art is given by Le Bon, *Les civilisations de l'Inde* (Paris, 1887). For architecture, consult: *Les monuments de l'Inde* (Paris, 1893), by the same author; Fergusson, *History of Indian and Eastern Architecture* (London, 1899); Fergusson and Burgess, *Cave Temples of India* (ib., 1880); *Archæological Survey of India*, published by the Government (ib., 1874-1901). Sculpture is well analyzed by Captain Cole, *Catalogue to the Objects of Indian Art in South Kensington Museum* (London, 1874); Birdwood, *The Industrial Arts of India* (London, 1880), is the best authority on the minor arts. For the jewelry, see Baden-Powell, *Manufactures and Arts of the Punjab* (Lahore, 1872).

INDIANA UNIVERSITY. A coeducational institution of learning, situated at Bloomington, Ind. It was founded in 1820 as Indiana Seminary, and was rechartered as a university in 1838. The university is an integral part of the State public school system, and admits pupils from commissioned high schools without examination. It maintains a professional school of law, and confers the degrees of bachelor of arts, bachelor of laws, master of arts, and doctor of philosophy. No honorary degrees are conferred. The university has a biological station on Winona Lake. The summer school, formerly privately conducted, is now a part of the university. The elective system was introduced in 1885. In 1902 the faculty numbered 70, and the attendance was 1334, including 104 in the law school. At the same time the university had grounds and buildings valued at $400,000, an endowment fund of $600,000, and an annual income of $165,000. The library contains 43,000 volumes.

INDIAN BADGER, BUFFALO, etc. See BADGER; BUFFALO; etc.

INDIAN BIBLE. An Algonquin version of the Bible made by John Eliot (1661-63). This translation was the earliest version of the Bible to appear in America.

INDIAN CORN. See MAIZE.

INDIAN CRESS. See TROPÆOLUM.

INDIAN EMPEROR, THE, OR, THE CONQUEST OF MEXICO BY THE SPANIARDS. A tragedy

by Dryden, successfully produced in 1665. It forms a sequel to the *Indian Queen*.

INDIAN FIG. See PRICKLY PEAR.

INDIAN FIRE. A bright white signal fire, consisting of a mixture of potassium nitrate 24 parts, sulphur 7 parts, and arsenic disulphide 2 parts.

INDIAN HEAD. The highest point of the Palisades of the Hudson, opposite Hastings, so called from its resemblance to the features of a human being.

INDIAN HEMP. A very strong bast fibre obtained from the perennial herb *Apocynum cannabinum*, and used by the American Indians for weaving and for cards and nets. It is also sometimes called Canada hemp.

INDIAN LANGUAGES. The languages of India are both numerous and important. Cust in his book on the *Modern Languages of the East Indies* (London, 1878) enumerates nearly two hundred and fifty Indian languages, and some three hundred dialects. Of these languages divisions are: First, the group of Aryan tongues spoken throughout the entire northern half and central portion of India; second, the unrelated Dravidian group (q.v.) in the south; third, the Kolarian languages scattered here and there in Central Hindustan; fourth, the Tibeto-Burmese family of non-Aryan tongues, distributed over the vast area which the name implies; fifth, the Khari, an isolated language near Bhutan. To these may be added likewise two Indo-Chinese spoken families, namely, the Thai, under which comes the Siamese, and the Mon-Annam family, which takes in the Cambodian and Annamite. It may furthermore be stated, for completeness, that the languages of the great Malayan family spoken in Sumatra, Java, Borneo, and the Celebes, and even in the Philippines, have certain Indian affinities or show the influence of the various tongues of India.

The Aryan group of languages in India has preëminence alike for the number and the character of the people that speak those dialects, and for the genius of the languages themselves, as well as for the long historical development of this branch, and for the literature attached to it. In point of time the Aryan division of Indian tongues covers a period of culture extending from at least a thousand years before the Christian Era down to the present time. Broadly viewed, these periods may be recognized in the history of this division of dialects: (1) *Old Indian*, comprising the earliest Vedic dialect and the historic form of the speech known as Sanskrit (q.v.); (2) *Middle Indian*, which embraces Prakrit (q.v.) and Pali (q.v.), both of which are descended rather from the Vedic dialect, or its kin, than from the classical Sanskrit; (3) *New Indian*, including the modern vernaculars of the more cultivated peoples of Hindustan. The general characteristics of the Vedic idiom, together with certain peculiarities of the epic speech, and the classical development of the language, will be found discussed in the article on SANSKRIT (q.v.). Under the Middle Indian or Prakrit group are comprised the Maharashtri dialect, or Prakrit par excellence, with its Jaina varieties, likewise the Magadhi or Ardha-Magadhi, the Sauraseni, which is found in the dramas, the *Apabhraniśa* and the *Pāiśaci*. The New India group, geographically arranged, takes in the vernaculars of Assam, Nepal, and Kashmir (the latter called Kasmiri), also Uriya, Bengali, Behari, Hindi, the dialects of the Punjab and of Sindh, likewise Gujarati, Marathi, the Singhalese of Ceylon, Maldive, and Gypsy.

BIBLIOGRAPHY. The standard work on the Aryan languages of India is Grierson, *Linguistic Survey of India* (Calcutta, 1898). Consult also: Beames, *Comparative Grammar of the Modern Languages of India* (3 vols., London, 1872-79); Cust, *Modern Languages of the East Indies* (London, 1878); and for the phonology, Gray, *Indo-Iranian Phonology, with special reference to the Middle and New Indo-Iranian Languages* (New York, 1902).

INDIAN MADDER. See CHAY ROOT.

INDIAN-MEAL MOTH. One of the most familiar moths (*Plodia interpunctella*) that infest the cereals, Indian meal, dried yeast-cakes, and dried fruits, nuts, etc. The moth has wings which are reddish brown on the outer two-thirds and dirty whitish gray on the inner third. It has a wing expanse of rather more than half an inch. The larva is white, brownish-headed, and worm-like. It spins silken tubes through the substance on which it is feeding, and its excrement and portions of the food adhere to this web.

INDIAN MILLET. See SORGHUM, paragraph *Non-Saccharine*.

INDIAN MUSIC. The music of the aborigines of North America, although never reduced by them to a written science, is nevertheless marked by distinct racial characteristics. Of the greatest importance to the Indian musician was the emotion to be expressed; to this everything was subordinated. As a result the Indian songs can be divided into certain stereotyped classes (such as burial, love, war-songs), in each of which the similarity of the different melodies is most marked. This monotonous character of their tunes is an outgrowth of the very elements which among civilized peoples have been skillfully blended to produce original and unusual effects; for preëminent in Indian music are complicated rhythms (many of them as intricate as those of Schumann and Chopin) and a frequent use of syncopation. When it is remembered that they had no strict forms to restrain them, it will be seen how these two strong elements came in time to dominate and confine their whole musical system. The strictly technical side of Indian music is of less interest. Their scale, like the Chinese, Hindu, etc., consisted of five tones, and was, for the most part, major; their melodies generally ran from the top of the scale to the bottom; their conception of time was very exact; but they had no part-singing; no way of determining pitch, and consequently no universal key. Of most interest to the cultured musician are the wonderful transitions which we find everywhere throughout the native songs. The smoothness and rapidity of their changes from key to key are unsurpassed even in European music. The Indians had a sense of harmony, but, owing to the crudity of their musical science, it was never developed. Only by the use of wooden drums, toned to different pitches, did they get a sort of crude bass. Besides the drums their instruments consisted merely of a flute (with a scale of seven notes), a whistle (with a scale of five

notes), and a rattle, made of dry gourds, loaded with sand or pebbles.

INDIAN MUTINY, or SEPOY REBELLION. See under INDIA.

INDIAN MYTHOLOGY. The mythology of India as found in the ancient hymns of the *Veda* deserves especial consideration, because it represents an earlier state of thought with regard to mythological subjects than is found in any other literary monument of the Indo-Germanic peoples. The development of Hindu mythology down to the present is furthermore of interest because of the chance it gives for a long historical perspective. Attractive parallels may likewise be drawn between the oldest mythological figures of India and those in the pantheon of Greece and Rome, like Father Heaven and Mother Earth (Skt. *Dyāuṣ Piter, Pṛthivī Mātar*, Gk. *Ζεὺς πατήρ*, Lat. *Jupiter*), but they are often erroneous, dangerous, or misleading. Despite, for example, the recognized possibility of kinship by reason of common Aryan or Indo-Germanic unity, such etymological equations as those between Lat. *Uranus*, Gk. *Οὐρανος*, 'Heaven,' and Sanskrit *Varuṇa*, in Indian mythology, or again between *Κένταυροι* and *Gandharva*, or the fire-myth of *Prometheus* in connection with Skt. *pramanthana*, the rubbing stick used in kindling fire, break down or become uncertain under the searching light of keen linguistic criticism. Nevertheless, such comparisons are always interesting, and they are often instructive as showing how myths may develop independently or on grounds remotely associated or even disconnected. The mythology of India frequently helps to throw much light on such subjects. Myths abound in the *Rig-Veda;* they are the outgrowth of personifications of the powers of nature and meteorological phenomena. (See AGNI; INDRA; MARUT; MITRA; SOMA; SŪRYA; USHAS; VĀYU; YAMA.) In later Hindu mythology the gods of the old régime gradually become replaced by the great Hindu trinity or triad, Brahma, Vishnu, and Siva, with all the beliefs and notions associated with each of these names (q.v.). The later pantheon is occupied likewise by a band of minor deities, godlings or demigods, like Ganeśa, Kartikeya, Kubera, and the goddesses Durga, Lakshmi, and Sarasvati. (See the articles under these names.) India of all ages has known also many myths, legends, or fables connected with the stars and planets, with sacred rivers, streams, and trees, birds, and animals. Consult: Wilkins, *Hindu Mythology* (London, 1900); Dawson, *Dictionary of Hindu Mythology and Religion* (London, 1879); Macdonell, "Vedic Mythology," in Bühler, *Grundriss der indo-arischen Philologie und Altertumskunde* (Strassburg, 1897).

INDIAN OCEAN. One. of the five grand divisions of the hydrosphere, bounded on the west by Africa and the 20th meridian east of Greenwich (running through Cape Agulhas, the southern extremity of Africa), on the north by Asia, on the east by the East Indian Archipelago, Australia, and the 147th meridian (running through the southern extremity of Tasmania) (Map: World, Eastern Hemisphere, K 28). The southern boundary is in an indefinite way assumed to be approximately the Antarctic Circle, although many geographers prefer to call what is south of latitude 40° S. the Southern Ocean. In its broader sense it covers about 27,500,000 square miles. Gradually narrowing from south to north, the Indian Ocean forks at Cape Comorin into the Bay of Bengal on the east, and the Arabian Sea on the west, the latter again branching off into two arms, the Persian Gulf and the Red Sea, which reach respectively the mouth of the Euphrates-Tigris and the neighborhood of the Mediterranean. These limitations exclude the waters of the Indian Archipelago, as belonging rather to the Pacific Ocean. From Africa it receives the waters of the Limpopo and the Zambezi, and from Asia those of the Irrawaddy, Brahmaputra, Ganges, Indus, and the Shat-el-Arab. It contains numerous islands, chiefly confined to the northern and western regions. Of these Madagascar and Ceylon are the only ones of considerable magnitude, the others being mostly small groups of volcanic or coral formation, the volcanic islands being usually surrounded by coral reefs.

The greatest depth of the Indian Ocean is found in the northeastern part, where, close to the southeast of Java, soundings have been made of 20,340 feet, and a considerable basin of nearly this average depth lies to the northwest of the Australian continent. An elevated ridge running along the 40th parallel has an average depth of 12,000 feet. Krümmel estimates the average depth of the ocean to be 10,970 feet. The surface temperature of this ocean is higher than that of the others, the mean temperature of the northern portion being considerably over 80°, while the bottom temperature, falling below 40° at the equator, indicates an undercurrent of cold water from the Antarctic region. The currents of the Indian Ocean depend to a great extent on the winds. North of the equator they reverse their direction with the annual change of the northeast trade wind to the southwest monsoon, while under the equatorial calm belt the equatorial countercurrent flows eastward. South of the equator, under the southeast trade winds a current flows west, bending south along the coast of Africa through the Mozambique Channel, and meeting the Atlantic westward current at the Cape, where it is turned back to the east toward the south coast of Australia. The winds over the Indian Ocean are, as a rule, gentle, with frequent protracted calms, though hurricanes occur occasionally. This ocean was the first to find a place in the history of commerce. As a commercial channel it virtually maintained its superiority during two thousand years, being habitually traversed in a direct line between Arabia and Hindustan, while coasting voyages alone were known in the Atlantic. This comparatively bold navigation of the Indian Ocean was suggested and facilitated by the periodically alternating monsoons of the northern part.

INDIAN OIL TREE. See BUTTER-TREE.

IN'DIANO'LA. A city and the county-seat of Warren County, Iowa, 18 miles south of Des Moines, on the Chicago, Rock Island and Pacific, and the Chicago, Burlington and Quincy railroads (Map: Iowa, D 3). It controls a large trade in grain, butter, eggs, live stock, fruit, and vegetables. The city has a public library and Simpson College (Methodist Episcopal), opened in 1867. The electric-light plant is owned by the municipality. Population, in 1890, 2254; in 1900, 3261.

INDIAN PEOPLES. For the anthropologist India is of remarkable interest. On its soil may still be met all grades of culture, from the savagery of hill and swamp to the urban civilization born of river and plain, and all forms of human social aggregates, from the primitive family group or clan to the foreign-ruled provinces with their magnificent and luxurious capitals. Here all forms of agriculture are to be found, from the burned-over forest plot to the terraced hillside of the north; in the west and south the utilization of the desert by canals and tanks; all varieties of human dwellings, from the primitive abode in tree and cave to magnificent palaces and temples; all forms of human government, from the primitive democracy and tribal anarchy to organized despotism of the civilized sort; all kinds of marriage, from polygamy to the strictest monogamy, and all varieties of both these systems, and of polyandry as well; as well as all forms of religion from the crudest animism and Shamanism to the agnosticism of certain developments of Buddhism. All these things have been invented, exploited, modified, improved, or degraded by members of the black, the brown, the yellow, and the white races of man for many thousands of years; so that nowhere else in the world have so many millions of human beings done so many things at so many times in so many ways as in India. Remains of the industry of Paleolithic man have been found almost everywhere throughout the peninsula, which makes India seem almost as old as the race of man itself. By far the most important peoples of India belong to the Aryan stock. They are responsible for a number of social and religious ideas and institutions, many of which are simply the expression of the mentality of the more northern and western Aryan in the process of, and after adaptation to, an Oriental and largely tropical environment. They never overcame the land by mere force of numbers, and their influence upon the pre-Hindu population was less racial than social and religious. Many primitive tribes who took over the culture of their conquerors have become assimilated to the Aryan type while preserving intact their aboriginal speech. The complicated caste system (see CASTE) is largely, if not entirely, the result of the contact of the Aryan invaders with the aboriginal population (Dravidian, Kolarian, etc.) of the peninsula, and of the efforts of the conquering race to preserve its purity as much as possible against miscegenation. It was very early dominated by religious ideas, but recent investigations have shown that the lines of caste are not nearly so coincident with racial distinctions as had been assumed to be the case. After the Aryans of India, the Dravidians (the civilized Tamils, Telugus, Kanarese, and Malayalams), the more or less civilized Kodagu, or Koorgs, and the tribes of the Nilgiris, Central India, Orissa, part of Bengal, etc., such as the Irulas, Kurumbas, Badagas, Todas, Kotas, Kader, Khonds, Gonds, Oraons, and Maler, are the most important peoples. The various tribes of this stock illustrate all grades of human culture, from the jungle-dwelling Kurumbas to the high developments of the civilized Tamils, who in literature, architecture, and other arts have shown great ability, and some of them notable capacity for assimilating both Hindu and Christian culture. The Dravidian area lies chiefly in Southern India, but the Tamils have extended their influence over the north of Ceylon, forming a very important part of the population of that island.

Next to the Dravidians are to be considered the Kolarian peoples (Munda-Kols, Larka-Kols, Bhumij, Santals, Kharia, Juang, Saoras, etc.) of the Orissa-Bengal country and farther inland. The Santals represent the highest development of Kolarian culture, and the Juangs perhaps the lowest; while the others, except some of the Kols, are more or less primitive. Like the Dravidians, the Kolarians, who are looked upon by some as a people even older, have given to and taken from the ancient and modern Hindus, and have also undoubtedly affected the physical type of both Dravidians and Aryans. In the Kolarians, as in the Dravidians, certain scholars detect traces of negroid intermixture, as well as much Aryan and some Mongolian blood. The Veddas of Ceylon, by some ethnologists classified as a separate variety of mankind, certainly are one of the most primitive peoples now existing. They have been thought to represent the oldest non-negroid population of India, now disappearing. Some have sought to class the Todas of Southern Hindustan as a peculiar people. The islands off the Indian coast present some interesting tribes. The Selungs of the Mergui Archipelago are classed by Deniker as 'Indosenians'; but this is rather doubtful, and a like uncertainty exists regarding the inhabitants of the Nicobar Islands, the natives of the interior of Great Nicobar being savages of a rather primitive type. The Minkopis or Andaman Islanders are characteristic Negritos, whose extension must at one time have been much greater. In Assam, Burma, and the Malaccan possessions and protectorates of Great Britain, a great variety of peoples are to be found, chiefly of Indo-Chinese, Proto-Malay, and so-called 'Indonesian' origin, besides the Sakai and Semang of Malacca, who are more or less Negritos. Among the most notable of these peoples, outside of the Burmese, Karens, etc., are the Nagas of Manipur, the Chins of Burma and Arakan, the Lushai tribes of Assam, the Shans of Northern Burma, and some other tribes.

The anthropological history of India includes the following successions and impacts of races: Pre-Dravidian and pre-Kolarian (with mixtures of Negrito and Proto-Malay); Aryan (invasion by the northwest as early as B.C. 2000 at least); Greek invasion, in the time of Alexander the Great (locally important in the Indus region, and more important as partly opening India to the Western world); Bactrian invasions of the northwest (following the Greek, and of local importance); Mohammedan invasions (A.D. 1000-1400), resulting in the establishment of many dynasties in the northwest and west, including the famous Mogul Empire of Delhi, and its successors of the eighteenth century, which were broken up by the revolt of the Mahrattas and Sikhs, who restored Aryan supremacy. Besides these must be counted the Pathan influence in the northwest at various times, the Mongol (Tibeto-Sinitic) influence from a comparatively early period in the Himalayan region, and Indo-Chinese and related influences in the northeast. Malayan elements also were present in the south and east, with the later Arabo-Persian, Dutch, Portuguese, French, and British commercial, missionary, and political achievements. The Parsis (Persians),

who are settled chiefly in Bombay, are of great importance in spite of their limited numbers; the Jews have had some influence on the east coast; and the Chinese in Ceylon. Since coolie labor has been in demand natives of India have found their way to Madagascar, the West Indies, Guiana, and Africa.

INDIAN PHYSIC. A genus of North American herbs. See GILLENIA.

INDIAN PIPE. See ROOT PARASITES.

INDIAN POKE. See HELLEBORE.

INDIAN QUEEN, THE. A tragedy by Sir Robert Howard, in collaboration with Dryden, produced with great splendor in 1664. Its success was probably due to its scenic effects rather than to the heroic verse in which it was written.

INDIAN RED. An impure ferric oxide of a dark-red color, with a tinge of purple. It is used as a pigment. Much of the Indian red of commerce is prepared artificially by the calcination of a mixture of copperas and lime.

INDIAN RESERVATIONS. See RESERVATIONS, INDIAN.

INDIAN RIVER. A tidal inlet along the east coast of Florida, in Brevard and Volusia counties, running inside a sandy bar or beach a half to one mile in width (Map: Florida, H 4). It connects with the similar Halifax River at Titusville, and extends 100 miles south-southeast, opening into the ocean at Indian Inlet. Its width varies from a few hundred feet to three miles, and it is navigable for vessels drawing five feet.

INDIANS, AMERICAN. The name applied first by Columbus and his immediate successors to the natives of the newly discovered islands and mainland of America, under the mistaken impression that these regions were a part of the outlying coast of Asia. The name most frequently used by scientific writers, especially in Europe, is simply *American*, while the term *Amerind* has recently been suggested as a substitute. Recent authorities class the Eskimo with the yellow rather than with the red races; the reader will find them treated under ESKIMO.

Granting the existence of a group of characteristic races which may be termed American, the problem of their origin remains unsolved. It is almost certain that no common origin for all of them can be assumed, but that various sources of population and centres of dispersion must be considered. Failing accurate knowledge of the geological conditions existing in earlier epochs, the most probable sources of immigration were Asia by way of the northwest coast of North America, Europe by way of Greenland, and the general region of Polynesia by way of South America. There are correspondences in physical types and cultures which tend to support particularly the idea of Asiatic and Polynesian relations. However, the theory of the Americas as an independent centre of origin has much in its favor, and must be taken into account. For example, the Eskimo, who form a strikingly homogeneous group wherever found, would appear from the evidence to have occupied, in former times, the territory in the neighborhood of Hudson Bay, and to have spread from that focus north and east and west, following the Arctic coast-line, and it is unquestioned that the Asiatic group of Eskimo is of American origin. In short, the problem is complex and deals with a very remote period, which prevents satisfactory treatment. The most popular explanation is, of course, that of Asiatic origin, based upon the striking similarities in type and culture which are evident to even superficial observation. It must be remembered, however, that any relation is mutual, and it is quite as easy to argue for an Asiatic origin from America as for an American from Asia.

A striking characteristic of the race is the marked uniformity of physical type throughout the two continents of North and South America. In general the color is brown, frequently with reddish tint, light in some tribes and dark in others. The hair is glossy black, either straight or slightly wavy, and baldness is almost unknown. The beard is usually scanty, and is seldom allowed to grow, although a light mustache is somewhat common. The cheek-bones are prominent; the nose usually good, and in some tribes strongly aquiline; the eyes dark and apparently small, from being held less open than in the white man. In cubical brain capacity and structural development the Indian holds a middle place between the white man and the negro. In mental capacity, physical strength and endurance, as well as in vital force to resist or overcome disease, he is far below the white man.

INDIANS OF THE UNITED STATES AND BRITISH AMERICA.

DRESS. As became tribes largely made up of hunters, the dress was generally of skins, so fashioned as to combine the greatest protective warmth with the least incumbrance of weight. From the Arctic Circle to the Rio Grande or farther, except in California and the adjacent region, the native dress was usually of buckskin, consisting, for the men, of a shirt, G-string, or breechcloth, leggings, and moccasins, and for the women, of a short-sleeved tunic, waist-cloth or apron, belt for knife and sewing-awl, with leggings and moccasins, generally made in one piece. The warrior's shirt was frequently fringed with scalp-locks. In cold weather and on ceremonial occasions a decorated robe was worn, while in warm weather or when engaged in active exertion the men were usually stripped to the G-string. The young children went entirely naked in warm weather. Among the plains tribes the investiture of a boy with the G-string occurred when he was about ten years old, and was an occasion of good-natured rejoicing in the family, as indicating that he was now considered old enough to accompany his older relatives on hunting or war expeditions. The Gulf tribes and those of the Southwest wore turbans of bright-colored woven stuff; but elsewhere, except in the extreme North, the head was usually bare. Some tribes west of the Rockies went practically naked. On the northwest coast the woman's dress was often of bark fibre. The Eastern moccasin was made in one piece; the plains moccasin had a separate sole of rawhide.

East of the Mississippi the men usually shaved the whole head, excepting for a crest along the top and a long scalp-lock plaited and decorated with various trinkets. This scalp-lock, the prize and trophy of the victor in battle, was universal east of the Rocky Mountains, and over a great part of the country westward, but seems to have been unknown in California. On the plains the men generally wore their hair its full length, in

two long braids hanging down over the shoulders in front, with the scalp-lock behind. The Osage and Pawnee shaved the head, excepting the scalp-lock, while the Wichita and Apache let the hair flow loosely down the back. The Pueblo, Piute, and most of the California tribes usually wore it cut off in front above the eyes and at the shoulder-level behind. The Navaho bunched it into club shape. Women usually wore it flowing loosely. Those of the Sioux and Cheyenne wore it neatly braided at the sides. The Pueblo women cut it off at the shoulders and rolled it at the sides, while among the Hopi the unmarried women were distinguished by an extraordinary butterfly arrangement of the hair on each side of the head.

Head-flattening was practiced by the Choctaw and some of the Carolina tribes, and throughout most of the Columbia region. Labrets of bone were used by many tribes of the northwest coast. Nose pendants were common with a few tribes (hence the Nez Percé), while ear pendants with both sexes were almost universal. Tattooing was widespread, reaching its highest development among the Haida and others of the northwest coast, and the Wichita of the southern plains. Excepting with the tattooed tribes, painting was an essential part of full dress, colors and designs varying according to the occasion or the particular 'medicine' of the individual.

Necklaces of shells, turquoise, mussel pearls, or, among the Navaho, of silver beads, were worn, with breastplates and gorgets of shell or bone and bracelets of copper wire. Feathers and small objects supposed to have a mysterious protecting influence were worn in the hair, and the dress itself was profusely decorated with shell beads, elk-teeth, porcupine-quills, antelope-hoofs, and similar trinkets.

Dwellings and House-Building. North of the Pueblo region the general house plan may be described as circular. Among the Haida and others of the Alaskan coast, and extending down to the Columbia, the prevailing type was of boards, painted with symbolic designs and with the famous heraldic totem-poles, carved from cedar-trunks, standing at the entrance. Along the Columbia were found great communal houses. California had several distinct types, of which the dug-out and the dome-shaped clay-built house, entered from the top, were perhaps most common. The Piute, Apache, Papago, and others of Nevada and Arizona had the *wikiup*, an elliptical structure covered with reed mats or grass. The Navaho *hogán* was a circular house of logs, covered with earth, and entered through a short passageway. The square-built stone or adobe dwelling of the Pueblo marked the northern limit of the Mexican culture area. These *pueblos*, as they were called by the Spaniards, were aggregations of continuous rooms occupied by different families, so that the whole village sometimes consisted of but a single house, sometimes several stories in height. The roofs were flat, a projection of the lower wall within the room served for seats and beds, and the fireplace was in one corner, instead of in the centre, as was almost universal elsewhere. For better security against the wild tribes, the outer walls of the lower story were often without doors or windows, entrance being gained through trap-doors in the roof by means of ladders, which were pulled up at night. For the same reason, many of the pueblos, especially in ancient times, were placed upon high mesas, or on shelves on the sides of almost inaccessible cliffs, whence the name 'cliff-dwellers.' The prevailing type on the plains was the conical skin *tipi* (a word of Sioux origin), no other being so easily portable and so well adapted to withstand the violent winds of the treeless prairies. The Pawnee, Arikara, Mandan, and one or two other tribes living close along the Missouri River built earth-covered log houses, somewhat like those of the Navaho, but much larger. The Wichita in the south built stationary houses of grass thatch laid over poles. About the upper lakes was found the bark-covered *tipi*, while east and southeast was the *wigwam*, a rectangular structure of stout poles, overlaid with bark or mats of woven rushes, and in general form closely resembling a rounded wagon top. Among the Iroquois it became the communal 'long house.' In the Gulf States were found houses, either rectangular or circular, of upright logs plastered over with clay.

The Pueblo villages had underground *kivas*, or public rooms, where the men of the various secret orders made their preparations for the great ceremonials. It corresponded somewhat to the medicine lodge of the plains tribes, built of green cottonwood branches for the celebration of their annual sun-dance, while among the Gulf tribes its place was supplied by the circular log 'town house.' Some of the Eastern and Southern tribes had also dead-houses, temples, and public granaries. In general, an Indian village was a scattering settlement, but with many of the Eastern tribes the more important towns were compactly built and strongly stockaded.

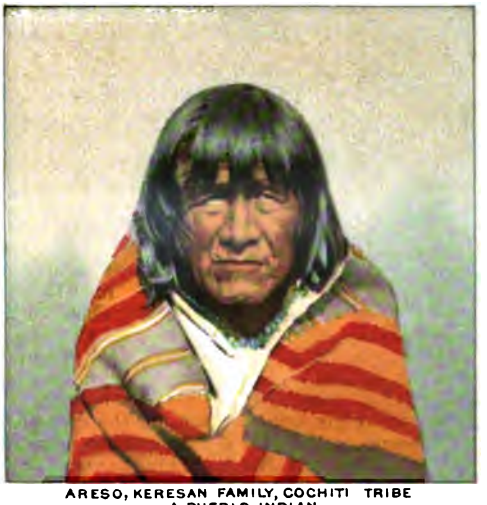
Food, Agriculture, Hunting, Fishing. Excepting on the plains and in the frozen north, agriculture was the chief dependence of most of the tribes. Those on the coast, including the Haida, were naturally fishermen. Those of the upper lakes and about the head of the Mississippi planted little, but gathered large quantities of wild rice and cranberries, besides sugar which they boiled from the sap of the maple. The equestrian plain tribes, excepting the corn-planting Pawnee and Arikara, were hunters pure and simple. Those of the Columbia were salmon-fishers, root-diggers, and berry-gatherers. Those of California and the Sierras were chiefly acorn and seed eaters. The Navaho, since the Spanish mission period, have lived principally by the flesh of their sheep and goats, while the predatory Apaches were expert in preparing the edible roots and petals of various desert plants. The Pueblos may be considered as purely agricultural, raising large quantities of corn, beans, squashes, and other vegetables, as well as chile and native tobacco. The tobacco was also cultivated by the Arikara and others of the upper Missouri, and by most of the Eastern tribes. Wild plums, pecans, mesquite beans, the tubers of the *pomme blanche*, and the seed-berries of the wild rose, were gathered and eaten by the buffalo-hunting tribes of the plains. Agriculture furnished more than half the food-supply of the Iroquois, the Atlantic coast and Gulf tribes, corn standing first in importance. In the arid Southwest irrigation was essential to success, and the Indians were skillful in utilizing the scanty water-supply in this manner.

Almost every animal of the plains and forest

AMERICAN INDIANS

ES-SEN-CE OR "LITTLE SHELL," ALGONQUIAN FAMILY, OJIBWA TRIBE
A FOREST INDIAN

NOM-PA-A-PA OR "TWO STRIKES," SIOUAN FAMILY, BRULE TRIBE
A PLAINS INDIAN



ARESO, KERESAN FAMILY, COCHITI TRIBE
A PUEBLO INDIAN

A SHAMAN, ATHAPASCAN FAMILY, NAVAHO TRIBE
AN INDIAN OF THE ARID REGION

OURAY, SHOSHONEAN FAMILY, UTE TRIBE
A MOUNTAIN INDIAN

CHIEF JOSEPH, SHAHAPTIAN FAMILY, NEZ-PERCE TRIBE
A COLUMBIA RIVER INDIAN

JULIUS BIEN & CO LITH N Y

was hunted for its flesh, skin, horns, teeth, or sinew. On the plains the great game animal was the buffalo, after which came the elk, deer, and antelope. Very few Indians of this region ate the meat of birds or fish, although not averse to eating the horse or dog, while the Navaho and Apache refused to eat or even touch the bear, for some occult religious reason, and had an almost equal horror of fish. The Eastern Indians used fish, flesh, and fowl indiscriminately, only being careful not to put two kinds into the same pot. Salt procured from natural deposits or by boiling the water of saline springs was in general use on the plains and in the Southwest, as well as among some tribes of the Ohio Valley. In the Gulf States lye was used as a substitute.

DOMESTICATED ANIMALS. The horse and dog appear to have been the only animals regularly domesticated, although various birds were sometimes kept in confinement for the sake of the feathers, or possibly in some cases for their flesh. The Indian pony is commonly supposed to have descended from animals brought over by the Spanish conquerors; but some of the Western tribes stoutly assert that the horse was theirs long before the white man ever came. However that may be, it is now so much a part of the religious ceremonial, and daily life of the plains tribes that it is difficult to imagine a time when they were without it. Dogs frequently took the place of horses as light-burden carriers, and were likewise esteemed a choice article of food. The Caddo are said by other Indians to have trained their dogs to follow the trail of raiding enemies, possibly a trick learned from association with the French. The animal's main usefulness was as a vigilant sentry. From animals originally introduced by the Spanish Franciscans over two centuries ago, the Navaho now have more than 400,000 sheep and goats, from the wool and flesh of which they derive almost their whole subsistence.

INDUSTRIES AND ARTS. Aside from his food-procuring occupations, the Indian had quite a number of industries and arts, both economic and æsthetic. Having only accidental knowledge of any metal but native copper, his tools were made of stone, bone, shell, or wood.

From stone he fashioned his knife, hammer, axe, spear-head, and arrow-point, as well as his pipe and gaming disk. Flint was the material commonly used for cutting tools in the East and obsidian in the West. Pipes were of great variety and sometimes of great beauty, being one of the most important adjuncts of ceremonial functions. The Navaho and Pueblos were expert in drilling turquoise for necklaces and ear-pendants. The black slate carving of the Haida and other northwest coast tribes is probably not excelled by any primitive people. Pots, bowls, mortars, and pestles were also fashioned from stone. Arrow-heads, knives, skin-dressers, sewing-awls, and fishing-hooks were frequently made from bone. Shells were also shaped into cutting tools, but were in more constant demand for gorgets and for the celebrated wampum beads, which were in universal use in the East for dress ornamentation and for weaving into record belts. The Eskimo and Aleut were expert carvers in walrus ivory, depicting whole hunting scenes upon a single tusk, with great beauty of execution. Mortars, bowls, clubs, masks, and sacred images for ceremonial occasions were made of wood. The Pueblos carved wooden figurines to represent their traditional mythologic characters, and distributed them to the children as dolls at their symbolic dances. Besides the immense carved totem-poles, the northwest coast tribes hewed great canoes from cedar-trunks, always painted and carved in characteristic style. The wooden dug-out canoe of the Atlantic tribes was a similar affair.

The Indian woman was a capable skin-dresser. Sinew was used for thread, and certain women were professionals in the work of cutting and fitting. Among the Pueblos and Navaho weaving had reached a high state of development, the material used having been originally a native cotton, and later wool. The art of feather-weaving was found with the Gulf tribes, while everywhere east of the Mississippi beautiful mats were woven from grass and rushes and stained in bright colors from native dyes. (See BLANKET.) Basketry was found almost everywhere except upon the plains, where rawhide boxes formed a substitute. The materials used were wood or cane splits, rushes, maguey fibre, and grass. The art reached its highest development in California, the Pomo baskets being unrivaled in any part of the world for closeness of weaving, intricacy of design, and beauty of shape and decoration. (See BASKET.) Akin to weaving and basketry was the art of decoration with beads and porcupine-quills, the most beautiful specimens being the cradles and colored sashes, on some of which months of labor were expended. Pottery was made by all the sedentary and semi-sedentary tribes of the Eastern timber region and the Southwest, the coil process being everywhere used. In the East the vessel was usually decorated with stamped patterns. Among the Pueblos and adjacent tribes figures in various colors were painted upon the smooth exterior and afterwards fixed in the firing process. Almost without exception the potter, basket-maker, weaver, and skin-dresser was a woman. The only metal really in use north of Mexico at the time of the discovery appears to have been copper, which was obtained native in small quantities in the Southern Alleghanies and in greater quantities from mines along the shores of Lake Superior. It was not smelted, but hammered into a great variety of useful and ornamental objects which passed from tribe to tribe in regular trade. Mica was quarried in western North Carolina for use in mirrors and gorgets, and beads and other small objects hammered out from gold nuggets or meteoric iron have been found in some of the Southern mounds. In the Southwest the Navaho have learned the smelting and forging arts from the Mexicans, and have now many expert silver-workers and blacksmiths, making beads, buttons, wrist-guards, rings, and belts from silver coins which they melt and shape in forges and molds of their own construction.

WAR. As in the tribal stage warfare is the chronic condition, so to the Indian war was the chief glory, scorn of death the highest virtue, and cowardice the greatest crime. Among extreme Northern tribes the principal weapons were the knife, club, and lance. To these were added farther south the bow and arrow, and the hatchet or tomahawk. The bow and arrow were practically universal, but the lance and shield as a rule were used only by the equestrian tribes of the open plains and the desert Southwest, the timber people finding them a hindrance to active move-

ment. Aside from the shield, defensive armor was not commonly used, excepting among tribes of the Alaskan coast, who had protective cuirasses of ivory plates, wooden slats, or of a very tough hide. The bow was selected wood, frequently reënforced with sinew along its entire length, and strung with a sinew cord. The Gulf tribes had also blowguns of cane for hunting. The club was of stone or wood, in the latter case being sometimes supplemented with a piercing blade of flint or iron. The shield of the plains warrior was of the toughest buffalo-hide, cut and decorated according to the spirit dream of the maker, and given to the recipient under the most solemn vows of lifelong tabus and sacred obligations.

In some tribes the direction of all that pertained to war belonged by hereditary right to certain clans or towns. Thus among the Creeks the privilege belonged to the people of the so-called 'red towns,' while on the other hand the 'white towns' had sole direction of peace negotiations. The prairie warriors had military orders with different degrees, the member being advanced from one to another by gradual steps. Thus the Kiowa had six orders, beginning with the 'Rabbits' or boys in training, and ending with a select body of ten tried and veteran warriors.

Service in any particular expedition was entirely a matter of individual choice, and the authority of the leader rested solely upon the voluntary obedience of his followers. On the plains the invitation was usually given by sending around a war-pipe, which every volunteer was expected to smoke. The going and the home-coming were attended with numerous ceremonies, and a successful campaign was celebrated with the scalp-dance, in which the women carried the captured scalps and sang the praises of the victors.

Indiscriminate massacre was the ordinary rule; but prisoners were frequently taken, either for torture, slavery, or adoption into the tribe. In the East the decision of the prisoner's fate was usually left to the women. If adopted, he was taken into a family and became thenceforth a full member of the tribe. If condemned to death, he met his fate with all the courage of his Indian training. On the plains captives were seldom tortured, but were more often taken into the tribe, being rarely, however, so completely admitted to membership as in the East. Along the Pacific Coast from Alaska to California regular slavery existed. The practice of scalping the slain enemy was probably universal north of Mexico, excepting among certain tribes of California, the scalp being kept as a trophy or offered in sacrifice to some tribal medicine. It was not, however, the only or even the chief evidence of the warrior's courage. His standing depended upon the number of his *coups* or brave deeds against the enemy, of which careful record was kept in the tribe. A man was entitled to 'count coup' (French, *a stroke*) not only for killing or scalping an enemy, but also for being the first to touch an enemy in the charge, for rescuing a disabled comrade, or for stealing a horse from a hostile camp. Thus three warriors might count coup upon a single slain enemy—viz. the one who killed him, the one who first touched the body with his coup-stick or weapon, and the one who secured the scalp. In many tribes it was customary to feast upon the flesh of one of the slain enemy after a notable victory.

AMUSEMENTS. The leisure of the Indian was taken up with athletic contests, games, dances, feasts, and story-telling. The ball-play was the chief athletic game everywhere east of the plains, as well as among some tribes of the Pacific Coast, the ball being handled with netted sticks somewhat resembling tennis rackets. From this game are derived the lacrosse and racquet of Canada and Louisiana. Next in importance in the East was the game known to the old traders as *chunkee*, played with a circular stone disk or wheel, and a pole curved at one end in the fashion of a shepherd's crook. The wheel was rolled by one of the contestants, while the other tried to slide the stick after it in such a way that the wheel would lie within the crook when both came to a stop. The plains tribes had a very similar game in which a netted wheel took the place of the stone disk. Foot-racing was common among the agricultural tribes, and horse-racing on the plains. The Wichitas had grand ceremonial races in which every person old enough to run participated. Dice games were universal.

A favorite pastime of the plains women was the awl game, played with marked sticks which were thrown down upon a stone set in the middle of a blanket, tally being kept by advancing an awl along certain marks around the margin of the blanket. Shinny and football were also played by the women. Hunt-the-button games were played within the tepee during the long winter nights, the players accompanying the movements of the hands with songs intended to distract the attention of the other side. Games of divination were also found among many tribes.

Dances, frequently preceded by purification rites and usually followed by feasting, were either social or ceremonial, and of great variety. Many were pantomimic, the performers wearing masks or other costumes intended to symbolize various animals or mythic characters, whose cries and actions they imitated.

Musical instruments were the drum, flageolet or flute, eagle-bone whistle, rattles of various kinds, and even a notched stick rubbed in saw fashion with one end resting upon a gourd for a sounding-board. The rattle was most commonly used in doctor's incantations and in the peyote ceremony, the whistle in the sun dance, and the flute to accompany the songs of the young men while riding about at night. There were songs for every occasion, lullaby, work, love, gaming, medicine, war, and ceremonials.

RELIGION AND MYTHOLOGY. To the Indian every animal, plant, and object of nature was animated by a spirit, beneficent or otherwise, according as it was propitiated or offended. Certain of these were regarded as especially powerful or active, as the sun, fire, and water among the elemental gods, the buffalo, eagle, and rattlesnake among the animals, and the cedar, cottonwood, corn, tobacco, and peyote among plants. The number four was peculiarly sacred, as having reference to the cardinal points. Colors had symbolic meanings, and sometimes also sex and local abiding-places. Thus with the Cherokee the red gods of victory lived in the Sunland or east, while the blue spirits of disaster dwelt in the north. Spirits were propitiated and implored with prayer, sacrifice, vigil, and fasting, and the purificatory sweat bath usually preceded every important ceremony. There was no overruling 'Great Spirit,' excepting as certain gods were

of more frequent importance than others. Among the plains Indians the spirit buffalo was all-important, while with the agricultural tribes the rain-gods took precedence. The sun and its earthly representative, fire, were everywhere venerated. Certain tribes had tribal 'medicine' or palladiums, with which the nation's prosperity was supposed to be bound up and around which centred their most elaborate ceremonial. Thus the Kiowa had their Taime image of stone, the Cheyenne their sacred arrows, the Omaha their great shell. Each man had also his own secret personal medicine.

The priest was also a doctor, medicine and religion being so inseparably connected in Indian idea that there was usually but one word to designate both. The priests were frequently organized into cult societies, and there were also brotherhoods bound together by certain secret rites. Great stress was laid upon dreams and sacrifice. Among the Pawnee, in former times, a captive girl was annually sacrificed to the goddess of fertility. The cannibalistic practices of the Eastern tribes after a victory, and the cannibal feasts of the Northwest coast, in which a slave was the usual victim, were also more or less sacrificial in motive. With these exceptions human sacrifice was rare, such bloody rites as those of the Aztecs being unknown in the North. There were special ceremonies for girls at puberty, and for young men on first taking rank with the warriors. Among the great religious ceremonials may be noted the green-corn dance of thanksgiving for the new crops, among the Eastern tribes; the sun dance and the more recent ghost dance of the plains tribes; the salmon dance of the Columbia region, and the celebrated snake dance of the Hopi of Arizona. To these may be added the peyote cult of the Southern plains. Tribal religions were sometimes subject to revival or revolution as new prophets arose from time to time. Thus the religion of the ghost dance, which has practically superseded the old beliefs and ceremonial forms of the plains tribes, had its origin in Nevada about fifteen years ago.

Each tribe had its genesis tradition and its culture hero—usually a great trickster and frequently an anthropomorphic animal—together with giants, dwarfs, fairies, witches, and various monsters, as well as animal tribes and chiefs, concerning all of whom there was a great deal of myth and folk-lore. Certain stories must be told only in winter, and others only at night, in order not to offend the chief personages concerned.

Social Organization. Government was based upon the gentile or clan system everywhere excepting among certain tribes of the plains and the Pacific region, notably the Kiowa and Klamath. Under this system the tribe was organized into certain clans or gentes, the members of each clan being considered as so closely related to each other that intermarriage within the clan was forbidden. Children usually belonged to the mother's clan and descent was in the female line. Chiefship and certain civil and religious functions inhered in particular clans. Captives or other aliens must be adopted into a family and clan in order to become members of the tribe. These clans were commonly known by the name of some class of animals, e.g. bear, beaver, wolf, etc.; more rarely by plant or other designations. In other words, the clan was distinguished by a *totem*, as it is now universally called, and the totemic practices were inseparably tied up with their religious rituals and social organization. See Totemism.

Among the plains tribes generally the clan system was either absent or quiescent, the unit being the band, each band having its own appointed place in the camping circle at the great tribal gatherings, as for instance the annual sun dance.

In exceptional cases tribes combined into confederacies, sometimes accidental and temporary, at other times built up in steady pursuance of a definite policy, as among the Iroquois and Creeks.

Land was the common property of the clan, tribe, or confederacy, excepting in certain tribes of California and the northwest coast, where it is asserted that individual ownership existed. Game, timber, and other natural products were also free, and hospitality was so much a cardinal virtue that it might almost be said that everything which was not hedged in by some sacred tabu was common property within the tribe and might be had for the asking, or without it if there seemed need. While this system almost eliminated the individual pauper, it killed ambition and hindered advancement by making it impossible for any man to rise far above the general level. Accumulation was impossible, and even what property he might possess was usually destroyed at his death. The niggard was rated with the coward, and in some tribes a man rose to the highest rank of distinction by giving away all that he owned. Along the Lower Columbia and the northwest coast this public surrender of the savings of a lifetime was a recognized tribal custom known as the *potlatch*.

Slavery was a regular institution on the Pacific Coast from Alaska to California, the slaves being prisoners of war, their children and descendants, who thus constituted a permanent slave caste within the tribe, condemned to hard labor, harsh treatment, sale, or death at the will of their masters. Slavery of a milder type seems to have existed among the South Atlantic tribes. In more modern times the Southern Indians followed the example of the colonists, and became the owners of negro slaves.

Numerous societies existed for various purposes, military, religious, and social. The plains tribes had a custom by which two young men mutually agreed to become partners or 'friends' through life, the compact being sometimes ratified by a public exchange of names.

Woman, while subject to her husband in ordinary affairs and debarred from certain societies and ceremonies, had yet well-defined rights of her own. She was complete mistress in household affairs, and among the Eastern tribes had either a voice or a representation in councils. With the Iroquois all important questions must be passed upon by a council of the women, who alone had power to declare war. The right of adoption, which meant the decision of a captive's fate, rested also with the women. In general her position was highest in the agricultural tribes. In the division of labor most of the heavy work fell to her share, while the dangerous and arduous undertakings belonged to the man. Polygamy was recognized in most of the tribes excepting the Pueblos.

Burial. The method of disposing of the dead

varied with the tribe and environment, inhumation being most common. Some tribes, as the Choctaw and Nanticoke, dug up the corpse after the flesh had had time to decay, and carefully cleaned the bones, to be kept thenceforth in a box in the cabin or deposited in a tribal ossuary. Some of the South Atlantic tribes preserved the mummified bodies in dead-houses. The Hurons exposed the bodies on scaffolds until the annual 'Feast of the Dead,' when all the bones were interred in a common sepulchre. Many of the smaller Eastern mounds were evidently built for sepulchral purposes. The Northern plains tribes usually deposited the bodies in trees or upon scaffolds. The Kiowa buried in the rocks. The Aleut of Alaska doubled the body into a compact bundle and laid it away in a sitting posture in a cave. Southward along the coast canoe burial was common. The Piute, Mohave, and others of the lower Colorado region practiced cremation.

Everywhere it was customary to bury or otherwise destroy the property of the deceased at the time of the funeral, and in many Eastern tribes food was placed beside the grave and a fire kept burning for four successive nights, the period supposed to be occupied by the soul in its journey to the land of shades. Laceration of the body and cutting off of the hair on such occasions was very common, especially on the plains, with wailing of the relatives for several weeks thereafter.

LANGUAGE. The first attempt at classifying the North American languages was made by Albert Gallatin in 1836, the relationships being established chiefly by a comparison of word roots. The beginning of regular systematic research dates from the establishment of the Bureau of Ethnology, under Major J. W. Powell, in 1879. The number of linguistic stocks north of Mexico, as at present recognized by the bureau, is 57, as given below, but it is probable that more extended study will reduce this number by disclosing affinities as yet undiscovered.

Algonquian	Keresan	Shoshonean
Athapascan	Kiowan	Siouan
Attacapan	Kitunahan	Skittagetan
Beothukan	Koluschan	Takilman
Caddoan	Kulanapan	Tañoan
Chimakuan	Kusan	Timuquanan
Chimarikan	Lutuamian	Tonikan
Chimmesyan	Mariposan	Tonkawan
Chinookan	Moguelumnan	Uchean
Chitimachan	Muskhogean	Waiilatpuan
Chumashan	Natchesan	Wakashan
Coahuiltecan	Palaihnihan	Washoan
Copehan	Piman	Weitspekan
Costañoan	Pujunan	Wishoskan
Eskimauan	Quoratean	Yakonan
Esselenian	Salinan	Yanan
Iroquoian	Salishan	Yukian
Kalapooian	Sastean	Yuman
Karankawan	Shahaptian	Zuñian

The necessity for some common means of intercommunication was supplied by trade jargons, chief of which were the 'Mobilian language,' and the Chinook jargon, and by the sign language on the plains. Some tribes had made fairly successful attempts at recording their history and mythic traditions by means of pictographs. Of these the best known are the Walam Olum of the Delaware, and the Kiowa calendars. Intertribal compacts were commemorated among the Eastern tribes by means of symbolic wampum belts. The Cherokee alone had a literature recorded in an alphabet of their own invention.

POPULATION. The theory of a former large Indian population has been found to be erroneous, but on the other hand the frequent assertion that the Indian has held his own, or is even increasing, is equally incorrect. It must be remembered that the Indian of the discovery was a full-blood, while the officially recognized Indian of to-day may be full-blood, mixed-blood, white man, or negro.

The population varied according to the district, being naturally greatest along the coast, and in rich agricultural regions where the means of subsistence were most abundant. The best summarizing of trustworthy early writers would seem to make the original Indian population east of the Mississippi about 200,000. Beyond this we have no reliable data for any large area, although it may be noted that so careful an observer as Powers estimates the Indian population of California just before the gold discovery to have been greater than that of all the rest of the United States together. Some examples may serve to show the terrible decrease in almost every section since the advent of the white man, taking only tribes still in existence, and making no account of tribes and whole linguistic stocks which have utterly disappeared.

In 1701 Lawson crossed the Carolinas from Charleston to Albemarle Sound, meeting in his journey sixteen different tribes. Of these only two have any representatives to-day, viz. the Tuscarora and Catawba. The Tuscarora at that time were estimated at 1200 warriors. They number to-day, all told, perhaps 700, of whom probably not one-fourth could make a valid claim to pure blood. The Catawba, who about the first settlement of Carolina had 1500 warriors, were reduced by 1743 to 400 warriors, in 1775 to about 100 warriors, and now number altogether about 100 souls, of whom hardly a dozen are of pure blood. Furthermore, the Catawba themselves in 1743 represented all that were left of more than twenty broken tribes.

The tribes of the ancient Iroquois league, with the larger tribes of the Gulf States, the latter now constituting the five civilized tribes of the Indian Territory, seem to form exceptions to the general history of aboriginal extermination, their numbers now being apparently as great as at any previous era. The figures are deceptive, however, for the reason that an overwhelming majority of those now so enrolled are mixed-bloods—sometimes with but an infinitesimal proportion of Indian blood—adopted whites, negroes, or Indians of other tribes. Thus in 1890 the so-called 'Cherokee Nation' of 27,000 souls included 2000 adopted whites, 3000 adopted negroes, and about 1500 Indians of other tribes, while those of full Cherokee blood were estimated at not more than one-fifth of the remainder. Since then the rolls have been swelled by the compulsory admission of some 7000 claimants repeatedly repudiated by the tribal Government.

On the plains the decrease has been appalling. The confederated Mandan, Minitarí, and Arikara in 1804 numbered nearly 8000 souls in eight villages. In 1900 they were 110 in one village. The Osage and Kaw at the previous date were estimated on good authority at 6300 and 1380 respectively. In 1900 they numbered 1781 and 217, including all mixed-bloods. The Pawnee numbered over 12,000 in 1834, 8400 in 1847, 3416 in 1861, 1440 in 1879, and 650 in 1900. The Tonkawa were estimated at 1000 in 1805, 700 in 1849, counted 314 in 1861, 108 in 1882, and now num-

ber but 51. The confederated Kiowa, Comanche, and Apache have decreased over 10 per cent. since 1890. The Navaho and Hopi, who as yet have remained almost undisturbed, seem to hold their own, but in California the native population has been almost wiped out. All that remain of some twenty tribes of the Oregon coast are now gathered upon Siletz reservation to the number of 482 in 1900, with the record for the year of 22 births and 31 deaths. On the North Pacific coast the Aleuts have dwindled within a century from an estimated 25,000 to a present 2000. The celebrated Haida, with 39 villages and 7000 souls in 1840, are now reduced to two villages with a population of but 600.

The chief destruction has been from changed conditions, new diseases and dissipation introduced by the white man. The present Indian population north of Mexico, according to the best official estimates, is approximately as follows: United States proper, 260,000; British America, 100,000; Alaska, 20,000; or a total considerably under 400,000 souls.

INDIANS OF MEXICO, CENTRAL AMERICA, AND WEST INDIES.

The tribes of Mexico and Central America exhibited every stage of culture from the brutish Cochimí and savage Seri to the civilized Maya, Tarasco, or Aztec, with their highly developed agriculture, architecture, and literature. From the Rio Grande to Panama some thirty linguistic stocks were represented, besides the Arawakan and Cariban tribes of the West Indies. From traditional and other evidence nearly all of the more important tribes of Mexico and Guatemala, including those of Piman, Nahuatlan, and Mayan stock, appear to have migrated from the north. The Otomí and Chinantec, however, appear to have antedated this movement and may properly be considered indigenous. There are shadowy traditions of earlier cultivated races, the Ulmec and Toltec, from whom the ruder Aztec acquired their first civilization, but it is difficult to decide whether these names belong to the domain of history or of myth. The roving tribes of the northern frontier seem to have been akin to the Apache, but have now so completely disappeared that even their affinity is not certainly established. The Comanche and Kiowa, as well as the Apache, made constant inroads from the north, penetrating as far down as Zacatecas. The destruction of the peaceable Carrizo tribes of the lower Rio Grande is chiefly due to these raids.

The tribes of the California peninsula, apparently of Yuman stock, were among the lowest of the human race, possessing every beastly instinct without even the savage virtue of bravery. The Seri of Tiburon Island in the adjacent gulf were but slightly higher in the scale, but earned respect by their determined defense of their territory against all intruders. Their southern neighbors, the Yaqui, were as much noted for their fighting qualities as for their superior industry and reliability. The Tarumari and other Piman tribes of the Sierra Madre, as far south as Jalisco, differ but little in general habit of life from the northern Pueblos. Physically they are dark and rather undersized. The Otomi of the central plateau were but little inferior in culture to the Aztec, by whom they had been subjected. The Chichimec of the same region, so long the subject of ethnologic conjecture, are now known to have been a definite people of distinct stock.

The Nahuatlan tribes which constituted the nucleus of the ancient Aztec Empire dwelt chiefly in the present states of Mexico and Puebla, the Aztec proper having their capital on the site of the present city of Mexico. Detached offshoots of the same stock were found as far south as Costa Rica. The empire included many tribes or nations of diverse stocks, but not all the cognate Nahuatlan tribes, even in the central territory, were under the rule of the Aztec, their bitterest enemies in fact being their neighbors and kinsmen, the Tlascaltec.

By reason of their military importance, the Aztec have been somewhat overrated. Their general culture, while high in itself, was not superior to that of the Tarasco or Zapotec, and was inferior to that of the Maya. In their social organization they had passed the matriarchal stage and reckoned descent and inheritance in the male line. The national prosperity rested upon agriculture. Land belonged to the clan and marriage was regulated by gentile laws. In architecture they had reached a high stage of advancement, the pyramid of hewn stone being one of the most characteristic features. They knew the secret of bronze, and were skillful workers in gold and copper, but stone implements continued in common use, particularly obsidian for cutting purposes. Their dress was of native cotton, woven and dyed in brilliant colors. They had an extensive pantheon with orders of priests and priestesses, and a ritual ceremonial, impressive but cruel and bloodthirsty in character, thousands of human victims being annually sacrificed to the god of war, and their flesh afterwards eaten by the multitude. Children of the higher classes were educated in public schools, where boys studied military science, writing, history, and religion, and girls were taught cooking, household work, weaving, and morals. There was a large native literature preserved in books written upon parchment or maguey paper, 24,000 bundles of this fibre being exacted as an annual tribute from the conquered tribes. The characters were ikonomatic, or partly ideographic, partly phonetic, upon the principle of the rebus. Their calendar recognized 365 days in the year.

In Southern Mexico were the Tarasco, Totonaco, Zapotec and Mixtec, all populous and civilized nations equal in culture to the Aztec, if not superior. They built houses of cut stone, brick, and mortar, planted fields and orchards, worked gold and copper—the Tarasco wearing complete body armor of wood plated with copper or gold —made beautiful inlaid pottery, and wove cotton garments and robes of bright-colored feathers. They had elaborate ritual religions, accompanied sometimes by human sacrifice, with calendar systems and hieroglyphic literatures like those of the Aztec tribes. The Totonaco, who practiced circumcision and head-flattening, claimed to have built the pyramid ruins of Teotihuacan, a few miles northwest from the city of Mexico. The wonderful ruins of Mitla are claimed by the Zapotec.

Passing by the ruder Zoque, Mixe, and Chinantec, and the more advanced Chiapanec, in Oaxaca and Chiapas, we enter the territory of the highly civilized Mayan tribes, who held the whole peninsula of Yucatan, with large portions

of Tabasco and Chiapas and most of Guatemala, and had an outlying colony in the Huastec of Vera Cruz. Their principal nations, besides the Maya proper in Yucatan, were the Quiche and Cakchiquel of Guatemala. There is evidence that the ancient builders of Palenque and Copan, already in ruins at the time of the conquest, were of the same stock. The Maya proper had at one time formed a powerful confederacy, which, however, had broken up into a number of independent States before the arrival of the Spaniards, by whom they were conquered in detail, the last free remnant being driven from their citadel of Chan Santa Cruz by Mexican troops only as late as 1900, after a stubbornly contested war of several years. When first known, the great cities Mayapan, Uxmal, and Chichén-itzá, now in ruins, were flourishing centres of dense populations, which had attained the highest point of native American civilization. In government they retained a modified clan system, with an hereditary chief ruler, assisted by a council from his own clan. They were preëminent in architecture, building palaces, pyramids, and cities of cut and polished limestone, set in mortar and covered with figures and hieroglyphic inscriptions. Strange as it must seem, all this was done without metal tools, gold and copper being used only for ornamental purposes. Agriculture was the principal industry, the common lands being portioned out by the village chiefs. Honey and wax were obtained from domesticated bees, and an active commerce was carried on by sea along the southern Gulf coast as far as the island of Cuba, copper disks and cacao-beans being used as currency. Their intricate calendar, with its cycles of 20, 52, and 260 years, has been the subject of much scholarly interest, as also their remarkable hieroglyphic records, written upon parchment or maguey paper, or carved or painted upon the walls of their ruined cities, and for which as yet there is no interpreter. The cognate Cakchiquel and Quiche were similar to the Maya in culture, differing only in dialect and extent of territory and influence. The great *Popol Vuh*, a native compendium of the ancient mythology and history of the Quiche, translated by Brasseur de Bourbourg, has been characterized as "one of the most valuable monuments of ancient American literature."

Honduras, Salvador, Nicaragua, and Upper Costa Rica were occupied by tribes of different stocks, some of them of considerable advancement, others, particularly along the east coast, mere savages. The Xinca, on the Guatemala-Salvador frontier, are believed to have been a remnant of the pre-Mayan tribes. The Carib, on the Honduras coast, were exiles from the Antilles. The Mosquito, Ulva, and Rama, farther south along or near the coast, were all wild tribes of different degrees of savagery. The Ulva also have the custom of head-flattening. The Guatuso of northern Costa Rica were an agricultural but brave and savage people, now near extermination, owing to the cruelties of the rubber-gatherers. South of their territory were found tribes of higher culture grade, the northern outposts of the civilized Chibchan tribes of Colombia.

The whole of the West Indies, with the exception of two or three sporadic settlements from Florida in the Bahamas, was held by tribes of the two great South American stocks, Arawakan and Cariban, the former being indigenous, while the latter were recent invaders, who, at the time of the discovery, had as yet colonized only the southern islands. The Arawakan tribes were peaceful and agricultural, skillful weavers, wood-carvers, and stone-polishers, but unable to withstand the inroads of the more savage Carib.

Below is given a list, from north to south, of the linguistic stocks of Mexico, Central America, and the islands, so far as present limited study enables us to classify them, the Mexican portion being according to the latest researches of Dr. Nicolas Leon. The first five are extensions from the United States; the Cariban, Chibchan, and Arawakan are mainly in South America:

Yuman (Lower California, etc.).
Piman.
Athapascan (Chihuahua, etc.).
Tañoan (Chihuahua).
Coahuiltecan (Tamaulipas, etc.).
Maratinian (Tamaulipas).
Serian (Sonora).
Chichimecan.
Otomían.
Matlaltzincan (Mexico and Michoacan).
Nahuatlan.
Tarascan (Michoacan).
Totonacan (Vera Cruz).
Zapotecan (Guerrero, Oaxaca).
Chinantecan (Oaxaca).
Huavean (Oaxaca).
Zoquean (Oaxaca, Chiapas).
Chiapanecan (Chiapas, Nicaragua, Costa Rica).
Mayan.
Xincan (Guatemala).
Cariban (Honduras and islands).
Lencan, Xicaquan, Payan } (Honduras).

INDIANS OF SOUTH AMERICA.

Our acquaintance with the ethnology of South America is still very imperfect, for the reason that vast areas are yet unexplored, while in some regions brought under Spanish or Portuguese dominion so much confusion has been wrought by the migration, disintegration, or complete extermination of tribes that the writings of early missionaries or travelers help little to clear up the difficulties. Here, as wherever else the uncivilized man confronts the European, we find the same steady march toward extinction, brought about originally by wholesale massacres and cruelties at the hands of the white conqueror, and later by the new diseases which followed in his wake.

As in North America, we find also on the southern continent the phenomenon of vast areas occupied by tribes of some half-dozen linguistic stocks, differing little in habit and all upon nearly the same culture plane, with other areas of mountainous or otherwise difficult country held by a multitude of small stocks with habits almost as widely variant as their languages. In general we may group the tribes by three great regions, viz. the Andean, the Amazonian, and the Pampean, the first being the mountainous territory extending along the Pacific coast from the isthmus to about 35° south, in Central Chile; the second, the whole interior stretching eastward from the summit of the Cordillera to the Atlantic, with the exception of the Chaco; and the third, comprising the Chaco forest and the grassy plains of the Pampas, between the Andes and the Paraná River, together with Southern Chile, and stretching southward to Cape Horn.

In the Andean region we find the highest culture, represented by the Chibcha, Yunca, Aymara, and above all the Quichua, whose empire extended nearly two thousand miles along the

coast and made its influence felt even among the wild tribes of the Upper Amazon and the Chaco border. In nearly all these nations we find a firmly established system of government, with social distinctions clearly defined; careful and successful agriculture, including irrigation and the use of manures; superior pottery, with curious designs found nowhere else; weaving of cotton and the hair of domesticated animals; beautiful metal-work in gold, silver, and bronze; and an architecture with such enduring monuments as the stupendous ruins of Gran Chimu, Paucartambo, and Tiahuanaco. So far as can be learned the various governments were based upon the clan system, even in Peru, where the Inca himself was but the executive officer of a council of the gentes. Of the various religious systems the best known is that of the Quichua, whose great god was the Sun, after whom came their culture hero, the white and bearded Viracocha. The dead were buried in the ground, deposited in stone sepulchres, or mummified and preserved thus in temples and caves. Anything in the nature of a hieroglyphic system appears to have been unknown, the nearest approach having been the *quipu* records of the Quichua. The descendants of these cultured Andean nations still number many millions, in fact constituting the bulk of the population over large areas, and although in theory accorded equal civil rights, they are yet, like aboriginal races elsewhere, in a state of practical vassalage to the dominant race of the conqueror.

The tribes of the Amazonian region, the Orinoco, and the Paraná, were all in various degrees of savagery, although nearly all sedentary and more or less agricultural in habit. Cannibalism prevailed extensively, the word itself being derived from the name of the fierce Carib tribe. The custom still exists on some of the southern headstreams of the Amazon. Living mainly under the tropics, many tribes were entirely naked, and tattooing and body-painting, although occasionally found, were rare. Labrets were worn by a number of tribes. Scalping was unknown, but several tribes, notably the Mundurucú, preserved the heads of their slain enemies. The blowgun and poisoned arrow were general throughout the Upper Amazon and Orinoco regions, curari poison constituting a chief article of intertribal trade. Government was of the loosest and confederations were almost unknown. The prevailing religious form was a crude animism, apparently several degrees lower than that of the North American savages. Throughout this vast area the tribes which have not disappeared are still nearly in their primitive condition, excepting where devoted missionaries have gathered them into villages, chiefly in Peru, Bolivia, and Paraguay. The Jesuit missions among the Guarani are recognized as the most successful ever established in America. At one time they contained over 300,000 Christianized Indians, the basis of the modern civilized States of Paraguay and Uruguay.

The tribes of the northern and central Pampean region, including the Chaco and Pampas sections of Argentina, are warlike equestrian nomads and hunters, living in tents of skin, subsisting almost entirely upon meat, and in other respects also very similar to our own plains tribes, but superior in the possession of herds of cattle and sheep, as well as horses, and in a certain skill in iron-working. The Araucanians of Southern Chile, an extension of one of the most important Pampean stocks, have successfully maintained their independence both against the Inca emperors and the conquering Spaniard. The Patagonians resemble their northern neighbors of Argentina, but represent a somewhat lower grade of culture. Like them, they are brave fighters and of fine physique. The natives of bleak Tierra del Fuego are in perhaps the lowest stage of culture found in South America, occupying the merest temporary shelters, going almost naked even in coldest weather, and having no apparent tribal forms or ceremonials. On the other hand, they are skillful hunters and daring fishermen.

Below is given a tentative list of the existing South American linguistic stocks, numbering approximately sixty so far as present very deficient knowledge permits a classification, Brinton being the chief authority:

Alikulufan (Tierra del Fuego).
Andaquian (Colombia).
Arauan (Brazil).
Araucan or Aucanian (Argentina, Chile).
Arawakan (Brazil, Venezuela, etc., and islands).
Atacamefian (Chile).
Aymaran (Peru, Bolivia).
Barbacoan (Colombia).
Betoyan (Colombia, Venezuela).
Canichanan (Bolivia).
Carajan (Brazil).
Cariban (Brazil, Venezuela, Guiana, islands).
Caririan (Brazil).
Catamarefian (Argentina).
Cayubaban (Bolivia).
Changuinan (Colombia).
Charruan (Uruguay, etc.).
Chibchan (Colombia, Costa Rica).
Chiquitan (Bolivia).
Chocoan (Colombia).
Chonekan or Tzonecan (Patagonia).
Churoyan (Colombia).
Cocanucan (Colombia).
Cunan (Colombia).
Guahiban or Guayban (Colombia).
Guaraunan (Venezuela).
Guaycuran (Argentina, etc.).
Itonaman (Bolivia).
Jaruran or Yaruran (Venezuela).
Jivaroan (Ecuador, etc.).
Laman (Peru).
Lulean (Argentina).
Mainan (Ecuador, etc.).
Matacoan (Argentina, Paraguay).
Mocoan (Colombia).
Mosetenan (Bolivia).
Moviman or Mobiman (Bolivia).
Onan (Tierra del Fuego).
Otomacan (Venezuela).
Paniquitan (Colombia).
Panoan (Peru).
Payaguan (Argentina).
Peban (Peru, Ecuador, etc.).
Piaroan (Salivan?)—(Colombia, Venezuela).
Puinavian (Colombia).
Puquinan (Peru).
Quichuan or Kechuan (Peru, Ecuador, etc.).
Salivan (Piaroan?)—(Venezuela).
Samucuan (Bolivia).
Tacanan (Bolivia).
Tapuyan (Brazil, Colombia).
Ticunan (Brazil).
Timotean (Venezuela).
Tupian (Brazil, Bolivia, etc.).
Yahganan (Tierra del Fuego).
Yuncan (Peru).
Yusucasan (Bolivia).
Zaparoan (Ecuador).

INDIAN SARSAPARILLA, NUNNARI-ROOT. The roots of Hemidesmus Indicus, an East Indian shrub of the natural order Asclepiadaceæ, used as a substitute for sarsaparilla.

INDIAN SUBREGION. A zoögeographical district of the Oriental Region, comprising India from the valley of the Indus eastward to the delta of the Brahmaputra, and southward nearly

to its terminus, where it mingles with the Ceylonese Subregion, which includes Ceylon and the extremity of the Indian Peninsula. It is rich in animal life, which, as a whole, is Oriental in its affinities. The Mediterranean (Palearctic) Subregion seems to extend eastward to the arid valley of the Indus, and India thus possesses several Ethiopian forms, which have led some zoölogists to regard its fauna as Ethiopian rather than Oriental, but the weight of opinion has turned against this view. The eastern shore of the Bay of Bengal is the home of so mixed an animal population that it has sometimes been called an 'Indo-Malayan' subregion, but this is not generally recognized. Northeastern India, along the midslopes of the southern Himalaya ranges, is very different, faunistically, from the peninsular plains or the low hot coastal regions, owing to its elevation, and forms a long westward-reaching tongue of the Indo-Chinese and Manchurian subregions (q.v.). See maps under DISTRIBUTION OF ANIMALS; and the paragraph on *Fauna*, under INDIA.

INDIAN SUMMER. A short season of pleasant weather in the Central and Atlantic Coast States, usually occurring in October or November, more rarely in December, and characterized by an almost cloudless sky, calm or light airs, a hazy atmosphere, and mild temperature in the daytime, but rather cool at night. It may last one or two weeks, and may recur two or three times during a season, but rarely more than twice. During Indian summer weather the barometer stands above the average, and the cloudless sky indicates that there is in general a descending tendency of the air at some distance above the earth. Balloons ascending to great heights show that there is very little horizontal movement in the air, but what there is is toward the east. At this season the leaves of most plants dry up and drop away, adding their débris to the dust in the atmosphere. Owing to the prevailing dryness, forest fires and prairie fires occur at this time, and the smoke adds to the intensity of the Indian summer haze, but is not necessarily the sole cause of it. Frequently such smoke spreads slowly eastward, gathers moisture to itself, and is followed by clouds and gentle rain. Precisely similar weather occurs in Germany, where it is known as the 'Old Woman's Summer' and 'Saint Luke's Summer,' and in England, where it is known as 'Saint Martin's Summer,' or 'All Hallow Summer'; these terms being applied to it according to the various dates on which it happens to occur in October or November. There are also many indications of its existence in China and Siam. The haze attending the African Harmattan in December and January appears very similar to that of Indian summer, but the diatom dust that characterizes the former has not yet been found in the latter.

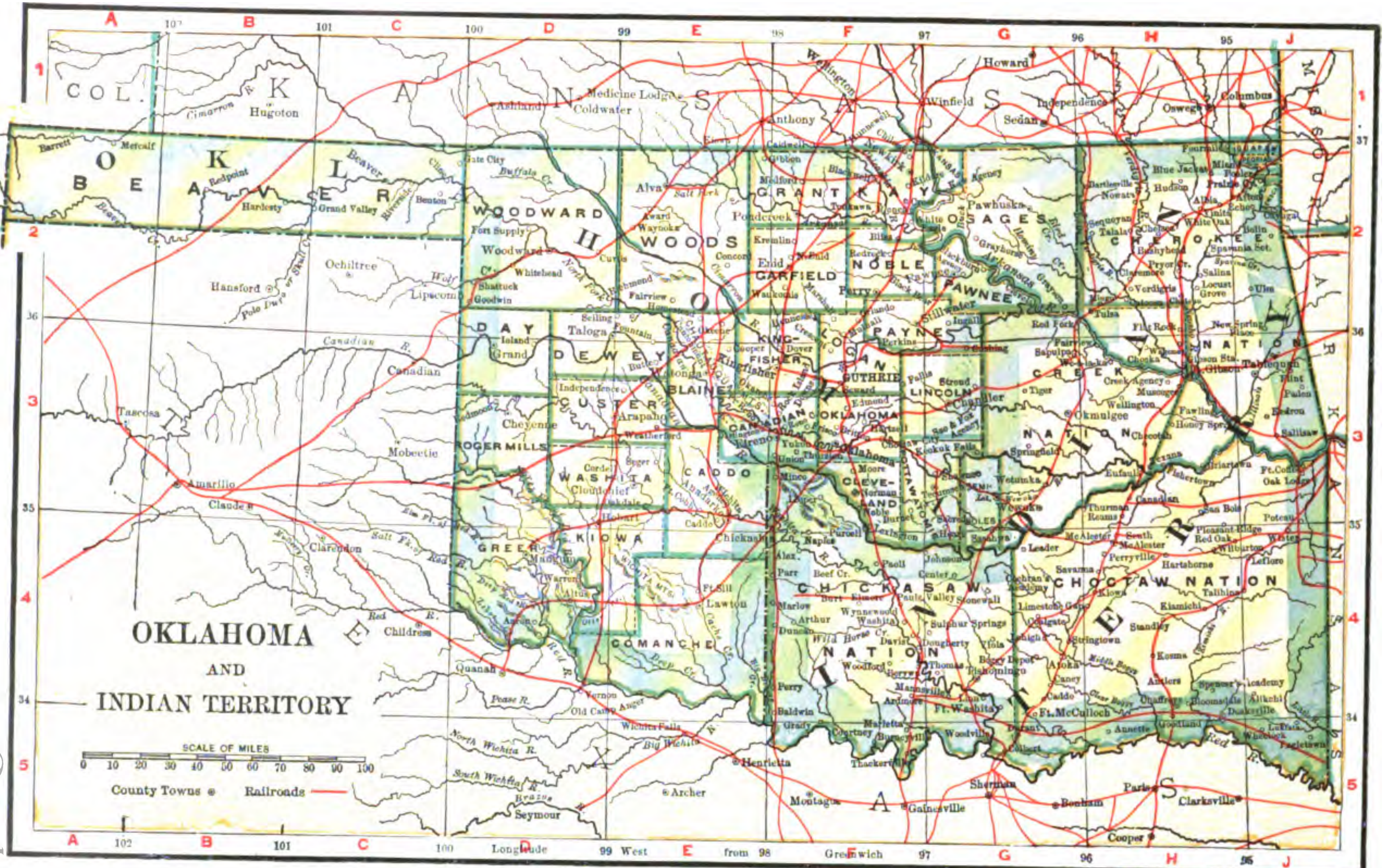
As to the origin of this expression, Mr. Albert Mathews has shown that it does not occur anywhere either in printed books or manuscripts until the year 1794; but at that time it was in use throughout the Atlantic States. The popular belief that Indian summer weather was predicted by the native Indians in conversation with the first European settlers finds no documentary corroboration, and the idea that the term Indian summer was employed by the early settlers seems to be a myth. In general, neither this term nor anything corresponding to it is to be found in any Indian language. The term Indian summer in its present usage was introduced into England from America. In 1778 Horace Walpole used the same expression, but he evidently had in mind the intense heats of the midsummer weather in India and the West Indies. For full information on the whole subject, see the *Monthly Weather Review*, vol. xxx., pp. 19-29 and 69-79 (Washington, 1902).

INDIAN TERRITORY. A Territory of the United States, situated nearly in the middle of the country. It is bounded on the north by Kansas and Oklahoma, on the east by Missouri and Arkansas, on the south by Texas, and on the west by Oklahoma. Its area is, approximately, 31,000 square miles (census of 1900).

Because the Indian Territory had been reserved for Indian tribes, it long remained practically unexplored, while the areas around it were surveyed and well mapped. A curious illustration of the fact that little was known about this large region was afforded by the survey of the lands of the Territory authorized by the National Congress in 1894. It had been assumed that the Territory was mainly an open, flat country, and that the survey might therefore proceed very rapidly. It was found, however, that about one-fourth of the Territory is mountainous, and that nearly two-thirds is woodland. As late as 1895 it appeared that while good maps of the drainage of the Chickasaw reservation had been prepared, its relief was not yet mapped; and that little was known either of the drainage or relief of the remainder of the Territory.

Various parts of the Territory differ much in their topography. South of the Canadian River, in the reservations of the Choctaw and Chickasaw nations, the country is considerably broken, being traversed by the winding serpentine ridges forming the southern part of the Ozark Hills. These hills enter the Territory from Arkansas, and the summits near the Arkansas boundary reach an altitude of 2500 feet above the sea. Farther south they diminish in height till, in the middle of the Choctaw reservation, they are not more than 1000 feet above the general level of the country. The rocks of these ridges are, for the most part, quartzite, while the valleys between them are floored with limestone. This difference in the rock formations explains the topography. The quartzite ridges are the survival of the hardest rocks.

The northeastern part of the country, north of the Arkansas and Canadian rivers, is a plateau deeply scored by streams. West of this very broken region the Territory is broadly undulating. The eastern portion of the Territory, particularly in the hilly and mountainous regions, is heavily timbered. The southern part, including the Chickasaw reservation and the western portion of the Choctaw country, is a territory of timber and prairie, the timber predominating to the extent of nearly three-fourths of the area. The largest extent of prairie is in the Cherokee and Creek reservations of the north, where there is little timber except along the streams between the timber belt on the west and the hilly country on the east. Some Azoic rocks are found in the north, and the igneous rocks of the hilly and mountainous areas are above mentioned, but the predominant geological formation is Carboniferous; in this formation are the bituminous coal measures that will probably always be the chief



AREA AND POPULATION OF OKLAHOMA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Beaver	A 2	Beaver	5,739	2,674	3,051
Blaine	E 3	Watonga	941	.....	10,656
Canadian	F 3	Elreno	803	7,158	15,961
Cleveland	F 3	Norman	545	6,605	16,398
*Comanche	E 4	....	....	.....	.....
Custer	D 3	Arapaho	1,001	.....	12,264
Day	D 3	Grand	1,044	.....	2,173
Dewey	D 3	Taloga	1,008	.....	8,819
Garfield	F 2	Enid	1,066	.....	22,076
Grant	F 2	Pondcreek	1,004	.....	17,273
Greer	D 4	Mangum	2,393	5,338	17,922
Kay	F 2	Newkirk	895	.....	22,530
Kingfisher	F 3	Kingfisher	891	8,332	18,501
*Kiowa	D 4	....	....	.....	.....
Lincoln	F 3	Chandler	961	.....	27,007
Logan	F 2	Guthrie	749	12,770	26,538
Noble	F 2	Perry	631	.....	14,015
Oklahoma	F 3	Oklahoma	713	11,742	25,854
Pawnee	G 2	Pawnee	542	....	12,366
Payne	F 2	Stillwater	759	7,215	20,909
Pottawatomie	F 3	Tecumseh	790	.....	26,412
Roger Mills	D 3	Cheyenne	1,191	.....	6,190
Washita	D 3	Cloudchief	988	.....	15,001
Woods	E 2	Alva	2,749	.....	34,975
Woodward	D 3	Woodward	3,295	.....	7,469
Kaw Indian reservation	G 2	.....	...	.....	768
Kiowa, Comanche and Apache Indian reservation	....	Anadarko	4,643	.....	4,968
Osage Indian reservation	G 2	.....	2,298	.....	6,717
Wichita Indian reservation	....	.....	968	.....	1,420

* Organized since the last census was taken.

AREA AND POPULATION OF INDIAN TERRITORY.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Cherokee Nation	H 2	.....	7,188	.....	101,754
Chickasaw Nation	F 4	.....	7,326	.....	139,260
Choctaw Nation	G 4	.....	579	.....	99,681
Creek Nation	G 3	.....	4,843	.....	40,674
Seminole Nation	G 3	.....	10,910	.....	3,786
Modoc Indian reservation	J 2	.....	210	.....	140
Ottawa Indian reservation	J 2	.....		.....	2,205
Peoria Indian reservation	J 2	.....		.....	1,180
Quapaw Indian reservation	J 2	.....		.....	800
Seneca Indian reservation	J 2	.....		.....	970
Shawnee Indian reservation	J 2	.....		.....	297
Wyandotte Indian reservation	J 2	.....		.....	1,213

mineral resource of the Territory. Coal is mined most largely in the southeast and is yielding nearly 2,000,000 tons a year, most of the product being marketed in the Southern States. Gold and silver are also found in the mountain regions, and asphalt has been discovered, but is not yet of much importance.

As the drainage of the Territory shows, the general slope of the land is gently from northwest to southeast. The streams are numerous, but none of them is important for navigation. The Red River flows along the boundary of Indian Territory and Texas. The Canadian River, rising in New Mexico, flows east nearly across the Territory till it joins the Arkansas. The Washita River, emptying into the Red River, drains most of the southwestern part of the country. The Arkansas, passing through the Territory, and the Red River carry off all the drainage.

The whole Territory belongs to the humid area of the eastern half of the United States, with sufficient, though not superabundant, rainfall for agriculture. Lying, however, between the 33d and 37th parallels of latitude, the region has a warm climate, the main annual temperature being about 60° F. For FLORA and FAUNA, see those sections under UNITED STATES.

AGRICULTURE. The Territory has the advantages of excellent natural conditions for the development of agriculture. The soil is fertile, and the rainfall is greater and more certain than it is in Oklahoma Territory to the west. In 1900, 36.6 per cent. of the land was included in farms. Most of the farms are owned by Indians, but there are also a number of negroes who own land, and also a certain number of whites who have secured land, principally by being adopted as citizens by act of the legislatures of the several Indian nations. However, the Indians do not, as a rule, cultivate their own farms, but rent them instead to the whites, the latter constituting seven-ninths of the total number of farmers. The average size of farms varies from 42.5 acres in the small Seminole Nation, to 329.2 acres in the Creek Nation.

The climatic conditions are such that a great variety of products, including those of both the temperate and semi-tropical regions, can be grown. The cultivation of the soil has thus far, however, been largely subordinated to stock-raising, and corn has consequently been the leading crop, comprising, in 1900, 1,181,439 acres. The areas devoted to wheat and oats for the same year were, respectively, 247,247 and 160,457 acres, while the hay and forage crops exceeded 400,000 acres. Cotton produces abundantly and is rapidly becoming of great importance, the acreage devoted to its cultivation in 1900 being 442,065. Fruits and vegetables are also very successfully grown. The prairie lands of the Territory afford excellent and extensive pasturage for stock. The number of cattle in 1900 exceeded 1,500,000. In the same year the horses numbered 198,600; mules, 51,500; sheep, 12,600; and swine, 650,000.

MANUFACTURES. Because of peculiar local conditions, especially the nature of the population, manufacturing has been slow to develop in Indian Territory. However, a good beginning has been made in the decade 1890 to 1900. During this period the number of establishments —including hand trades and houses with a product of more than $500—grew from 20 to 789, the capital increasing from $204,329 to $2,624,265. The census of 1900 reported 348 establishments additional, having each a product of less than $500. The most important industries are cotton-ginning, flour and grist milling, the manufacture of cottonseed oil and cake, and the manufacture of lumber and planing-mill products. The greatest activity centres in the Chickasaw nation.

TRANSPORTATION. The railroad facilities are adequate enough for a higher industrial development than that which now prevails in the Territory. In 1900 there were reported 1500 miles. The principal lines are Missouri, Kansas and Texas; the Saint Louis and San Francisco; the Choctaw, Oklahoma and Gulf; the Santa Fé and the Rock Island.

FINANCE. The different nations assess tribal taxes upon non-citizens and those employing non-citizens. These taxes are collected with difficulty, as effort is made to avoid payment. The Indian Agent collected and disbursed $825,020 in 1900, of which amount $139,589 represented royalties upon mineral products.

BANKS. In 1902 there were 69 national banks, with loans amounting to $7,277,000; cash, etc., $548,000; capital, $2,779,000; and deposits, $5,896,000. The 20 private banks had in loans, $602,676; cash, $56,354; capital, $203,975; and deposits, $495,810.

RELIGION. Missionary work among the Indians of the Territory has always been very active. The Methodists and the Baptists are in the majority; Presbyterians, Roman Catholics, Disciples of Christ, Friends, and other denominations are represented.

EDUCATION. Religious denominations, the National Government, and the tribal governments all maintain schools within the Territory. Nevertheless, the educational situation is not what it ought to be. The Territory has been rapidly filling up with a population of whites, who, having no voice in the government, have been unable to secure public school advantages for their children. It was estimated (in 1900) that there were 50,000 white children of school age—three times that number of Indian children of that age—who were thus deprived. A recent act of Congress enabling towns to incorporate, elect officers, and provide education for white children, will be a particular relief. For a time the Indians were allowed to manage their own educational affairs. This was so unwisely if not corruptly done that Congress provided in the Curtis Act (1898) that the National Government assume charge, and accordingly a superintendent of education has been placed in authority over the Five Nations (the Seminoles excepted).

POPULATION. The population of the Territory grew from 180,182 in 1890 to 392,060 in 1900, an increase of 117 per cent. This great increase was due to the inflow of whites from the States. The Indians in 1900 numbered 52,510; negroes, 36,870; and whites, 302,680.

INDIANS. The Indians of the Territory consist of the 'Five Civilized Nations,' and those of seven reservations. Ninety-seven per cent. of the population, including whites, is found in the four principal nations. The census of 1900 distributes the population as follows: Cherokee Nation, 101,754; Chickasaw Nation, 139,260; Choctaw Nation, 99,681; Creek Nation, 40,674; Seminole Nation,

3786; Modoc reservation, 140; Ottawa reservation, 2205; Peoria reservation, 227; Quapaw reservation, 154; Seneca reservation, 255; Shawnee reservation, 79; Wyandotte reservation, 288; not located by reservations, 861. The majority of the negroes enumerated in the census are exslaves of the Indians, or descendants of exslaves, and share with the Indians in the allotment of lands. A non-citizen marrying into a tribe is made a citizen, and also receives an allotment of land.

GOVERNMENT. The 'Five Civilized Tribes' (the Cherokees, Creeks, Chickasaws, Choctaws, and Seminoles), who occupy almost the whole of the Territory, came thither under an agreement with the United States guaranteeing their tribal authority. They organized for themselves forms of government much like those of the States, having a Governor, Senate, and Legislature, elected by popular vote; a national court, school system, and treasury. Under this independent, self-governing system the Five Nations have lived until recent years. The workings of the system were quite tolerable in the early period, but it is quite inadequate on account of the rapid changes in conditions now taking place. The white population of the Territory, who outnumber the Indians six to one, found themselves without a voice in the government, unable to secure such privileges as look toward their proper protection and development. Accordingly, various enactments have been passed by Congress within the past few years, all having for their ultimate purpose the extension of complete Federal jurisdiction over the Territory, the extinction of Indian governments, and the opening of the country to unrestricted white settlement—in other words, their assimilation, political and legal, with the rest of the United States. However, the original guarantee of an autonomous form of government to the tribes and other complicating conditions exist to delay the process of transformation. The resisting Indian is sometimes conciliated, sometimes disregarded. In 1893 a commission to the 'Five Civilized Nations,' the Dawes Commission, was appointed to enter into negotiations with the Indians in the Territory for the allotment of their lands in severalty, or to procure a cession of their lands to the United States. The Commission had in 1901 finally secured from each of the five tribes tentative agreements, looking toward allotment and citizenship; but years are likely to elapse before the work of the Commission is ended, as the task of dividing 20,000,000 acres of land equitably among many thousands of legitimate claimants is enormous. An act of 1897 gave the United States courts jurisdiction within the Territory. The Curtis Act of 1898 had for its general purpose the transfers of the control of property rights from tribal authority to that of the United States. Accordingly it provided, among other things, for the enrollment of citizens, preparatory to the allotment of lands, for the regulation of town sites, and the incorporation of towns; and it gave the President a veto power over acts of the tribal governments. Differences of conditions have prevented a uniform application and enforcement of this policy. Some features are universally carried out, while others are temporarily suspended for certain tribes. An agreement with the Seminoles permits the continuance of the Seminole government in a limited way, and an agreement with the Choctaws and Chickasaws extended their governments, with certain modifications, until March 4, 1906. Consult: Hinton, "The Indian Territory, Its Status, Development, and Future," in *Review of Reviews*, vol. xxiii. (New York, 1901).

INDIAN TOBACCO. See LOBELIA.

INDIAN TURNIP. See ARUM.

INDIAN YELLOW, or PURREE. A coloring matter highly esteemed by artists. It is exported from the East Indies and China in spherical masses, which are of a dark brown color externally, but of a bright orange yellow in the interior. It is obtained in Bengal as a sediment from the urine of cows fed on decayed and yellow mango leaves. Its odor is peculiar, and resembles that of castoreum. It consists chiefly of the magnesium salt of an acid termed *purreic* or *euxanthic acid* ($C_{19}H_{16}O_{10}$). Alkaline solutions dissolve this acid, and form a yellow liquid. A solution of euxanthate of potash, when mixed with the solutions of the salts of the earths, gives brilliant yellow, sparingly soluble precipitates, and with acetate of lead it forms an insoluble yellow. Purree is often found adulterated with chrome yellow.

INDIA-RUBBER. See RUBBER.

INDICATOR (Lat., pointer). In steam engineering, an instrument to measure and to record by means of a diagram the pressure of the steam in the cylinder of an engine. The indicator was invented by James Watt, of steam engineering fame, and the modern indicator is merely a structural modification of Watt's original design. Concisely described, the modern steam-engine indicator consists first of a small cylinder having communication with the interior of the engine cylinder by means of a short pipe provided with a stopcock. In this small cylinder works a piston having a piston-rod extending out of the top of the cylinder. This piston is normally pressed down to the bottom of the cylinder

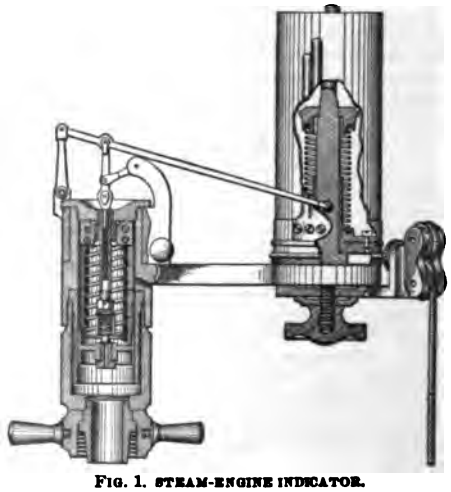


FIG. 1. STEAM-ENGINE INDICATOR.

by a spiral spring, but when steam is admitted below the piston by opening the stopcock previously mentioned, the pressure forces the piston upward against the spring, compressing it a greater or less amount, according to the steam pressure. The top of the piston-rod is attached to a lever which carries a pencil at one end.

This pencil bears against a slip of paper attached to a drum, which rotates back and forth on its axis for a distance and with motion which corresponds exactly to the stroke and movement of the engine piston. In operation the indicator piston rises and falls with the rise and fall of the steam pressure in the cylinder, and the pencil point is thus given a vertical movement whose magnitude corresponds to the intensity of the steam pressure. At the same time the rotation of the drum gives the paper a horizontal movement under the pencil point, corresponding in magnitude and speed to the engine-piston movement, so that the result of the two operations is the inscription of a loop-shaped diagram on the paper. These diagrams enable the steam engineer familiar with their use to calculate the power of the engine, to examine and adjust the actions of the engine valves, and to make certain inferences concerning the transformation of heat into work, and the influence of the metal of the cylinder on that operation. A concise treatise on the subject of indicators and indicator diagrams is Peabody, *The Steam Engine Indicator* (New York, 1900).

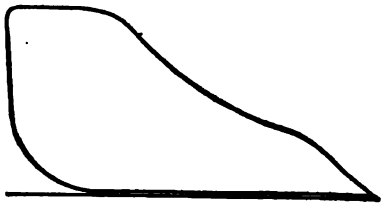


FIG. 2. INDICATOR DIAGRAM.

INDICTION, ĭn-dĭk'shŭn (Lat. *indictio*, imposition of a tax, period of fifteen years, from *indicere*, to declare, from *in*, in + *dicere*, to say, Skt. *diś*, to show). A period or cycle of fifteen years, the origin of which is involved in obscurity. It began to be used in reckoning time, chiefly by ecclesiastical historians, during the life of Athanasius; it was afterwards adopted by the Popes, through whose influence it came to be so generally employed during the Middle Ages, that the dates of charters and public deeds of this period are expressed in indictions as well as in years of the Christian Era. The time from which reckoning by indictions commenced is, according to some, September 15, 312; according to the Greeks of the Eastern Empire, September 1, 312; but when this method was adopted by the Popes, it was ordered to be reckoned as commencing January 1, 313. The latter, which is now alone used, is called the Papal indiction. If we reckon backward to the commencement of the Christian Era, it will be seen that 1 A.D. does not correspond to the first, but to the fourth year of an indiction—hence, if to any given year of the Christian Era three be added, and the sum divided by fifteen, the quotient will give the position of that year in an indiction—e.g. 1880 A.D. was the eighth year of an indiction.

INDICTIO PASCHALIS, ĭn-dĭk'shĭ-ō păs-kā'lĭs (Lat., Easter declaration). A custom that arose in the early Christian Church of Alexandria of announcing on Epiphany the days on which Easter would fall. Later this declaration was called the *Indictio festorum mobilium*, the announcement of the movable feasts, because the time when these should be celebrated depended upon the appointment of the days for Easter. The custom soon became general; the fourth Synod at Orleans (541) issued a formal order for the observance in its first canon.

INDICTMENT, ĭn-dīt'mĕnt (from OF. *enditer, endicter, inditer, indicter*, to accuse, Latin *indictare*, frequentative of *indicere*, to proclaim, from *in*, in + *dicere*, to say, Skt. *diś*, to show). The formal written accusation of crime against a person, presented on oath by a grand jury (q.v.), and upon which he is tried by a petit jury. In Scotland an indictment is also the accusation on which a prisoner is tried; but it runs in the name of the lord advocate, addressed to the prisoner. In England a prisoner is not entitled, before trial, to a copy of the indictment or a list of the witnesses against him except in case of treason. An indictment differs from an information (q.v.) in that it is the act of a grand jury, while an information is the written accusation of crime by the law officer of the Crown or of the State. It differs from presentment (q.v.) in that the latter is an accusation by the grand jury of its own motion, and without any charge of crime, or any bill of indictment being laid before it.

In the United States persons who are accused of felonies or grave misdemeanors can be brought to trial only upon an indictment which a grand jury has declared to be 'a true bill.' When a criminal court is convened, and the grand jury has been duly constituted and instructed, the State's attorney, or some other duly qualified officer, lays before them drafts of indictment against the alleged offenders, and furnishes them with the names of the witnesses whose testimony is relied upon to support the accusation. These witnesses the grand jury examines *ex parte*, not to determine the guilt or innocence of the accused, but to ascertain whether there is or is not *prima facie* evidence of guilt sufficient to warrant their trial. If twelve or more members of the grand jury pronounce in the affirmative, the presentment, with the words 'a true bill' indorsed upon the back thereof, is sent to the court; and, upon the charges therein contained, carefully set forth in the indictment subsequently prepared, the accused is put upon trial before a petit jury. The indictment is prefaced by a 'caption,' in which are set forth the name, term, and place of meeting of the court, the names of the justices, and the fact that the grand jury was lawfully constituted. Then comes a full and particular description of the alleged crime; the name of the accused must be given if known; and if not, he must be described in such a way as to make his identity sure. The time and place of the commission of the crime must also be stated, though it is not always necessary to conviction that these particulars should be exactly supported as charged. In some cases, however, a failure upon this point is fatal to the indictment. In trials for perjury the exact day when the offense was committed must be named. To prove that the crime was committed on some other day will not avail. In cases of murder the death must be described as occurring within a year and a day of the time when the alleged fatal injury was inflicted. When several persons have been concerned in the commission of a crime, they may be indicted either jointly or separately. It is usual to describe the alleged offense in different

ways, in what are usually called 'counts,' in order to cover any uncertainty that may exist beforehand as to the precise way in which it was committed. It is enough if the prisoner is convicted upon a single count. The indictment must charge explicitly whatever is necessary to constitute the offense. In many of our States the harsh rule of the common law, which denied the right of a person accused of treason or felony to have a copy of the indictment, has been abolished by statute. Consult: Pike, *History of Crime in England* (London, 1876); Stephens, *History of the Criminal Law of England* (London, 1883); Pollock and Maitland, *History of English Law* (2d ed., London, 1899); *United States Constitution, Fifth Amendment.*

INDIFFERENTISM (from *indifferent*, from Lat. *indifferens*, not different, from *in-*, not + *differre*, to differ, from *dis-*, apart + *ferre*, to bear). A term used in philosophy and ethics, to designate the theory that the human will is absolutely indifferent to all motives. The doctrine is also called indeterminism or the doctrine of the liberty of indifference, and is opposed to determinism (q.v.). See FATALISM; ETHICS; WILL.

INDIGESTION (from Lat. *indigestio*, indigestion, from *in-*, not + *digestio*, digestion, from *digerere*, to digest, from *dis-*, apart + *gerere*, to carry), or DYSPEPSIA. A term somewhat vaguely applied to various forms of disease of the stomach or of the small intestines in which the natural process of digesting and assimilating the food is deranged. The common cause of indigestion, where organic disease is absent, is the eating of too much food, too rapidly, or without sufficient mastication.

The symptoms of indigestion are by no means constant in all cases. There is often *anorexia* (or want of appetite), but occasionally the appetite is excessive, and even ravenous. Nausea not infrequently comes on soon after a meal; while in other cases there is no nausea, but after the lapse of a couple of hours the food is vomited, the vomited matters being very acid, and often bitter from admixture of bile. In severe cases the vomiting has been known to occur after every meal for several months. Flatulence, relieving itself in eructations, is one of the standard symptoms of this affection, the gas that gives rise to this symptom being sometimes evolved from undigested matters in the stomach. It is very apt to occur in dyspeptic patients if they have fasted rather longer than usual. *Cardialgia* (popularly known as *heartburn*), *pyrosis* (q.v.), or water-brash, and *gastrodynia* (commonly designated *spasm* or *cramp* of the stomach, and coming on at uncertain intervals in most severe paroxysms) are somewhat less common symptoms of indigestion.

The treatment of indigestion is more dietetic than medicinal. All bad habits suggested above must be corrected. The quantity of food which can be digested by the gastric juice and intestinal fluids being limited (see DIGESTION), care should be taken that this quantity is not exceeded; moreover, the meals should not succeed each other too rapidly. With regard to the nature of food best suited to dyspeptic persons, it may be safely asserted that a mixture of well-cooked animal and vegetable food is in general more easily digested than either kind taken exclusively. Each patient should be advised by his physician as to his dietary. The unquestionable benefit which dyspeptic patients often derive from a visit to a hydropathic establishment is due perhaps not so much to any specific action of the water as to the well-regulated diet, the withdrawal of the mind from personal cares, and the change of scene. The use of purgatives and remedies for indigestion is much overdone by the laity, and lays the foundations of chronic gastric disorder that cannot be cured.

INDIGIRKA, ĕn'dyĭ-gēr'kȧ. A river of Eastern Siberia. It rises in the Stanovoi Mountains, 400 miles east of Yakutsk, and, after flowing in a northeasterly course for about 900 miles across a sparsely populated and frozen desert region, it empties through a large delta into the Arctic Ocean, 460 miles east of the mouth of the Lena (Map: Asia, O 1).

INDIGO (Sp. *indigo*, *indico*, from Lat. *indicum*, from Gk. *ἰνδικόν*, *indikon*, indigo, from *Ἰνδία*, *India*, India). A coloring matter first employed as a dyestuff in India, whence it was brought by traders to the Mediterranean countries. Europeans were not acquainted with its vegetable origin until the time when its importation assumed considerable dimensions, after the circumnavigation of Africa; and as the method of dyeing with woad did not present the indigo in substance, the virtual identity of the two was not suspected. Of late years, artificial indigo has been produced from coal-tar products, and is seriously threatening the existence of the indigo plantations. For the history of artificial indigo, see COAL-TAR COLORS.

INDIGO.

Most of the natural indigo of commerce is obtained from species of Indigofera, of the family Leguminosæ. The genus embraces about 400 species, widely distributed throughout tropical and subtropical regions. The best known and most widely cultivated species, as well as the ones which supply nearly all the indigo found in the markets, are *Indigofera anil*, a native of tropical America, and *Indigofera tinctoria*, the original home of which is not positively known, although it is said to occur wild in the Bombay Presidency. *Indigofera argentea*, a native of Arabia and parts of Africa, is a source of much of this valuable dye. Indigo plants are extensively cultivated in the East and West Indies (especially in Bengal), in Central America, parts of Europe, and Africa, etc. The plants are shrubby,

attaining a height of about six feet, have pinnately compound leaves, and usually pink or purple flowers. The pods of *Indigofera anil* are sickle-shaped, short and compressed, while those of *Indigofera tinctoria* are straight, cylindrical, and many-seeded. When cultivated the indigo plant requires a rich, friable soil, well watered, but not too wet. The seeds are sown in drills about a foot apart, and the plants are cut when beginning to flower. In the tropics this can be done at frequent intervals, and four or five crops a year obtained. After cutting, the crop is handled in various ways, fermented in tanks, as described below, and the indigo extracted. Although the plants are perennial, the greatest yields are obtained from annual plantings. In addition to the species mentioned above, at least half a dozen other species of Indigofera are known to produce indigo of good character. It is also produced by species of Sophora, Baptisia, Amorpha, Tephrosia, and Galega, all belonging to the order Leguminosæ. Baptisia tinctoria and Amorpha fruticosa are known as 'false indigo' in the United States, where they are widely distributed. Plants of other families produce indigo, as Isatis tinctoria, a cruciferous plant which was cultivated in Europe during the Middle Ages and is still planted in Southern France (see WOAD); Wrightia, and Nerium, which belong to the family Apocynaceæ; Marsdenia tinctoria and Gymnema tingens, of the natural order Asclepiadaceæ; Polygonum tinctorium, of the order Polygonaceæ; Strobilanthes flaccidifolius, of the order Acanthaceæ; Spilanthes tinctoria (Compositæ), and Scabiosa succisa (Dipsacaceæ), as well as many others, representing widely separated orders of plants.

Neither the indigo plant nor Isatis tinctoria contains the dyestuff (indigotin) ready formed, but rather a colorless glucoside, indicane, which breaks up, by fermentative processes, into indigotin, and a glucose sugar called indiglucin. It is a curious fact that indicane is a normal constituent of human urine, and becomes very plentiful in certain diseases. Natural indigo is prepared for the market in the following fashion: The plants are cut down just before reaching the flowering stage, and are thrown into vats, where they are steeped in water and allowed to ferment for 12 to 15 hours, practically out of contact with air. This produces the soluble *indigo white*, which is taken up by the water; the liquid is then drawn off into 'beating-vats,' where it is violently agitated by machinery, in order to promote contact with the air, so that the indigo white is oxidized to the insoluble *indigo blue*, which forms a thick scum on the surface and then sinks to the bottom as a bluish mud. After settling, the clear liquid is drawn off, and the indigo blue is collected, squeezed between cloths, and dried in the air. It is sold in irregular lumps, which differ in tint, size, and texture according to the various localities in which they are produced. The amount of available dyestuff ranges from 20 to 90 per cent. of the commercial product, some of the impurities being accidental, although intentional adulteration is common enough. This irregularity of composition in the natural product is one of the causes that have advanced the manufacture of artificial indigo, which is always chemically pure. There are a large number of patented processes for the preparation of synthetic indigotin, chiefly held by the German color-factories, and largely based upon the researches of Adolf Baeyer, who showed, about 1880, what the exact chemical constitution of this substance is, and indicated the general principles for its preparation from aniline derivatives. At present, indigo is manufactured on the largest scale by the Heumann process. Phthalic acid, from naphthalene, is converted into anthranilic (ortho-amidobenzoic) acid by way of the phthalimide, and the anthranilic acid is transformed, by treatment with chloracetic acid and fusion with sodium hydroxide, into indoxyl, which readily oxidizes to indigo. According to the United States Census for 1900, three million pounds, or one-quarter of the world's supply of indigo, are annually produced by synthesis. Pure indigotin, whether extracted from natural indigo or prepared artificially, is crystalline, with a coppery lustre and a very characteristic odor; when crushed, it forms a blue powder, and when fixed upon the fibre it constitutes a remarkably fast and brilliant 'navy-blue' dye. A few chemical compounds, analogous to indigo, and of slightly different shades, have been produced; but they are as yet of very slight importance. Mention may also be made of the so-called *indirubin*, a red coloring matter of insignificant tinctorial value, which is found in natural indigo.

DYEING WITH INDIGO. As indigo blue is insoluble in water, it must first be converted into indigo white, which is soluble in alkaline liquids. This change is produced by the chemical addition of hydrogen, so that the blue, $C_{16}H_{10}N_2O_2$, goes over into the white, $C_{16}H_{12}N_2O_2$. This is effected in *cold* vats, which are employed for the dyeing of cotton and linen, by metallic reducing agents, such as sulphate of iron, zinc dust, and alkaline sulphites; while wool and silk are dyed in *warm* vats, where the reduction is caused by a fermentation of vegetable substances, preferably woad, in a manner analogous to that by which indicane is converted into indigo white. These vats are always alkaline. When the reduction of the indigo is completed, the liquid is colorless, with a light bluish scum on top. The scoured materials are then drawn through the vats and exposed to the air while drying. The atmospheric oxygen immediately reconverts the white into the blue, by removing the extra hydrogen atoms. Indigo blue is also soluble in fuming sulphuric acid, forming 'indigo-sulphonic acid' or Saxon blue, which was formerly known as a dyestuff, but has been replaced in modern practice by its sodium salt, *indigo carmine*. The solution of this carmine produces a blue precipitate upon the fibre with an alum mordant, but the color is neither as deep nor as fast as that of the unaltered indigotin from the reducing-vats. With artificial indigo, the final synthesis can be produced on the fibre itself, as when ortho-nitrophenylpropiolic acid and potassium xanthogenate are applied separately and the doubly impregnated cloth is then steamed, whereupon indigo blue is formed within the fibre, and the by-products can be washed out.

PRINTING WITH INDIGO. Indigotin is not suited to printing in pigment form, and figured goods are produced by what may be considered as dyeing processes. To procure a blue-and-white pattern, for instance, the whole fabric may first be dyed blue, and the white produced by printing on bleaching agents which will remove the color.

Or the cloth may first be printed with a 'reserve,' a paste composed of gum, pipe-clay, and copper salts, which will prevent the deposit of indigo upon the spots which they protect, while the material passes through the vat. Artificial indigo can again be produced by printing one chemical upon the fibre and putting the other into the bath through which it is subsequently passed.

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INDIGO-BIRD. A North American finch (*Passerina cyanea*) of the Eastern United States. It breeds as far north as Nova Scotia and Minnesota, but migrates southward in the fall to Central America, where it spends the winter. It is about 5½ inches in length, and the adult male is rich dark blue in color, variously tinged and shaded, the lores and angles of the chin velvety black. The female is gray brown. It frequents open places on the edges of woods, and delights to sit on the top of a high tree singing a very sweet and peculiar melody, continued late into summer, after most other birds have stopped singing. It is easily domesticated. The nest is built of grasses, leaves, bark, and long hairs, in a little bush or on weeds near the ground. The eggs are three or four, pale bluish white, without spots. See Colored Plate of EGGS OF SONG-BIRDS.

INDIGO-SNAKE. See GOPHER-SNAKE.

IN'DIUM (Neo-Lat., from Lat. *indicum*, indigo). A metallic element, discovered by Reich and Richter in 1863. It occurs in minute quantities in various zinc ores, especially in the zinc blendes of Freiberg, in some galenas from Italy, and in the flue dust of zinc-furnaces. In the metallic state, the element may be obtained by reducing its oxide in a current of hydrogen, or by fusing the oxide with sodium. The oxide itself is obtained by dissolving Freiberg zinc in weak sulphuric acid, precipitating the solution with metallic zinc, and separating out, from the precipitate, lead, copper, and iron. With oxygen indium forms two compounds, a monoxide (InO) and a sesquioxide (In_2O_3). A number of its salts have been prepared, but none of them has any economic value. Metallic indium is ductile, silver-white, and lustrous. Its specific gravity is from 7.36 to 7.42 and its melting-point is at 176° C. Its chemical symbol is In, and its atomic weight, referred to oxygen, is 114.

INDIVIDUALISM (from *individual*, from ML. *individualis*, relating to an individual, from Lat. *individuus*, indivisible, from *in-*, not + *dividuus*, divisible, from *dividere*, to divide). The doctrine that society is only an artificial device, whose value is to be gauged by its conduciveness to the good of the several associated members or by some other standard set by these individuals. Individualism must be distinguished from egoism, with which it is often confounded. While individualism perhaps is generally egoistic in character, it is not always so. An individualist may maintain that the end which justifies all justifiable means is "the greatest good of the greatest number;" what makes him an individualist is his conception of the greatest number as composed of *independent* units, the happiness of each of which is to be reckoned as *a separate item* in the sum total of general happiness. Such being the nature of individualism, it is clear that in all the sciences which deal with man as a social being there may be individualistic tendencies. And as a matter of fact individualism has been a marked characteristic of many prominent theories in political science, in economics, and in ethics.

In political theory the consistent individualist regards the State as a means to subserve individual ends. He may be an egoistic anarchist, desiring to remove all restraints which the State imposes upon his freedom of action. On the other hand, he may be an absolutist, believing that the restraints imposed by a supreme government are necessary to prevent the disastrous consequences which would follow from every man's acting upon his unregulated desires, and thus involving himself in perpetual warfare with all his neighbors. Thus we see that the sovereignty of government, which the individualist must deny in ultimate theory, he may stoutly maintain in practical politics. Hobbes, the prime individualist of modern times, was nevertheless one of the stanchest supporters of unlimited despotism when despotism was making its last stand against parliamentary government in England. Again, an altruistic individualist may, like the egoistic, be either an anarchist or a believer in government. The anarchism of our day is in large measure a reaction against absolutism, a reaction motived by a sincere desire to secure for mankind at large the blessings of freedom. The trouble with it is that it conceives freedom as license, and regards license as in its nature humane when not irritated by authority. Other altruistic individualists, however, who do not share with the benevolent anarchist the optimist belief that man is by nature a saint and only by government a sinner, justify government as a necessary evil: an evil because individuality is more or less repressed by law, but a necessity because without some measure of such repression some individuals would make life intolerable or even impossible for others. It is thus clear that individualism as a political theory is quite compatible with acquiescence in and support of almost any form of government, or even with revolt from all government. Practical individualism, on the other hand, may prevail to a large extent along with anti-individualistic theories, for it is quite logically consistent for a thinker to maintain that the true end of all government is the welfare of society as an organic whole, and yet that this welfare can best be served by allowing every individual to pursue his own ends.

In economics individualism has generally advocated the practice which is formulated in the well-known precept, *laissez faire, laissez passer*. The State is to keep hands off of the economic machinery. Free competition, resulting in the survival of the economically fittest, is the individualistic ideal. Hence we find among individualists a tendency to oppose all sumptuary and other economic legislation. Compensation for service rendered is held to be a matter which concerns merely the parties immediately involved, and no general laws, it is urged, should control the unre-

stricted privilege of any man to buy labor as cheap and to sell it as dear as the relation between supply and demand allows. No minimum of wage, no maximum of hours, no restriction upon the age or sex of employees, no employer's liability except as specified by contract, no fostering of industries by tariff or subsidy, no political arbitration of economic disputes, no Government ownership or operation of any industrial plant—in short, no State interference in production, distribution, or consumption—this is what absolute and unadulterated individualism is apt to hold before itself as the true type of the industrial life. But pure economic individualism is at the present day more a theory than a practice. Public policy has asserted itself against private license, and the struggle at present is not so much between State interference and free competition as between different views as to the points at which State interference is advisable. Thus, in the United States both of the great political parties are anti-individualistic in their economic principles. The Republican Party stands for State interference in international trade, while in matters of internal policy it is inclined to allow competition a freer hand. The Democratic Party advocates greater freedom in international economic activity, while, at least of recent years, it has sought to interfere with the freedom of capital to combine and with the freedom of natural preference for the economically more valuable medium of exchange found in gold. The paternalism of the tariff is offset by the paternalism of State-ordained bimetallism. Individualism has become more of a war-cry than an accurate designation of economic principle. What is true of American economics is also true of the economic status in other civilized countries. The socialism and the agrarianism of Germany are no more and no less anti-individualistic than the governmental policy they oppose. The question is only as to the character of the limitations to be put upon the freedom of the individual in his economic relations.

In ethical theory individualism is not now so important a factor as it was a century or so ago. Pure individualism is incompatible with morality as ordinarily understood. If each man's ideals are the measure of his morality, morality ceases to have any general meaning. This is frankly recognized by some individualists; but some, on the other hand, still maintain the possibility of carrying their theory out logically without detriment to morality. The typical representatives of the latter view are to be found among those who claim for the individual conscience the right to pass definitively upon all questions of morals. "There is no such thing as an erring conscience," they say. In some thinkers, as, for example, Kant, the individualism of the conscience theory of morals is offset by the universalism of the criterion of reason, which directs the conscience. One must see one's duty only in what can be duty for all. The combination of individualism and anti-individualism in an ethics of conscience is, however, a *tour de force* which can be successfully achieved only by those who unknowingly have a higher standard for morality than either conscience or pure reason. But when this higher standard is lacking individualism gets the upper hand, and we have as the logical result the view that everything is right which a man thinks to be right. The individual with all his idiosyncrasies becomes the measure of the universe. Most ethical thinkers have come to see that this is the natural consequence of the contention that conscience is the supreme *arbiter morum*, while moral practice has always been controlled by other influences besides the conscience of the individual. Or perhaps it would be more correct to say that these other influences operate upon a man by giving character and direction to his conscience, so that while he is guided by his conscience, that conscience is not merely an individual peculiarity. It reflects with greater or less accuracy the ideals of his community—a community sometimes large, sometimes small, but, whether large or small, of decisive influence in determining the kind of conscience the man is to have. Hence, as conscience is not something ultimate and intuitive, but derivative, there is no reason for supposing that its dictates are incorrect. The individual reflects the opinions, prejudices, superstitions, and sane judgments of a community, and gives to them perhaps an individual coloring, especially in matters bearing on his own conduct. The result we call conscience.

The history of individualism cannot here be given. All that can be done is to refer to other articles in this Encyclopædia treating of persons who have made that history. See SOPHISTS; GROTIUS; HOBBES; LOCKE; SPINOZA; QUESNAY; MIRABEAU; TURGOT; SMITH, ADAM; BENTHAM; BRIGHT, JOHN; MARX; SPENCER, HERBERT; NIETZSCHE. Consult, also: Donisthorpe, *Individualism, a System of Politics* (London, 1889); Le Gall, *La doctrine individualiste et l'anarchie* (Toulouse, 1894); McKechnie, *The State and the Individual* (Glasgow, 1896); Ritchie, *The Principles of State Interference* (London, 1891); Schmidt (Max Stiner), *Der Einzige und sein Eigenthum* (Leipzig, 1845); Spencer, *Man versus the State* (London, 1884); Wenzel, *Gemeinschaft und Persönlichkeit* (Berlin, 1899); Lutoslawski, *Ueber die Grundvoraussetzungen und Consequenzen der individualistischen Weltanschauung* (Helsingfors, 1898); Tufts and Thompson, *The Individual and His Relation to Society, as Reflected in British Ethics* (Chicago, 1898).

INDIVIDUALITY (from ML. *individualitas*, from *individualis*, relating to an individual). Separate or distinct existence. There is some difference of opinion as to what constitutes individuality, the discussion being principally confined to the domain of natural history. Some authorities regard the various organisms springing by buds from a single hydroid as individual. Others consider various parts of a tree to be individuals. In one sense all the organisms proceeding from one egg may be considered as constituting one individual, since they are derived from one germ, and the production of the zoöids by budding is similar to the development of a stock by grafting; but similar only because, in grafting a part of one individual, and not a germinal part, is inserted into another, and there proceeds to grow, as if the original plant extended itself. But in the budding of hydroids the different zoöids produced exactly resemble each other, depart from each other, and develop independently into hydroids like their parent; and some may develop much more rapidly than others. The production of a zoöid is more like original germination or ovum development than

the growth and extension of a part of the common tissues of a parent.

Individuality, in the psychological sense, which is different from the preceding biological and physiological meanings of the term, has reference to the personality of experience which is largely constituted by the continuity of the personal memory. Cases have not infrequently been reported where this memory continuum has been broken off and another instituted in its place, as the result of hypnotism or some form of disease. A person thus affected loses all memory of previous bodily existence, together with name, home, family, and friends, and begins a life so entirely new and different that he may be called another and different personality. The greatest number of personalities mutually ignorant of the existence of others connected with the same brain is five, in the case of Louis V., reported by Bourru and Burot in *Variations de la personnalité* (Paris, 1888). For further information, consult: Binet, *Altérations de la personnalité* (Paris, 1892); Janet, *L'automatisme psychologique* (Paris, 1889); James, *Principles of Psychology* (New York, 1890); Podmore, *Studies in Psychical Research* (London, 1899). See DOUBLE CONSCIOUSNESS.

INDIVIDUAL PSYCHOLOGY, or DIFFERENTIAL PSYCHOLOGY. That branch of psychology which deals with the individual differences between mind and mind, as distinct from general psychology (see PSYCHOLOGY), which deals with mental constants and uniformities. It thus includes what Mill called 'ethology' and Bahnsen 'characterology,' though it is as much wider than this discipline as the concept of mind is wider than that of character. Its first principal problem is (1) to determine the range and nature of mental variations. This falls into two part-problems. The individual psychologist must (a) ascertain how and to what extent mental processes vary from one individual to another, and (b) trace the relation of the processes to one another in a single mind, thus discovering whether they are mutually independent, or whether there are certain fundamental processes upon which the rest depend. The answers to these two questions form the contents of differential psychology proper. We have, however, further to inquire (2) into the conditions of the variations which we have established; we must investigate the influences of heredity, climate, position in life, adaptation, education, sex, age, etc. And lastly (3) we must examine, classify, and explain the expressions of mental difference in handwriting, physiognomy, characteristic gesture, literary style, etc.

The first of the three main problems is psychologically the most important. The observed differences between mind and mind have led, in the first place, to the elaboration of a doctrine of psychological *types*, which—seeing that the mind experimented on in the laboratory is always an individual mind—promises to be of value, not only for individual, but also for experimental psychology (q.v.). Practically all the more complex mental functions (ideation, attention, memory, judgment, action, assimilation, constructive ability) evince typical differences. Unless we take account of them we cannot adequately interpret our experimental results. Conversely, it is clear that the careful and exact work of the laboratory is peculiarly adapted to bring out the differences which individual psychology is seeking. More difficult is the second part of the problem: to determine the interrelation of the variable processes within a single mind. Here we have three methods at our disposal. The first is that of abnormal cases; we may take advantage of instances where there is extreme development or enfeeblement (perhaps even loss) of some processes, to study the resulting modification of other processes. We may ask, e.g. how loss of memory affects imagination, attention, power of observation, etc. The second is that of isolated variation; we may, by experimental means, vary a single mental process, and see if this variation involves changes in other processes in the same mind. The third is that of 'tests;' we choose in advance a number of processes for study, and proceed to examine them in a number of individuals, noting whether the individual differences in the selected processes run parallel to one another, and correspond in a regular manner. This correspondence or the lack of it will show the degree of correlation obtaining between the mental functions studied. The method is extremely laborious, but is at present more available than any other, and should, in the long run, lead to valid results. Binet and Henri, e.g. suggest the following tests: (1) Memory: Visual memory of geometrical design, memory of sentences, musical memory, memory of colors and of figures. (2) Nature of mental images. (3) Imagination: Passive (finding forms or faces in ink-blots), constructive (development of an essay theme), of design (composition or completion of a picture), and literary (construction of sentences from given substantives or verbs). (4) Duration and range of attention. (5) Comprehension: Observation (analysis of a machine) and discrimination (definition of synonyms). (6) Suggestibility. (7) Æsthetic and moral sentiments. (8) Muscular force and strength of will (persistence in muscular effort). (9) Motor skill and sureness of eye.

Consult: Stern, *Ueber Psychologie der individuellen Differenzen* (Leipzig, 1900), which contains a bibliography; Kraepelin, *Psychologische Arbeiten* (Leipzig, 1896); Titchener, *Experimental Psychology* (New York, 1901).

INDO-CHINA. A geographical term formerly designating the southeastern peninsula of Asia (Farther India), embracing Burma, Siam, French Indo-China, etc.

INDO-CHINA, FRENCH. See FRENCH INDO-CHINA.

INDO-CHINESE. The name applied as a general term to the great majority of the native population of Farther India, or Indo-China. It originally indicated that these peoples were related by speech and physical characteristics to the Chinese, but in part also somatically and culturally to the peoples of Hindustan. The Indo-Chinese peoples speak what are called 'tonic monosyllabic' languages, forming, with the Tibetan and Chinese groups, the extensive and important Sinitic or Tibeto-Chinese stock or family. The chief Indo-Chinese peoples are the following: Burmese, Siamese, Annamese, Cambodians, Tonkinese, who have all in some respects reached the status of civilization. Related to the Siamese are the other Thai tribes, Shans and Laos, who preserve (some of them, at least) the primitive type of the Thai stock better than the Siamese,

and are likewise less civilized, though in the past they have created or have been the bearers of several half-civilizations. The Cambodians, or Khmers, about whose linguistic and somatic relationship there is still some dispute, authorities crediting them with Aryan affinities, especially as to physical characters, have behind them the more or less indigenous culture represented by numerous inscriptions and by the remarkable temples and monuments of Angkor-Vat, etc. The culture of the Indo-Chinese peoples has been largely influenced by both India and China, while the more primitive Malays have also had a not insignificant share in the physical and social complexes there existing. The Khmers have in earlier times borrowed not a little from Hindu sources, though this borrowing may not have been so great as has hitherto been assumed. The Burmese owe a good deal of their civilization to India, the Siamese almost as much, though more indebted to China than the Burmese; while the social life and culture of the Annamese is largely a reflection of Chinese. The Assamese of the northwest, who speak an Aryan language closely related to Hindi, are probably a mixture of some of the more primitive tribes and Hindus. The exact relationship of some of the savage tribes of the northern parts of Farther India is not yet clear, but those not distinctly Thaï are more closely connected with the pre-Sinitic inhabitants of Southern China and the Tibetan area. The Mois, by which general name a number of more or less primitive tribes scattered over the eastern mountains and tablelands are known, are an aboriginal race with perhaps a Caucasian strain. The Kuis of the Shan States are probably aboriginal like the Mois; the Kuis of Cambodia have for some time been rapidly assimilating in speech and otherwise to the Cambodians. The Mons, or Talaing, of Burma, formerly had a much greater extension, but have been driven back by the more civilized peoples and the mixed races of modern origin. The Tchiam or Chiam, who are the modern representatives of the people who founded the ancient Empire of Champa, are by some authorities thought to possess Malay linguistic affinities. The Karens of Burma, who have recently shown themselves to be so amenable to missionary influences, are related to the Burmese linguistically and physically, but are of a more primitive type. The numerous Chin tribes of the Northwest are probably closely related to the primitive Burmese, but some of them are of very mixed type. The Lushai tribes are perhaps similarly related in general; they, together with the Nagas of the mountains of Manipur, are now more or less mixed—some of them have been thought to have Malay affinities. The Indo-Chinese peoples as a whole are probably of Mongolian stock, with early and later admixtures of Aryans and non-Aryans from India, etc., Malays and possibly Negritos, besides interminglings with the more modern peoples of the Indo-Chinese area. Like Hindustan, Farther India has had a history of primitive occupation, indigenous culture evolutions, foreign conquests, native combinations and disputes, etc. The more civilized peoples have more or less exploited for agricultural, commercial, and labor purposes the less civilized; the Burmese and Siamese the Shans, the Annamese the Mois, the Laos the wilder peoples of their country; and to this general exploitation the Chinese, whose coming into this area as colonists and traders antedates the Christian Era, have added much. Back of the modern civilization of Burma, Siam, Annam, Cambodia, etc., lie older half-civilizations of the more primitive tribes—Khmers, Shans, Laos, etc.—whose remains are of considerable importance and of great antiquity. Back of these again are the monuments of prehistoric man in this part of the world—the kitchen-middens of Cambodia, the stone monuments of the Khasi country, etc., and, earliest of all, the chipped implements discovered by Noetling in 1894 near Yenangyoung, on the Irrawaddy, in Upper Burma, which are claimed to prove the existence of Tertiary man in this region. It is probably from some of the proto-Indo-Chinese or their closely allied predecessors that the Malayan stock has sprung. Some of the Indo-Chinese, however, exhibit closer somatic affinities with certain of the Mongolian natives of Northeastern Asia, such as the Tchuktchi, etc. Consult: Von Hellwald, *Hinterindische Länder und Völker* (Leipzig, 1880); Forbes, *Comparative Grammar of the Languages of Farther India* (London, 1881); Bastian, *Völkerstämme am Brahmaputra* (Berlin, 1883); Ehler, *Im Sattel durch Indo-China* (ib., 1894).

INDO-CHINESE SUBREGION. In zoögraphy, a faunal district of the Oriental Region, comprising all that part of China south of the high mountains which carry the Himalaya range eastward nearly to Fu-chow, and form the watershed between the south coast and the valley of the Yang-tse; also all of Annam, Siam, Yun-nan, Burma, and Assam, and a long, narrow extension westward along the southern slopes of the Himalaya, between the levels of about 2500 and 9000 feet. The name 'Himalayan' or 'Himalo-Chinese' is therefore sometimes given to this fauna and subregion. It is one of the richest faunas in the world, and is especially distinct in its birds, of which more than 40 genera are peculiar, among which the pheasants are conspicuous. In the higher mountains Palearctic forms mingle with it to some extent, but on the whole the affinities are distinctly Oriental. See map under DISTRIBUTION OF ANIMALS.

INDO-EUROPEANS. A term frequently applied to the so-called Aryan race (see ARYAN; EUROPE), as being inhabitants of India and Europe. The word is, however, linguistic rather than ethnological. Even in linguistic usage the term is abandoned by the leading authorities, except among French and Italian scholars, in favor of Indo-Germanic. See INDO-GERMANIC LANGUAGES.

INDO-GERMANIC LANGUAGES, often called INDO-EUROPEAN, ARYAN, or sometimes INDO-CELTIC. The name given to the great cognate group of tongues spoken by the kindred peoples of Southern and Southwestern Asia and Europe, and extending from India as far as the people of Germanic blood have spread. (See ARYAN.) This great group is quite distinct from the Semitic family of languages, from the forms of speech spoken by the Mongolian tribes, and from the various other recognized groups of tongues which are distributed over the world. The question as to the situation of the primitive home of the Indo-Germanic peoples has been much discussed. The present tendency is to locate the original Indo-Germanic habitat in Central or Northern Europe

rather than in Asia. Various theories have been advanced, especially a generation ago, to account for the present distribution of these languages. The genetic arrangement of the tongues in a genealogical tree by Schleicher and other scholars, or views as to migratory movements or dissemination, like Johannes Schmidt's 'wave theory,' will be found referred to in most books relating to linguistics and comparative philology. The kinship of these languages has been scientifically proved by the family features and general likeness in their structure. In point of age they go back as far as the literary monuments of the Vedas.

The division of the Indo-Germanic peoples as represented by the various branches of speech is generally considered to be eightfold, as follows: (1) Indo-Iranian or Aryan proper, the ancient and modern languages of India and Persia; (2) Armenian, forming a sort of bridge between Asia and Europe; (3) Grecian or Hellenic, with its modern representatives in the tongues of Northern Greece and the Peloponnesus; (4) Albanian, a more modern representative of the ancient Illyrian; (5) Italic, the Latin, with its modern descendants in the Romance tongues; (6) Celtic or Keltic, originally occupying the west of Europe, but now confined chiefly to the British Isles, and of particular interest to the historical student of English and French philology; (7) Germanic, the important group to which the Anglo-Saxon, English, the German, and other Teutonic tongues belong; and lastly (8), the Balto-Slavic group, the chief representative of which is the modern Russian. The various subdivisions of these language divisions, together with their branches or dialects, will be found under the respective titles. Besides these there are some sporadic traces or representatives of other Indo-Germanic idioms which are not included in the list because the fragments are too scanty or too scattered to allow a determination in detail of the real character of the speech. Such are the Phrygian, which has affinities with the Armenian, or again the Messapian, which may be connected with the Albanian, or still further, the Macedonian, Gallic, Burgundian, or the like.

With reference to the general features, the Indo-Germanic languages are an inflectional group of tongues, sprung from a common ancestor no longer in existence. They have certain marked or distinctive features or variations of sound and accentuation that are more or less common to all, and they show a general similarity in structure as to roots, affixes, composite forms, with kindred variations of nouns, adjectives, pronouns, and verbs through eight cases, three numbers, including a dual, and a variety of moods and tenses, together with certain common phenomena in syntax and word-order. For a full bibliography, reference may be made to the standard work on the subject, Brugmann, *Comparative Grammar of the Indo-Germanic Languages* (5 vols., London, 1888-95), translated from the German without the three volumes on syntax by Delbrück. A second and revised edition of the original German work began to appear at Strassburg in 1897. Consult also the authorities referred to under ARYAN; INFLECTION; LANGUAGE; PHILOLOGY; PHONETIC LAWS; and also the articles on ALBANIAN LANGUAGE; ARMENIAN LANGUAGE AND LITERATURE; CELTIC LANGUAGES; GREEK LANGUAGE; INDO-IRANIAN LANGUAGES; ITALIC DIALECTS; LATIN LANGUAGE; ROMANCE LANGUAGE AND LITERATURE.

INDO-IRANIAN LANGUAGES. A branch or group of the Indo-Germanic family of languages. It comprises the Indo-Germanic languages of ancient and modern India, Ceylon, Persia, Afghanistan, Baluchistan, Kurdistan, and the Ossetic portion of the Caucasus. Although the vowel-system is meagre, the consonants, generally speaking, best represent the pre-Indo-Germanic conditions. In inflection this group is the most primitive and highly developed of all the Indo-Germanic language divisions, while the most ancient literature in Indo-Germanic is preserved in Indo-Iranian. See AFGHAN; AVESTA; BALUCHI; BENGALI LANGUAGE AND LITERATURE; CEYLON, section LANGUAGE AND LITERATURE; GUJARATI LANGUAGE AND LITERATURE; HINDUSTANI LANGUAGE AND LITERATURE; INDIAN LANGUAGES; INDO-GERMANIC LANGUAGES; KASHMIRI; KURDISH; MALDIVE LANGUAGE; MARATHI LANGUAGE AND LITERATURE; NAIPALI; OLD PERSIAN LANGUAGE; OSSETIC LANGUAGE; PALI LANGUAGE AND LITERATURE; PAHLAVI LANGUAGE AND LITERATURE; PANJABI LANGUAGE AND LITERATURE; PERSIAN LANGUAGE; PRAKRIT LANGUAGE AND LITERATURE; SANSKRIT LANGUAGE; URIYA LANGUAGE AND LITERATURE.

INDO-MALAYAN SUBREGION. See MALAYAN SUBREGION; INDIAN SUBREGION.

INDONESIAN, ĭn'dō-nē'zhăn (from Gk. Ἰνδός, *Indos*, Indian + νῆσος, *nēsos*, island). A term, coined in analogy with Polynesian, Melanesian, Micronesian, etc., used by certain ethnologists to denote certain peoples of the East Indies and Polynesia who are neither Malays nor Papuans, but Caucasian in type. Such authorities would include under this head the 'Eastern Polynesians,' certain tribes of Sumatra, Java, Borneo, the Philippines, etc. The differences between the so-called 'Indonesians' and the Malayan stock are, however, neither so important nor so significant as these writers claim, and there is good reason for looking upon the former as only a more primitive Malayan type, or proto-Malays. The 'Indonesians' and Malays are probably closely related, the former being really primitive Malays. The term 'Indonesian' was introduced by Logan, who attributed a Caucasian (Indian) origin to the lighter-colored natives of some parts of the East Indies, and extended in meaning by Hamy and others, who enlarged upon this theory. The term 'Indonesia' is used by some authorities to designate the Malay Archipelago, or island-group of the East Indies.

INDOOR BASEBALL. This sport varies but little from the regular game of baseball (q.v.). It originated at Chicago in 1887, and is credited to George W. Hancock and fellow-members of the Farragut Club of that city. It can be played in any hall of size which will permit of sufficient light and room for the diamond and fielding, the minimum playing floor measuring 40 × 50 feet. The rules are designed to equalize the difference of size and surroundings from outdoor baseball, as are also the implements of the game. The ball is of compact substance, 17 inches in circumference, weighs 8¼ ounces, and has a white cover; the bat being 2¾ feet long and 1½ inches in diameter. The bases are half-filled with sand, or other heavy substance sufficient to anchor them in place, and the rules of

the National Indoor Baseball Association of the United States govern the game.

INDORE, in-dōr'. A native Mahratta State of Central India (Map: India, C 4). It is traversed from east to west by the Nerbudda River, and also by the Vindhya Mountains, their loftiest point within its limits being 2500 feet above the sea. Valuable timber is found in the forest; and wheat, rice, tobacco, sugar-cane, cotton, poppy, etc., are cultivated. Opium is one of the chief manufactures. The Bhils, one of the wildest and most savage of the aboriginal tribes of India, inhabit Indore. Besides the capital of the same name (q.v.), the principal towns are Rampura, Mehadpur, Bhanpura, and Mhow. Area, 8400 square miles; population, in 1891, 372,800; in 1901, 333,000. The Mahratta ruler bears the name of Holkar (q.v.), whence the State is sometimes called the Holkar's Dominions.

INDORE. The capital of the native Mahratta State of the same name, India, situated on the left bank of the Kuthi (Map: India, C 4). It is about 2000 feet above the level of the sea. Indore was founded in 1767, and contains the palace of the Holkar, a college, and mint. It has a modern drainage system, and a good water-supply, and maintains a public lighting plant, market, reading-room, and dispensary. It has manufactures of cotton and a considerable grain trade. A suburban district, assigned by treaty, contains a British residency, the seat of an agent and his staff, and the Government opium depot of the Central Provinces. Population, in 1891, 92,300; in 1901, 86,200.

INDORSED. See HERALDRY.

INDORSEMENT (from ML. *indorsare*, to indorse, from Lat. *in*, in + *dorsum*, back). In its broadest sense, any writing on the back of an instrument. As a technical term of the law merchant, it denotes the writing of the holder's name upon a bill of exchange, check, promissory note, or other negotiable instrument, on transferring it to another. While this writing is ordinarily on the back of such an instrument (whence its name), it is equally effective if made on its face, or on a paper annexed to the instrument. In order to convert the writing into a contract, it must be delivered with the intention of giving effect thereto; or it must find its way into the hands of a bona-fide holder. The contract obligation of an indorser is to pay the indorsed instrument, provided payment is duly demanded, and payment is refused, and due notice of the dishonor is given to him. If the payee or holder simply signs his name, the indorsement is said to be blank, and the subsequent holder may fill out the indorsement to any one. A special indorsement is one which specifies the person to whom, or to whose order, the instrument is to be payable, e.g. 'Pay C. D. or order. (Signed) A. B.' When personal liability as indorser is to be avoided, the words 'without recourse' are added. Such an indorsement does not prevent the further negotiation of the instrument, or cast any suspicion upon its validity. A similar restriction is made in England in the case of checks by crossing them. (See CHECK.) One which limits further negotiation is called a restrictive indorsement, e.g. 'Pay Corn Exchange Bank only.' It is provided by modern legislation that when an indorsement is conditional, a party required to pay the instrument may disregard the condition and make payment to the indorsee or his transferee, whether the condition has been fulfilled or not. This changes the old rule, under which an acceptor or maker paid a bill or note with such an indorsement at his peril, if the condition was not fulfilled. That was thought to be unduly hard upon the party required to pay. See BILL OF EXCHANGE; CHECK; NEGOTIABLE INSTRUMENT.

IN'DRA. The great national god of Vedic India. Although Indra lost his supremacy through the rise of Brahma, Siva, and Vishnu, he is still preserved as a figure in the Hindu pantheon. As represented in the *Veda* (q.v.), he is primarily the god of the lightning and thunder, with the attendant phenomena of the storm, wind, and rain; by vanquishing the demons of drought and darkness he restores the sun to the sky, the light of dawn, and the day. The realm of his activity is the atmosphere; and the many hymns of the *Rig-Veda* that are devoted to his praise—far outnumbering those to any other god—are rich in meteorological imagery and poetic allusions to natural phenomena. Armed with the thunderbolt (*vajra*), his special weapon, and inspired by copious draughts of intoxicating *soma*, his favorite beverage, he goes forth to do battle with the demons, especially Vritra, who, wrapped like a choking serpent about the clouds, has shut up the waters as prisoners. One of the hymns that describes this battle and the god's triumph over the dragon (*Rig-Veda* 1.32) is an epic in miniature. As the god of battles, Indra is looked upon in the historical hymns of the *Veda* as the royal patron of the victorious Aryans in their conflicts with the aboriginal inhabitants of India. His supremacy during the whole Vedic period is unquestioned; the more ethical and transcendental Varuna is no rival to his prowess.

In the later mythology a change takes place; Indra gradually sinks to a secondary rank among the gods. His installation as god of the lesser divinities is described in the *Aitarēya-Brāhmaṇa;* and from that time onward he becomes rather a figurehead in the pantheon, and the type of a mortal king, than the former supreme lord of heaven. The Epic and Puranic periods distinctly show that he has ceased to enjoy the worship accorded him in Vedic times. He remains ruler of the atmosphere, it is true, and one of the eight world-guardians, regent of the eastern quarter of the sky, wielding his thunderbolt and sending down rain, but his real power is gone. Instead of descriptions of him as the great god of battles, praises are lavished on the delights of his paradise, *Svarga*, with its heavenly musicians and enchanting nymphs, the *Gandharvas* and *Apsarasas*, and all the joys of this happy abode of the gods and faithful worshipers. Like the later writings, the epics bring to view the sensual side of Indra's character in his amours with Ahalya, the wife of a sage — a bit of scandal as old as the Brahmanas. In consequence of the curses of the outraged seer, the god was doomed to lose his virile power; the conqueror Indra ceases to be invincible, even a son of the demon Ravana vanquishes him, as told in the *Rāmayaṇa*, and wins the title *Indra-jit*, victor over Indra, for his prowess. The *Purāṇas* likewise describe him as worsted by the rising god Krishna, an incarnation of Vishnu, and they name various successors of Indra as

rulers in the different *manvantaras*, or ages of the world.

Among the Hindus at present Indra is little worshiped. In Bengal a single day of the year is consecrated to his service, and, on occasions of drought, he is prayed to in other parts of the country. But Indra the mighty is no more. His golden chariot in the *Veda* is now replaced by an elephant on which he is generally represented as riding, and the thunderbolt is grasped in his hand. The face and body are sometimes portrayed as covered with figures resembling eyes, into which they are said to have been mercifully transformed from the thousand vile marks that came out upon his person in consequence of the curse brought upon him for his incontinency with Ahalya. For a full description of Indra during the Vedic period, consult: Perry, "Indra in the *Rig-Veda*," in the *Journal of the American Oriental Society*, vol. xi. (New Haven, 1880), and Macdonell, *Vedic Mythology* (Strassburg, 1897); for the later Indra, consult also Dowson, *Hindu Mythology* (London, 1879); Hopkins, *Religions of India* (Boston, 1895); Wilson, *Hindu Mythology* (2d ed., London, 1900).

INDRANI, ĭn-drä'nē. A name of the wife of the Hindu god Indra (q.v.) in the *Veda*. She is called Saci or Andri in the later legends.

INDRE, ăn'dr'. A river of France, rising on the northern border of the Department of Creuse (Map: France, H 5). It flows northwest through the departments of Indre and Indre-et-Loire, past the towns of La Châtre, Châteauroux, and Loches, and joins the Loire 17 miles below Tours, after a course of 136 miles, for the last 40 of which it is navigable for small craft.

INDRE. A central department of France, the western portion of the old Province of Berry, lying immediately south of the Department of Loir-et-Cher. Area, 2666 square miles, of which about four-fifths are in tillage and pasture (Map: France, H 5). Population, in 1896, 289,206; in 1901, 288,788. The chief rivers are the Indre, the Vienne, the Creuse, and its tributary, the Anglin. The surface is for the most part flat, and the land is generally fertile, producing large crops of wheat and barley. The principal resources of the department are its vineyards and its flocks. The principal manufactures are woolen and linen cloths, hosiery, scythes, paper, and porcelain. Iron-mines are worked. Capital, Châteauroux.

INDRE-ET-LOIRE, ā lwär. An inland department of France, part of the ancient Province of Touraine, lying northwest of the Department of Indre (Map: France, G 4). Area, 2377 square miles, of which more than one-half is arable; population, in 1896, 337,064; in 1901, 335,541. The department is watered by the Loire, the chief river, and by its tributaries, the Cher, the Indre, and the Vienne, all of them navigable. In the south the surface is hilly, but in the other districts it is undulating and fertile. Cereals are grown, but wine is the most important product. The chief manufactures are bar iron, woolen cloth, silk, rope, paper, and leather. Capital, Tours.

INDRI. A large, monkey-like lemur (*Indris brevicaudata*), of Madagascar, which is regarded as the most highly organized of the tribe, and differs from other lemurs in several important particulars, such as having only 30 teeth, the large size of the hind limbs as compared with the fore limbs, the webbing of the toes, and the fact that only one offspring is produced annually. The coat is variable black and white curiously contrasted, and the ears look like hairy tufts. Unlike most lemurs, the indris are wholly diurnal, going about in the forests of the East Coast, to which they are confined, in small parties, and subsisting mainly on fruit. Their voices are loud, and when angry or hurt the animals utter piercing shrieks or mournful cries. These howlings and other characteristics have led to many native superstitions in regard to the indri, which alone constitutes a subfamily of the Lemuridæ. See Plate of LEMURS.

INDUCED ELECTRIC CURRENTS. See ELECTRICITY; INDUCTION.

INDUCTANCE. See INDUCTION.

INDUCTION (Lat. *inductio*, inference, from *inducere*, to lead in, from *in*, in + *ducere*, to lead). A form of the logical process of discovering the general character of individual phenomena. In order to understand any fact or event, we need not only to be able to tell of its sensible qualities or constituents, but also to know what identity (q.v.) it has with other facts or events. Such an identity is a general character, or, as it is called in logic, a universal. When in the case of several objects we discover an identity in color or shape, we perform the act of conception (q.v.). If, using some already discovered identity between some objects as a point of departure, we assume some other identity to exist between the same objects, we are said to generalize or to make an induction. Induction may thus be defined as the universalizing of perceived relations or connections between objects. Among these relations one of the most important is that of antecedence and consequence. (See CAUSALITY.) This universalization is corrected or confirmed by further observation of these connections in other individual cases until at last often a valid judgment asserting unconditional connection is reached. A valid induction is one which, starting from particular observations, thus reaches a valid universal judgment. Scientific inductions do not differ in principle from the naïve inductions we have already described; the difference is one of degree, not of kind.

Looking now at inductions ascertained to be valid, we discover three stages in the process of arriving at certified results. The first stage is called *preliminary observation*. At this point actual coexistences and sequences or other relations are observed and form the data for the induction. The second stage consists in the generalization of some actually ascertained coexistence or sequence, or other relations. This is *induction* proper. The third stage is *verification*, the correcting or confirming of the validity of the generalization by further observation. Frequently the term induction is used to include all these three steps; in this case the second step is called generalization. Let us now take up these three steps in order.

I. Preliminary observation may be quite casual and accidental, or it may be intentional. A person may happen to see some connection between phenomena, or he may be intently looking for connections. In the latter case, the

observer may simply look at things as they offer themselves to his notice, or he may set about to interfere with the spontaneous course of events in order that he may the better observe the connection. The latter sort of observation is called an experiment. When experiment is possible, it is usually of great assistance in collecting data for generalization. Indeed, almost all the great advances in modern science have been due to experimentation rather than to mere observation. In intentional observation, whether it be simple or experimental, it is extremely important for the observer to know what he is to look for. Not every detail in the complex of details under observation is pertinent to the matter in hand; and yet no *a priori* rules can be given to direct an investigator. Much depends on experience and skill not subject to rules. But by analyzing successfully conducted inductions, logicians are able to formulate several important rules of procedure, which thus are *a posteriori*. For our present purposes we can do no better than quote John Stuart Mill's canons of induction. These state the conditions under which generalization may be made. Hence the observer should be on the watch for the occurrence of these conditions.

The canons are as follows: First Canon, for the Method of Agreement: *If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree, is the cause (or effect) of the given phenomenon.* Second Canon, for the Method of Difference: *If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former, the circumstance in which alone the two instances differ, is the effect, or the cause, or an indispensable part of the cause, of the phenomenon.* Third Canon, for the Joint Method of Agreement and Difference: *If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance; the circumstance in which alone the two sets of instances differ, is the effect, or the cause, or an indispensable part of the cause, of the phenomenon.* Fourth Canon, for the Method of Residues: *Subduct from any phenomenon such part as is known by previous inductions to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents.* Fifth Canon, for the Method of Concomitant Variations: *Whatever phenomenon varies in any manner wherever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation.* These are statements of the conditions under which scientific men make inductive inferences. Hence in our observations for the purposes of induction we should keep the following questions in mind: Is it the case that any instance in which the phenomenon under investigation occurs, and any instance in which it does not occur, have every circumstance in common save one? Is it the case that two or more instances of the phenomenon under investigation have only one circumstance in common? Is it true that two or more instances in which the phenomenon under investigation occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance? Is a part of this phenomenon under investigation known to be the effect of certain causes? Does the phenomenon under investigation vary in any manner whatever whenever some particular circumstance varies in some particular manner? In case any of these questions can be answered in the affirmative, an induction may be made. It must not, however, be supposed that an investigator sets about his work with only such general clews as are furnished by these questions. In any particular investigation, a knowledge of exactly what has already been done by previous workers is indispensable. If he has this knowledge, the investigator is in a position to ask much more definite concrete questions than the five we have just mentioned. But, however much more definite his problem may be, it may always be reduced to general expression, and when so reduced it will assume the form of one of the five questions stated above, which give the headings for the treatment of the methodology of observation. Any more specific methodology can be worked out only on the basis of the practiced experience of the expert in any particular line of research.

II. It has already been said that when any one of the five questions given in the last paragraph can be answered in the affirmative, we universalize the actually observed relation between phenomenon and circumstance. But now it will probably be asked what warrant there is for this universalization. The answer is somewhat as follows: To universalize is an instinctive tendency of thought. The child 'jumps at conclusions' in very much the same way as the kitten jumps at a moving string. What the child does, the ordinary adult also does, and unless corrected by experience the probability is that every one would generalize every observed relation. But experience does check the tendency in a measure. The child who generalizes the observed connection between shape and reboundingness, or color and reboundingness, comes by later experience to find that his generalization is invalid. The truth of the universal judgment implied in his expectation is not borne out by later developments. But he is nothing daunted. He proceeds to generalize some other observed connection until at last he gets *a general law which is uncontradicted by experience*, and which he therefore accepts as true. The first generalizations are naïve, instinctive attempts to find uniformity in the world of experience. The attempt in any particular direction may be baffled, but only to be followed by an attempt in another direction. In other words, some attempts fail and others succeed. To succeed is to find that subsequent experience conforms and continues to conform to the expectation aroused by previous experiences. To fail is to find that subsequent experience disappoints this expectation, while in either case the expectation is, from the point of view of logic, an unreflective generalization. In later life consciousness becomes reflective; it looks back upon its own processes and finds that in cases of successful generalization certain conditions are present, while in cases of failure these conditions are absent. The same instinctive generalizing

tendency which led to the generalization of the earliest connections discovered, now leads to the generalization of the connections between successful generalization itself and the conditions under which the success is achieved. These latter generalized connections are logical laws of thought. We now are in a position to see that there are two kinds of laws of thought, logical laws and psychological laws. The psychological laws are those which express the modes of thought-behavior, whether the results of the behavior be intellectually satisfactory or not. The logical laws express the conditions under which the results of thought-behavior are intellectually satisfactory to the thinker. Thus it is a psychological law that an immature thinking consciousness generalizes instinctively, i.e. without any foresight of the results to be gained; it is a logical law that if the generalization is to be valid it must be made only under certain conditions, given in the five canons mentioned above. This logical law is itself validated by the fact that it is a generalization made in conformity with the law of which it is itself the expression. In other words, it is self-consistent, and also consistent with all the known facts. A more stringent test of the validity of any law has never been conceived. If now it is further asked whether we know that the thought which conforms to the laws of thought thus discovered will continue to be successful in the future as it has been in the past, we can answer by saying that we have only one plausible reason to suppose it should not be successful, while every other reason that we know would lead us to believe that it will be successful. That one exception is the fact that in past experience when we thought that we had discovered laws, we often found that we were in error. Hence, it may be reasoned, it is possible that we may be in error now as to the logical laws of thought. But this argument has not the force that at first sight we might be tempted to ascribe to it. If we know that in the past we thought wrongly in many instances in which we thought that we were right, and if we now generalize this knowledge and say that therefore on the same principle we may now be in error, and may always be in error, we are making a naïve, uncriticised induction; and such inductions our past experience has proved to us to be very precarious. We can criticise the naïve induction when we discover that in the past any supposed knowledge turned out to be error only in cases which did not conform to certain conditions. If now our generalization as to the valid laws of thought is made in conformity with these conditions, lack of conformity to which made other inductions invalid, then the invalidity of those other inductions is no reason for attributing invalidity to these laws of thought. Past errors in induction should indeed make us very circumspect. We should use our utmost endeavors to avoid the causes which misled us; but having avoided the causes, we need not be timid as to the validity of an induction which in the past has never been impeached by experience, but, on the contrary, has been verified time and time again. A persistent objector may still argue that the fact of our having made errors in the past is still a good reason for doubting the validity of all inductions, and therefore for doubting the validity of the laws of thought which we have discovered by induction. A man who argues thus forces us to resort to a valid form of the *argumentum ad hominem*. (See ARGUMENT.) He obliges us to remark that he assumes for the purposes of his argument the validity of the law he is assailing. What is an appeal to the fact of past error in proof of the fallibility of all laws of thought? It is nothing but an *induction* from past experience. The correctness of the conclusion of this induction would carry with it the invalidity of all argument by induction, and therefore the invalidity of this argument which seeks to prove by induction the correctness of the conclusion. Here as elsewhere (see KNOWLEDGE, THEORY OF) we see that one cannot reason against the laws of reason without putting one's self out of court.

III. Verification of an induction consists in testing it in new instances. Any newly made induction is presumably based on a limited experience and it needs to be examined in its bearings upon other parts of experience. The question in the mind of a person verifying an induction is this: Does the universalized relation prove its universal character in all our experience so far as this experience is pertinent to the relation at issue? This question can be answered only by looking at our past experience and by getting further pertinent experience. No verification of a true universal can be exhaustively completed; but, as we saw under II. above, it may be practically conclusive. There may be no reason left for doubting a proposition except the bare possibility that it may not be true in cases as yet beyond our ken, but a bare possibility is always an unreasonable possibility. The relation of induction to deduction is treated under DEDUCTION. The question whether any general proposition can be arrived at without induction has often been affirmatively answered. (See A PRIORI.) But that answer is incorrect. (See KNOWLEDGE, THEORY OF.) For instance, the geometrical axiom that things equal to the same thing are equal to each other is derived from experience by induction. It is first seen in individual instances that individual things, equal to the same individual thing, are equal to each other. This relation is then universalized. So with the arithmetical judgment: 'Two and two are four.' Hegel and J. S. Mill are the great logical protagonists of this view. Mill's statement of the view is more familiar than Hegel's, but it is defective in that it is based on an atomistic view of experience (see ATOMISM), a view which makes against the validity of induction by reducing all induction to mere simple enumeration (*inductio per enumerationem simplicem*), or a bare telling off of isolated findings, and a summation of the results of these findings into a collective statement.

Consult the authorities referred to under LOGIC; especially to be named here are the logics of Hegel, J. S. Mill, Bain, Minto, Jevons, Ueberweg, Lotze, Wundt, Sigwart, Bradley, Bosanquet, Hibben, and Creighton, also Hobhouse's *Theory of Knowledge* (London, 1896).

INDUCTION. If an electrified body is brought near an uncharged one—either conductor or non-conductor—the latter will exhibit electrical forces; it is said to be charged by 'induction.' In general, if a charged body is surrounded by a uniform medium, such as air, and if a body of

any other material than that of the medium is introduced, thus making the surrounding medium heterogeneous, there will be induced charges on the body introduced. The question as to the character of the charges on this body and their distribution depends upon the relative electrical inductivity of the body and the surrounding medium. (See ELECTRICITY.) Similarly, if there is a magnet surrounded by a uniform medium, such as air, and if a body of a different kind of material from the medium is brought near the magnet, it will exhibit magnetic forces and is said to be magnetized by induction. The character and distribution of this induced magnetization depend upon the relative magnetic inductivity of the medium and the foreign body. (See MAGNETISM.) If the body which is introduced is iron or any magnetic body, and if the medium is air, the induced magnetization is such as to produce attraction by the magnet; if bismuth is introduced there will be repulsion. Electromagnetic induction is the phenomenon observed when the magnetic field of force included by a conducting circuit is altered in any way, viz. electric currents are produced in this circuit. These induced currents are due to the *changing* of the field of magnetic force, and are in such a direction as to tend to neutralize the change; they last only so long as the field is changing. See ELECTRICITY.

TUBES OF ELECTRIC INDUCTION are tubes which can be imagined drawn in the medium surrounding electrified bodies by choosing any small closed curve in this medium and drawing lines of force through each point of it. A hollow tube is thus made which has one open end on a positively charged body and the other on one negatively charged. If this tube is made of such a cross-section that it includes unit electrostatic charges as its two ends, it forms a 'Faraday tube.'

TUBES OF MAGNETIC INDUCTION are tubes formed in the same manner in the field around magnets by drawing lines of magnetic force through the points of any small closed curve. Faraday conceived the idea of these tubes being continuous through magnets and all bodies, not ending on any surface; they form, therefore, closed circuits, like a rubber tube with the two open ends brought together. The tubes are conceived to be of such cross-sections that the number leaving a north pole of unit strength is 4π, where $\pi = 3.1416$. See MAGNETISM.

Owing to an electric current in a closed circuit, there is a magnetic field of force inclosing it; the tubes of magnetic induction form closed curves around the conductor. The *coefficient of self-induction*, or the *inductance*, is the number of these tubes threading through the circuit when there is a unit current in the conductor. Some of these tubes of magnetic induction may also in their paths pass through a neighboring closed conducting circuit, and the number of those tubes which do so when there is a unit current in the first circuit is called the *coefficient of mutual induction* of the two circuits. It may be shown that if there is a unit current in the second circuit, thus producing tubes of magnetic induction of its own, the number of these which thread the first circuit is the same as in the last case. The coefficient of self-induction depends upon the shape of the circuit, the number of turns of the conducting wire, and on the surrounding medium, and the coefficient of mutual induction depends upon these properties for each circuit and upon their relative positions. It can be shown that inductance plays the same part in the phenomena of electric currents that inertia or mass does in the motion of matter. The practical unit of induction is the henry (q.v.).

INDUCTION BALANCE. An instrument to determine the presence or character of a piece of metal, which may be either concealed, as a bullet in a human body, or in the form of a counterfeit coin or alloy. It was originally devised by Dove in 1841, but was improved and constructed in a serviceable form by Hughes in 1879. It consists of two sets of induction coils in which the primaries are connected together in a circuit that includes a battery and a microphonic or other circuit-breaker, while the secondaries are in connection with a telephone used by the observer. The current traverses the primary coils in opposite directions, and the secondary coils are so arranged that the sound of the microphone or circuit-breaker is not heard, owing to the inductive effect being neutralized completely. If a coin or other metallic substance is introduced into the vicinity of one of the pairs of coils, this equilibrium will be disturbed, as part of the induction acts upon the metal and gives rise to induced currents. This of course produces an audible sound in the telephone. The instrument is also used to measure hearing, and it then is known as an audiometer, the perception of sound being tested by altering the positions of the coils. An arrangement of the induction balance was devised by Prof. Alexander Graham Bell to locate a bullet in the human body, and apparatus based on the foregoing principle was employed and numerous different forms made and tested. It was used in an attempt to discover the bullet by which President Garfield was killed, but the presence of the metallic mattress interfered with the operation of the instrument. Instances, however, of its successful use are on record. Consult: Bell, "Induction Balance," in *American Journal of Science* (New Haven, 1883); Hopkins, *Experimental Science* (New York, 1890).

INDUCTION COIL. A form of electrical apparatus used for transforming an interrupted current of low potential or pressure into one of high potential and alternating in direction. The fundamental fact of electro-magnetic induction was first stated by Michael Faraday in a paper presented to the Royal Society on November 24, 1831, in which he derived the conclusion that any change in a magnetic field will induce an electric current in a conductor situated in it. This basic principle of electro-magnetic induction underlies the construction and operation of the induction coil. As regards its construction, it consists of four essential parts: A bundle of soft

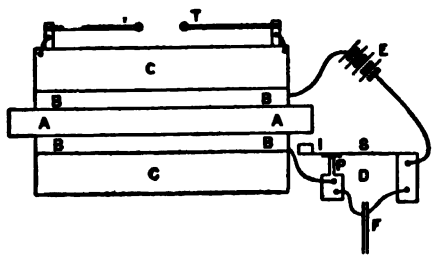

FIG. 1. DIAGRAM OF INDUCTION COIL.

iron wire, AA (Fig. 1), called the core; the 'primary coil,' BBBB, of insulated copper wire wound on the iron core, which is usually made of comparatively large wire and short in length; a much larger 'secondary coil,' CC, of longer, finer copper wire; and a device, D (Wagner's hammer, 1839), called the rheotome or interrupter, which alternately makes and breaks the connection of an electric current through the primary coil. In dimensions they vary from a few inches in length and a fraction of a pound in weight to those of large dimensions used for wireless telegraphy described below.

The operation of the apparatus is as follows: The small spring S, being in contact with the point P, allows the current from the battery E to flow through the primary coil, converting it and its core into a powerful electro-magnet. The production of this powerful magnetic field in and around the secondary coil induces in it a momentary current of high potential, and opposite in direction to the primary. This secondary current is usually able to pass as a spark between the terminals of the secondary TT. When the core AA becomes magnetic it attracts the piece of soft iron I on the spring S and draws it up, thereby breaking the connection between the spring S and the point P, and interrupting the flow of current in the primary. Thereupon the electro-magnet AB loses its magnetism, and, ceasing to attract the iron I, the spring returns to its original position, restoring the contact between S and P and again starting the current in the primary. The disappearance of the magnetic field on breaking the primary circuit induces a momentary current of high potential in the secondary coil in the same direction as the primary current, and hence in the opposite direction to the current induced in the secondary upon starting the current in the primary. The above cycle of operations repeats itself periodically, at a rate depending upon the spring S. Many modifications of the interrupter are used, some attached directly to the coil, as above described, some operating independently, but still electro-magnetically, and yet others are driven by an independent motor and are purely mechanical. Fig. 2 illustrates a form due to Foucault. One circuit runs from the binding post k' through the

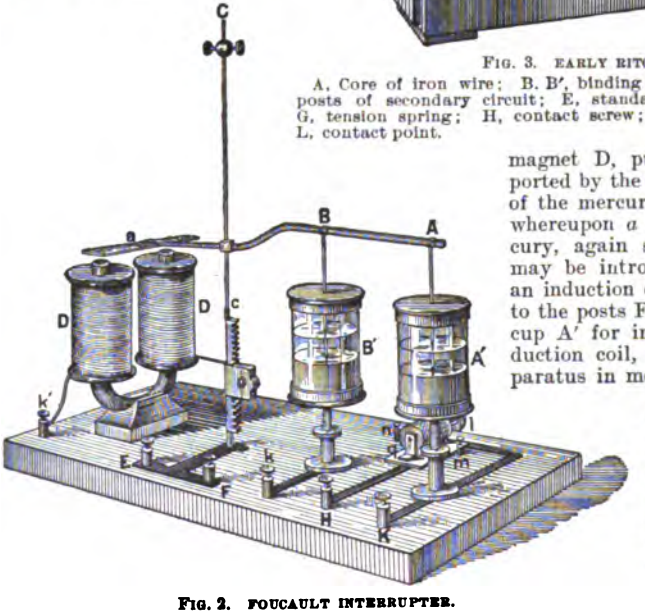

FIG. 2. FOUCAULT INTERRUPTER.

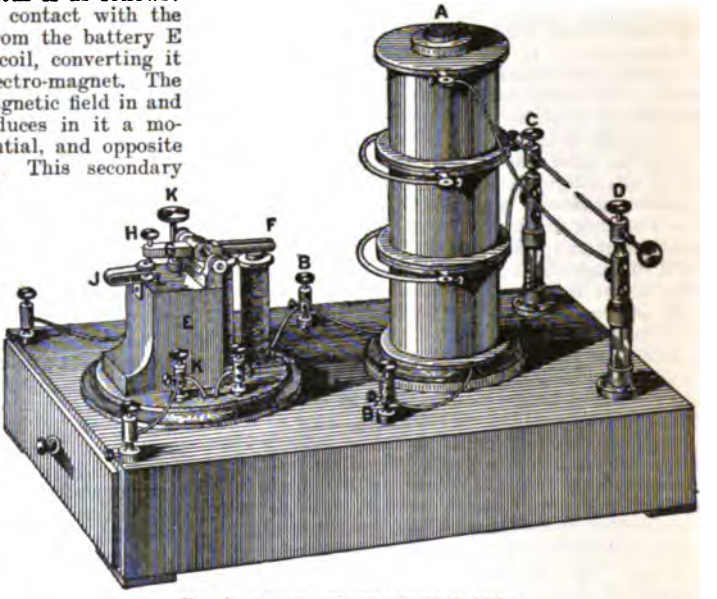

FIG. 3. EARLY RITCHIE INDUCTION COIL.

A, Core of iron wire; B, B', binding posts of primary circuit; C, D, binding posts of secondary circuit; E, standard carrying interrupter; F, armature; G, tension spring; H, contact screw; J, contact spring; K, binding post; L, contact point.

magnet D, pulling down the armature *a* supported by the spring *c*, and lifting the wire B out of the mercury cup B', interrupting the current, whereupon *a* springs up and B enters the mercury, again starting the current. This device may be introduced into the primary circuit of an induction coil, or the latter may be connected to the posts F, H, K, so as to use the wire A and cup A' for interrupting the current for the induction coil, while B' operates to keep the apparatus in motion. A commutator consisting of a hard rubber cylinder with metal contact pieces is shown at I, with binding posts at *n* and *m*. Fig. 3 shows another form of interrupter attached to an early form of induction coil. Fig. 4 shows the latest improvements—a Queen coil, with independent mechanical interrupter, capable of giving a 46-inch spark.

In some cases an alternating current is used in the primary without an interrupter; then the induction coil becomes practically a transformer, and the action is essentially the same as in apparatus of this class. See TRANSFORMER.

The quantity of electricity moved at the break is equal to that moved at the make in the primary circuit; but, owing to the fact that the magnetism in the core vanishes much more rapidly at the break than it builds up at the make, the effect at the break is more compressed, and the potential, or electrical pressure, much greater than at the make. The suddenness of the break is of the greatest importance, and most of the improvements in interrupters have been designed to make the break as sharp as possible. The important factors which affect the potential or length of spark produced by an induction coil are the relative number of turns of wire in the primary and in the secondary, the suddenness of the break, and the voltage or potential of the current used in the primary coil.

Pohl in 1835 made a very crude induction apparatus of a different style; but the first to make large coils of the above type were Stöhrer and Ruhmkorff, and from the latter is derived the name 'Ruhmkorff coil,' which is frequently used as a synonym of induction coil. In 1855 Poggendorff increased the suddenness of the break by so arranging the device that the interruption occurred under an insulating liquid or in vacuo. (The cups B′ A′ in Fig. 2 have alcohol over the mercury.) In 1857 Ritchie, of Boston, devised a means of winding the secondary coil in sections, like circular disks, which, laid together and connected, formed the cylindrical coil. This obviated to a great extent the danger of a spark jumping across from one turn of the secondary to another through the insulation. Ruhmkorff was so impressed with the superiority of a Ritchie coil exhibited in Paris that he adopted the Ritchie method of winding, and it prevails at present.

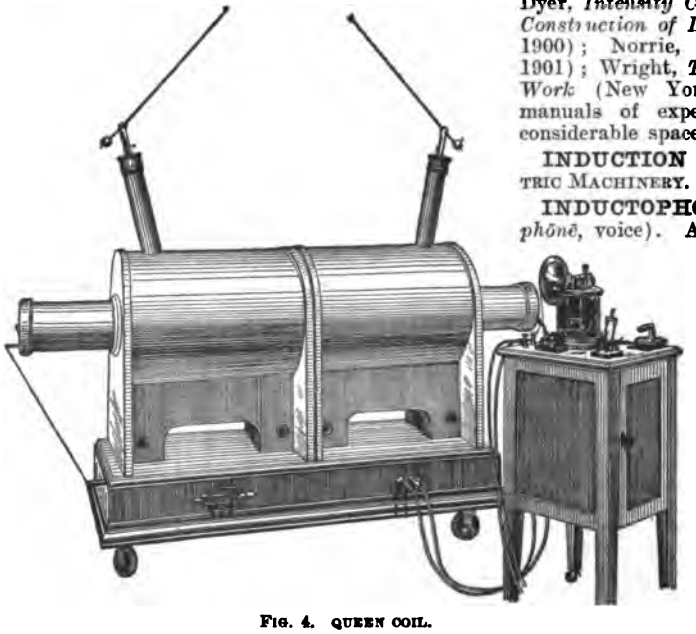

FIG. 4. QUEEN COIL.

Poggendorff proposed, and in 1853 Jean tried with good success, the use of a liquid as the insulation of the secondary, and at present most of the high-potential coils use liquid insulation. The advantage lies in the fact that if a spark should jump over, the hole in the insulation would immediately close. Fizeau suggested a decided improvement in 1853, introducing a condenser at the break, as shown at F (Fig. 1). This enables the extra current of the primary to run into the condenser for an instant, while the points S and P are first separating, and by the time that F is charged P and S are too far apart for the current to jump across.

In 1869 a coil was built for the London Polytechnic Institute the core of which was 5 feet long, 4 inches in diameter, and weighed 123 pounds. The primary had 6000 turns of wire 0.095 inch in diameter and 3770 yards long, weighing 145 pounds. The wire of the secondary was 0.015 inch in diameter and 150 miles long. This coil gave a spark 29 inches long and could penetrate more than 3 inches of glass. The modern coil shown in Fig. 4 gives a spark 46 inches long.

The induction coil is especially used in the study of the electric discharge in rarefied gases, as in Geissler, Crookes, and X-ray tubes; also in electro-therapeutics, and more recently for X-rays and wireless telegraphy. Although the static machines have supplanted the induction coil in the best X-ray laboratories, it still holds its place in wireless telegraphy. It was by means of such a coil that Heinrich Hertz carried out his brilliant researches which led to the discovery of electric waves, thus confirming the great theoretical hypothesis of Maxwell, and laying the foundation for wireless telegraphy.

Consult: Alsopp, *Induction Coils and Coil-Making* (New York, 1896); Bonney, *Induction Coils: A Practical Manual for Amateur Coil-Makers* (New York, 1892); *Induction Coils: How Made and Used*, an American reprint of Dyer, *Intensity Coils* (New York, 1892); Hare, *Construction of Large Induction Coils* (London, 1900); Norrie, *Induction Coil* (New York, 1901); Wright, *The Induction Coil in Practical Work* (New York, 1901). All of the large manuals of experimental physics also devote considerable space to this class of apparatus.

INDUCTION MOTOR. See DYNAMO-ELECTRIC MACHINERY.

INDUCTOPHONE (from *induct* + Gk. *φωνή*, *phōnē*, voice). A form of apparatus consisting of coils of wire and a telephone receiver, designed to afford communication between moving trains and stations. The apparatus and system were devised by Willoughby Smith, of London, in 1882, but never have been practically applied. Signals were transmitted inductively from coils of wire placed along the line to other coils in the train and received by means of a telephone.

INDULGENCE (Lat. *indulgentia*, indulgence, from *indulgere*, to indulge). A term of Roman Catholic theology, signifying the remission of temporal penalties due to sin, by one who has the power to distribute the spiritual treasures of the Church. An indulgence is not believed to remit guilt; only sacramental absolution avails for that; but it affects the punishment which would otherwise

be inflicted in the regular exercise of ecclesiastical discipline. According to Bellarmine's statement, one who has been absolved from guilt in the sacrament may be released from penalty by an indulgence. It is an act, not of 'order,' but of 'jurisdiction,' based upon the power of the keys. (See KEYS, POWER OF.) So complete is this power held to be that the efficacy of an indulgence is believed, in a true sense, to satisfy divine justice, as well as to secure the remission of temporal penalties, whereby it is made to extend beyond this present life into the state of purgatory. The ground of this satisfaction is sought in the treasure of merit laid up by Christ and the saints, and always at the disposal of the Church whenever need requires. This *thesaurus meritorum* is fundamental to the fully developed theory of indulgences. The clergy are its duly appointed custodians; its beneficiaries are the adherents of the Church throughout the world who themselves fall short of sainthood; the indulgence is its channel of communication.

The history of indulgences begins with Roman law, where the word *indulgentia* means the remission of a punishment or of a tax. From legal the word easily passed into ecclesiastical usage. A sovereign Church, like a sovereign State, might exercise clemency, instead of exacting the full measure of punishment which the law required. But long-continued, and sometimes bitter, controversies indicate the doubts which many Christians felt as to the propriety of this contention, which finally led to the catastrophe of the sixteenth century, when Luther voiced the protest of a large section of Christendom against the current application of the doctrine. The first important step toward establishing the dispensing power of the Church was taken in consequence of the Decian persecution, beginning A.D. 250, when the problem arose how to deal with the lapsed. These questions were answered by the beginnings of penitential discipline. The further question of the relaxation of discipline was also answered on the side of mildness. The power of 'loosing' was declared to be no less real than the power of 'binding' (cf. Matt. xvi. 19). Ambrose especially taught that the two were correlative, and the Church accepted his view. But the Council of Ancyra (A.D. 314) had already sanctioned the use of clemency, at the discretion of the bishop, and this position had been indorsed by the first Ecumenical Council at Nicæa (325). Appeal was made to the example of Saint Paul, who recommended a degree of mercy toward the offender in Corinth (see II. Cor. ii. 6-8). The main exercise of this power, in the fourth and fifth centuries, was in shortening the canonical periods of penance, evidence of which is found, for instance, in the teaching of Gregory of Nyssa.

By degrees a variety of substitutes for the canonical penalties were introduced. Fasting might be remitted in consideration of repeating a certain number of psalms, or of paying a fine (as by Theodore of Tarsus, Archbishop of Canterbury, in the seventh century). Almsgiving, pilgrimages, and holy wars came to be the most popular means of securing indulgences, especially in the period of the Crusades (q.v.). The Council of Clermont (1095) asserted that the pilgrimage to the Holy Land took the place of all other penance. With the decline of the Crusades indulgences were offered for fighting against heretics, such as the Albigenses and Hussites (q.v.). The first great jubilee indulgence was published by Pope Boniface VIII. in 1300. The fully developed scholastic theory upon which indulgences are based is found in Thomas Aquinas and Alexander of Hales. The importance there attached to the 'treasure of merit' naturally led to a popular belief among the ignorant that pardon for sin and immunity from punishment were matters of ecclesiastical bookkeeping—that they could be bought and sold. It was in view of this popular impression, and the undoubted abuses which grew out of it, that Luther published his theses on indulgences in 1517, the event which marks the beginning of the Protestant Reformation. See LUTHER.

The Council of Trent, at its twenty-fifth session (1563), condemned those who assert that indulgences are useless, or deny that the Church has power to grant them; but in reaffirming its belief the Church decreed the abolition of all evil gains and other abuses which had grown up in connection with the indulgence system. Since that time the Church has attempted to guard against misinterpretations of the doctrine, and to safeguard it from the criticisms to which it had previously been exposed.

From what has been said it will be evident that Roman Catholics do not understand by an indulgence a remission of sin itself, much less a permit to sin, or a pardon for the future. They hold that its benefits can be enjoyed only by a sinner who has repented and resolved to lead a new life, and they deny the charge that the indulgence system has introduced any laxity of principle into the Church.

The power to grant indulgences for the whole Church resides only in the Pope, but primates, archbishops, and bishops have power to grant them within their own jurisdictions. The indulgence may be either plenary or partial, the former remitting the whole of the temporal punishment, the latter something less than the whole. For example, an indulgence of forty days is understood to remit as much as would have required forty days of penance without it. Indulgences may be attached to certain articles (e.g. a crucifix), or to certain places (as a shrine). In these cases the original possessor of the article, or the pilgrim to the shrine, receives the benefit of the indulgence. A custom of granting indulgences for the dead grew up in the Middle Ages. The right and efficacy of such grants has been much debated; but the Church holds them to be salutary, even though their precise scope cannot be defined. As limited by Sixtus IV. (Constitution of 1477), they are 'only by way of suffrage'—i.e. the Church does not assume direct authority over the dead.

Consult: E. Amort, *De Origine, Progressu, Valore ac Fructu Indulgentiarum* (Augsburg, 1735); Palmieri, *Tractatus de Pœnitentia* (2d ed., Prati, 1896); H. C. Lea, *History of Auricular Confession and Indulgences in the Latin Church*, vol. iii., "Indulgences" (Philadelphia, 1896); "The Roman Catholic Doctrine of Indulgences," by the Bishop of Newport, in the *Nineteenth Century* (January, 1901); Addis and Arnold, *Catholic Dictionary* (2d ed., London, 1884), article "Indulgence."

INDULT (Lat. *indultum*, indulgence, from *indulgere*, to indulge). A term derived from the

Roman Imperial codes, and used in canon law to designate an exceptional concession or privilege granted by the Pope to one or more persons. The best-known examples apply to the privilege allowed in certain cases to kings and other rulers of nominating to bishoprics and ecclesiastical benefices; thus Francis I. of France received this power when the Pragmatic Sanction was abolished in 1516. Indults were frequently granted in the Middle Ages allowing perpetual non-residence at the same time that the income was drawn; but this practice was abolished by the Council of Trent, except that canons who have a record of forty years' irreproachable service are dispensed by indult from further residence in the seat of their chapter. Temporary indults of this nature are frequently granted for absence on important ecclesiastical business.

INDUNO, ēn'dōō-nō, GIROLAMO (1827-91). An Italian painter, born in Milan. He studied at the Milan Academy, and first exhibited in the Paris Salon in 1855. His pictures are mainly of military or of humorous genre subjects. They include: "Garibaldi's Soldiers" (1855); "A Vivandière;" "Dancing Lesson in the Last Century;" "A Souvenir of Rome;" and "The Musicians."

IN'DUS (Lat., from Gk. *Ἰνδός*, from Skt. *sindhu*, river). The great river that bounds India on the west, separating it from Afghanistan and Baluchistan (Map: India, A 3). It is over 1800 miles long, and the drainage area of its basin is estimated at 372,000 square miles. It rises 50 miles southeast of Gartok, an important trading centre in Tibet, its source being 15,000 feet above the level of the sea, on the north side of Kailas, a Himalayan peak, 19,796 feet high. Its general course, till it forces its way between the Himalaya proper and the Hindu Kush, is toward the northwest. It flows past Leh, the capital of Ladak; receives the waters of its important Trans-Himalayan tributary, the Shyok, from the north; and after a descent of 11,000 feet in a course of 500 miles, through some of the grandest mountain scenery of the world, about 60 miles below Iskardo bends sharply southward, above the confluence of the Gilgit. It flows past Bunji, on the Kashmir-Kohistan border, and 20 miles below takes a western course to Kotgata, where again it turns southward, and at Darband emerges from the Kohistan Mountains into the plains of the Punjab. It becomes navigable at Attock (ancient Taxila), the scene of Alexander the Great's passage, 870 miles from its source. Here it receives the Kabul River (q.v.), its chief affluent on the right. Continuing past Dera Ismail Khan, Dera Ghazi Khan, and other minor towns, near Mithankot, about midway in its further course of 940 miles to the Arabian Sea, it receives the waters of the Chenab, the Ghara, the Jhelum, the Ravi, the Beas, and the Sutlej, through the Panjnad (literally 'five rivers,' which gives its name to the Punjab). Each of these rivers, as well as the Kabul, is practicable for inland craft to the mountains.

Below the confluence of the Panjnad the volume of the Indus, past Sakkar and Hyderabad, becomes gradually less. Through the arid, rainless, alluvial plain of Sindh it divides into numerous channels, many of which do not return to the main stream, while others return much shrunken in volume. This wasting of the waters is not very apparent to the eye, owing to the gradual slackening of the current and the ascent of the tides. Miani, 8 miles north of Hyderabad and 75 miles from the sea, is the head of the delta which extends for 130 miles along the coast of the Arabian Sea. The chief outlets of the Indus are the Kori, Mal, and Yatho mouths. The annual rise of the river, owing to the melting of the mountain snows, extends from May to August, and is often attended by considerable inundations and changes of the deltaic channels, chiefly owing to the enormous amount of sand and clayey silt brought down by the current. Modern engineering has done much to obviate the inconveniences caused. The value of the Indus as a navigable route of traffic, never considerable, has been lessened since the building of railways through its valley from Karachi to Attock, and navigation is now confined to native craft. In a hot climate, where precipitation is almost nil, the river is more important as a means of irrigation, and the various works toward this end inaugurated by the British Government have led to a remarkable agricultural development throughout Sindh. The river is spanned by several modern bridges, of which the chief is the huge cantilever bridge at Sakkar, and the northernmost an iron suspension bridge above Bunji. Fish of excellent quality abound in its waters, and form the staple article of commerce and food of the surrounding country. The gavial, or long-snouted alligator, is the amphibious reptile of the river. The Indus is the 'King River' of Vedic poetry.

INDUSIUM, in-dū'shĭ-ŭm *or* -zhĭ-ŭm (Lat., tunic). In ferns, a flap-like outgrowth which covers the sorus or group of spore-cases (sporangia). Indusia are exceedingly varied in structure, and furnish characters for classification. Occasionally the sporangia are developed along the leafy margin which inrolls to cover them, as in the maidenhair fern and the common bracken. In this case the inrolled leaf-margin is spoken of as a 'false indusium.' See FERN.

INDUSTRIAL ACCESSION. A phrase borrowed by the Scotch from the Roman law to denote the increased value given to a thing by labor and skill bestowed upon it. See ACCESSION; FIXTURE.

INDUSTRIAL ARBITRATION AND CONCILIATION. Modern industry, with its sharp distinction between employer and employed, and its rapidly changing methods of production and conditions of employment, has given rise to a new class of disputes, which affect vitally not only the parties immediately concerned, but the general public as well. These disputes lie for the most part beyond the province of courts of justice, and therefore an imperative need has arisen for a new form of tribunal to which they may be referred. To meet this need, boards of arbitration, official or unofficial, have been organized in all of the leading countries of the world.

A preliminary function of these organs of industrial arbitration is what is usually termed *conciliation*. Before a dispute can be arbitrated it is necessary that the facts in the case should be investigated and placed in their true light. When industrial disputes result from mere misunderstandings—and it is safe to affirm that a

majority of them have no deeper origin—the preliminary investigation may suffice to bring the contending parties to an agreement. It is therefore natural that the work of settling disagreements of this kind should be assigned to two bodies, a board of conciliation, which investigates each case and attempts to clear away misunderstandings, and a board of arbitration, which gives awards on the cases in which more essential points are at issue. Where, however, boards of conciliation and arbitration are actually organized separately, their relation is often merely that of a lower and an upper court, the organ of conciliation giving awards, subject to revision in the board or court of arbitration.

Arbitration and conciliation may be voluntary or compulsory. In the former case, the organ of arbitration may be created by the contending parties, or may be officially constituted; but either party is free to refuse its services or to accept its awards. When arbitration is compulsory, disputes must be arbitrated at the request of either party, and decisions of the court of arbitration are sanctioned by legal penalties.

The earliest systematic arbitration of industrial disputes appears in France. Before the French Revolution there was a tribunal at Lyons for the settlement of disagreements arising in the silk trade. This tribunal was connected with the guild, and disappeared with the abolition of corporations (1791). It had worked so successfully that it was restored in 1808, forming the germ of the conseils des prud'hommes (boards of experts) which still perform this function in France and Belgium. The example of Lyons was soon followed by several cities in Southern France, and with excellent success. These early boards contained no representative of the working classes, the one at Lyons being composed of five merchants and four overseers. By a law of 1809 workmen were admitted, but they were always in the minority until 1848, when they were given, for a short time, equal representation. At the present day, the conseils des prud'hommes are found in all of the important cities of France. They are composed of a board of conciliation, consisting of a representative of the workmen and a representative of the employers, which has jurisdiction in disputes involving less than 200 francs, and a board of arbitration consisting of three employers and three workmen, whose findings are subject to appeal to the Tribunal of Commerce in cases involving more than 200 francs. The court of arbitration has power to summon witnesses and to take testimony under oath. Acceptance of the decision is voluntary. Nevertheless, two-thirds of the cases brought before the court are settled by the board of conciliation; only a small percentage are appealed to the tribunal of commerce. It is, however, only minor matters that are brought before the courts. They have proved unable to prevent strikes and lockouts, which in late years have seriously crippled French industry. In Prussia industrial courts were established in 1849, but did not prove to be of much use, and were later abolished. In 1890 an Imperial law authorized the municipalities to create such courts. The president is appointed by the commune; the assessors must be workmen and employers in equal numbers. They have power to summon witnesses and to take testimony; in cases involving 100 marks or more, appeal to the regular courts is permitted. Few municipalities have availed themselves of the privilege. Moreover, unofficial arbitration has made little headway in the Empire. In Switzerland far greater progress has been made in this direction. Unofficial arbitration is carried on under the direction of trade unions, and several of the cantons have established conseils des prud'hommes, after the French model. Arbitration is compulsory in some of the cantons, notably Luzerne, where refusal to accept an award may be punished by fines and imprisonment; in some cantons it is optional, as in France.

In England voluntary and unofficial arbitration was instituted early in the nineteenth century, and has made greater progress than in any other country. In 1836 disputes in the pottery trade were settled in this way; and within the following decades several important trades adopted the same practice. Committees of employers and employed meet informally to discuss grievances, and usually succeed in reaching an amicable agreement; and where these committees are best organized, as in the coal trade of Durham, the decisions of the committee are rarely rejected by the disputants. In the last decade, upon the initiative of the London Chamber of Commerce and the trade unions, local boards not connected with any particular trade have been created in large numbers, and have been successful in diminishing the number of serious disturbances in industry. But in England, as in France, the more important disagreements have had to be adjusted by protracted and costly strikes and lockouts.

New Zealand enjoys the distinction of being the only country which undertakes systematically to prevent strikes and lockouts by a general law of compulsory arbitration. In 1894 a law was enacted creating boards of conciliation and a court of arbitration, the latter having power to enforce its awards by penalties. The boards of conciliation consist of four to six members, one-half representing the labor associations, the other half representing associations of employers. They are elected every three years by the associations of employers and employed. Each board elects as chairman an impartial outsider, who votes in case of a tie. The arbitration court is composed of three members appointed by the Governor, one from a list nominated by the employers, a second from nominees of the laborers, and the third from the judges of the Supreme Court. Cases are tried before the court only upon the request of one of the disputants, and all means of conciliation are attempted before resort is had to arbitration. Strikes and lockouts are forbidden while the case is pending. Awards of the court may be extended to a whole district. Under the act trade unions are recognized as corporate bodies; and only by belonging to such a body does a workman secure standing in the court. Numerous disputes have been settled by the court, and light fines have hitherto been sufficient to enforce its awards.

The first noteworthy case of unofficial arbitration in the United States was in 1865, when a committee was appointed to arbitrate differences between the Sons of Vulcan and their employers. Since that date arbitration committees have been chosen in many trades, often operating with marked success. Much attention has been

1898, and since that year innumerable grievances which might have led to strikes have been amicably adjusted. When such disputes arise, representatives of the coal operators and of the United Mine Workers (q.v.) meet, together with the miners and operators immediately interested. The mere discussion of the points at issue frequently results in explaining away alleged grievances.

Official boards of arbitration were established in Massachusetts and New York in 1886. At present twenty-four States in the Union have made statutory or constitutional provision for industrial arbitration or conciliation. Seventeen of these contemplate the administration of arbitration through permanent boards: Massachusetts, New York, Montana, Michigan, California, New Jersey, Ohio, Louisiana, Wisconsin, Minnesota, Connecticut, Illinois, Utah, Indiana, Idaho, Colorado, and Kansas. The Constitution of Wyoming directs the Legislature to establish courts of arbitration to determine all disputes between employer and employed. Provision is made for appeals to the Supreme Court from the decision of compulsory boards of arbitration. Kansas enacted compulsory arbitration in 1898, but in the following year the enactment was declared unconstitutional. In addition to the State courts, temporary tribunals were created by Federal statute in 1888 to settle grievances between railroads engaged in interstate commerce and their employees. These tribunals consisted of one member chosen by each party, and a third chosen by these two. The law was repealed in 1898, but was reënacted in the same year in its essential features.

The organization of the State boards varies in detail, but the feature of equal representation of employers and employed is general. Their principal function is to investigate disputed questions, conciliation rather than arbitration being the end in view. In Massachusetts the arbitration board has power to summon witnesses, to take testimony under oath, and to require books and writings to be produced. The results of the investigation may be made public at any point in the proceedings. In other States the powers of the courts or boards are generally of a similar nature. The Massachusetts board has won a national reputation for efficiency, and while unable to prevent all strikes, has unquestionably done much to diminish their frequency.

An examination of the workings of boards of voluntary arbitration shows that for the settlement of disputes which are due to misunderstandings, or which involve matters of minor importance, their usefulness is unquestioned. Wherever they have been judiciously conducted they have served to lessen friction between employer and employed, and have often averted strikes and lockouts. But there are certain questions of general policy which have defied settlement by voluntary arbitration. Such, for example, are the recognition of labor organizations by the employer, exclusion of non-union labor from employment, a general and material increase or lowering of wages. These questions are still usually determined by the strength and endurance of the contending parties. Investigations by impartial boards of arbitration may direct sufficient to prevent prolonged strikes, causing widespread distress to the public, as well as to the parties to the struggle. It is for this reason that a growing sentiment manifests itself in favor of compulsory arbitration. It is pointed out that under a system of industrial concentration a strike may wholly cut off the supply of one of the necessaries of life—a condition which is manifestly intolerable. Advocates of compulsory arbitration point to the example of New Zealand, where for seven years disputes have been adjudicated without cessation of industry. Opponents of compulsory arbitration are, however, no less decided in their views than are the advocates of it. It is pointed out that laborers will frequently demand terms to which employers can accede only by producing at a loss; and that courts of arbitration, under the influence of a public sentiment naturally favorable to the laborer, will often give awards which will discourage business enterprise. It is alleged that this is the case in New Zealand, although this is vehemently denied, and there is no evidence that capital is withdrawing from the colony. Moreover, it would obviously be difficult to force the laborers to abide by a decision unfavorable to them, since men cannot be compelled to continue to work against their will. The incorporation of laborers into associations with collective responsibility (see TRADE UNIONS) is advocated as a measure which will obviate this difficulty; but such a measure is strongly opposed by the better organized labor unions, as well as by those who view with suspicion any tendency away from individual freedom and responsibility. In spite of the difficulties which beset compulsory arbitration, however, it would appear to be obvious that social welfare demands that judicial means should be developed for settling peacefully those disputes which can now be settled only through strikes involving untold losses and suffering.

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INDUSTRIAL COMMISSION. A non-partisan commission, created by act of Congress, June 18, 1898, to investigate industrial conditions, and to suggest Federal and State legislation for the better regulation and adjustment of conflicting industrial interests. The commission consisted of 19 members, of whom 5 were Senators, appointed by the president of the Senate, 5 Representatives, appointed by the Speaker of the House, and 9 especially qualified persons, appointed by the President with the consent of the Senate. The specific duties of the commission were, first, to investigate questions of immigration, labor, agriculture, manufacturing, and business, and, second, to suggest, on the basis of the

facts ascertained, proper Congressional legislation and also uniform State legislation, equitable at once to employer and employee, producer and consumer. The life of the commission was limited to two years, but this time was subsequently extended to December 15, 1901, and to February 15, 1902, successively. The work of the commission, owing to the inevitable preoccupation of its Congressional members, in their own and in public affairs, was largely carried on by the Presidential appointees, and by specially engaged experts. Of the latter may be mentioned: on strikes and arbitration, E. Dana Durand; on labor legislation, Frederic J. Stimson; on trusts and industrial combinations, Jeremiah W. Jenks; on transportation, William Z. Ripley; on agriculture, John F. Crowell; on immigration, John R. Commons; on taxation, Max West; on labor organizations, Charles E. Edgerton. The fact that no equally competent body of men, empowered to call for witnesses and documentary papers, had ever before examined American industrial methods and organizations, together with the fact that the period of prosperity succeeding 1897 brought industrial phenomena into accentuated relief and activity, resulted in the commission's bringing together a great body of new correlated and substantiated evidence concerning practically every phase of industrial life. Testimony was taken from nearly 700 witnesses, including heads of trusts, railroads, and mercantile establishments, public officials and leaders of trade unions, and in addition the commission collected much valuable but hitherto scattered information from official, national, and State documents, from judicial decisions, and from the researches of experts. The *Report of the Industrial Commission*, completed February 19, 1902, and issued as a Government publication, consists of 19 volumes, as follows: Trusts and Industrial Combinations (2 vols.); Trust and Corporation Laws; Prison Labor, Transportation (two vols.); Labor Legislation; Distribution of Farm Products; Capital and Labor in Manufactures and General Business (two vols.); Chicago Labor Disputes; Agriculture and Agricultural Labor; Agriculture and Taxation; Capital and Labor in the Mining Industries; Immigration and Education; Foreign Labor Legislation; Labor Organizations; Labor Disputes and Arbitration; Railway Labor; Industrial Combinations in Europe; Final Report—Miscellaneous.

INDUSTRIAL EXHIBITIONS. See EXHIBITIONS, INDUSTRIAL.

INDUSTRIAL FRUITS. In Scotch law, the annual produce of land which the life-renter is entitled to. For the corresponding doctrine of English and American law, see EMBLEMENT.

INDUSTRIAL INSTITUTIONS. See AGRICULTURAL EDUCATION; JUVENILE OFFENDERS.

INDUSTRIALISM. A term first applied by Saint-Simon and his followers to the 'modern régime,' but also to the peculiar systems of social organization which they advocated. In his *Data of Ethics* Spencer uses the term as descriptive of "a theoretically possible form of society purely industrial in its activities." Pure 'industrialism' according to Spencer would be reached when men were scrupulously honest in the fulfillment of agreements, while yielding "to one another no advantages beyond those agreed upon."

The meaning to be attached to the term has not yet been definitely established. By some it is employed to characterize the modern industrial system in which manufacturing industries predominate; others employ it as a description of modern civilization as opposed to the 'militarism' of preceding times. (See MILITARISM.) The definition which has been most generally accepted agrees in the main with Spencer's conception. This is exemplified by the deprecations of the 'industrialism' of modern life, found in literature and religious writings.

INDUSTRIAL REVOLUTION. In the latter part of the eighteenth century and the early part of the nineteenth the economic life of England underwent a great transformation, which has aptly been called the Industrial Revolution. As late as 1760 the 'open-field' system (q.v.) was the prevailing characteristic of British agriculture. Even in 1794, when the process of inclosing the commons and open fields had been progressing rapidly for a quarter of a century, out of 8500 parishes in England 4500 were still farmed in common. Great stretches of country lay quite unimproved; extensive bogs and heaths were found in all parts of the island. In many counties the miserable crops merely afforded sustenance to the agricultural population. The means of transportation were so defective that in one county surplus produce went to waste, while in an adjoining county scarcity prices prevailed. Industry was carried on by the domestic system, under which the manufacturer or merchant put out his materials to be worked up in the laborers' homes at piece wages. Exchange was still carried on largely by means of weekly markets, annual fairs, and through itinerant traders. British foreign trade was, however, increasing rapidly, and with the increased demand for goods prices of manufactures rose, affording the means of supporting a larger industrial population. The increased need for food rendered systematic agriculture more profitable; and the development of capital diverted much wealth to husbandry. A number of wealthy gentlemen turned their attention to the improvement of stock and the proper treatment of the soil (see AGRICULTURE), and demonstrated that agriculture could furnish returns rivaling those of trade, with the result that methods of agriculture were revolutionized. The Continental wars enhanced the prices of agricultural produce, and gave a great impetus to the adoption of the new methods. Between 1760 and 1843 nearly 7,000,000 acres of land were inclosed and put to intensive tillage.

At the same time, the domestic system in industry was giving way to the factory system, as a result of the great mechanical inventions. In 1770 Hargreaves patented the spinning-jenny; the water-frame was invented by Arkwright in 1769; Crompton's mule was introduced in 1779. In 1769 Watt obtained his first patent for an improvement in the steam-engine, and in 1785 it was successfully applied to the cotton manufacture. The effect of these inventions was enormously to increase output, the cotton manufacture trebling from 1788 to 1802. The iron industry, which had hitherto been relatively insignificant, and was dwindling to still greater insignificance with the destruction of the woods, was revived by the employment of pit-coal in smelting, rendered possible by the application of

the steam-engine to furnish power for the blast. The adoption in the woolen industry of the improvements in cotton manufacture extended the new system greatly. As a result of all these changes, English commerce, foreign and domestic, developed rapidly; shipping increased, good roads were built, and an era of canal-building set in. Industry shifted from the rural towns to the large cities of the north of England, where labor was concentrated in factories, with the effect of improving the organization of labor, and of making practicable numberless subsidiary labor-saving devices. Immense fortunes were made by those who were able to make use of the improved methods; population grew rapidly with the increased chances of employment. From 1791 to 1821 the population of England increased 43 per cent.

The period was, however, marked by a great deal of hardship to the working classes. The open-field farmers, displaced by inclosures, flocked to the cities and helped to reduce wages, at times, to a starvation level. The introduction of machinery deprived the hand workers of their means of livelihood; the crowding together of population in the large cities resulted in untold evils, moral and physical; the new life in the factory was not yet subjected to the regulations afterwards found to be imperatively necessary. The employment in factories of women and children, with all its attendant evils, became common in all the manufacturing towns. The general effect of the revolution, however, was to give England a century's start over her rivals in the competitive race. The foundations for the prosperity of England to-day were laid by the thorough change in industry. Consult: Toynbee, *Industrial Revolution* (6th ed., London, 1902); Held, *Zwei Bücher zur socialen Geschichte Englands* (Leipzig, 1881). See FACTORIES AND THE FACTORY SYSTEM.

INDUSTRIAL SCHOOLS. This term, now passing out of general use, has been variously and loosely applied to a large class of schools, mainly of a philanthropic, reformatory, or experimental nature, in which industrial work has been taught to boys and girls at a comparatively early age. This kind of school has been represented perhaps more fully than elsewhere in England, where the 'Ragged School' is a prominent type. The primary purpose of such schools is generally other than industrial, and the aim of the industrial instruction varies from the mere desire to keep boys off the streets to the serious effort to teach a trade. These institutions have not, however, filled the purpose of real trade schools, mainly on account of the early age of the pupils, and the short period of instruction. Simple operations like broom and brush making, chair-seating, or basketry, have been prominent in such schools; tailoring, shoemaking, and wood-working less so. Industrial classes, which represent the same characteristics as the above, are often a feature of orphan asylums or homes for juvenile defectives. On the whole, this type of school has not demonstrated any important function in training for industrial work, and its place in the social order, as has been pointed out, is mainly pathological. In the early discussion on the introduction of manual training into the common schools, the term 'Industrial Education' was very often applied to this subject. See TECHNICAL EDUCATION; MANUAL TRAINING; GEORGE JUNIOR REPUBLIC.

INDY, ăn'dē', PAUL MARIE THÉODORE VINCENT, D' (1851—). A French composer and pianist, born in Paris. He copied closely the method and style of Berlioz, and, like Berlioz, his genius inclined strongly toward symphonic art. It was his mother who gave him his first practical instruction, and at fourteen years of age he was reckoned a master of the piano. From 1862 to 1865 he studied under Diémer, after which he studied theory under Lavignac, and attended the lectures of Marmontel. In 1870 he enlisted in the army, and at the conclusion of the Franco-Prussian War took up his studies under César Franck. In 1873 he became a member of the organ class at the Conservatory. Afterwards he was engaged as second kettle-drummer and choirmaster of the Société des Concerts du Châtelet, a post which he accepted as much for the study of the orchestra as for a means of livelihood. In 1885 he took over the management of the Société Nationale de Musique, and when César Franck became president of it, he acted as secretary, together with Chausson, and practically managed all its affairs. Besides his appointment of inspector of music in the city schools of Paris, he received the decoration of chevalier of the Legion of Honor, and was given charge of various important choral societies. He was a thorough disciple of Wagner, and by some has been charged with imitating too closely the German master. His *Leit-motifs* are usually developed with exquisite felicity, and he is frequently daringly original. His most important works are: the tripartite symphonic poem *Wallenstein*, of which the second part, *I Piccolomini*, was first produced by Pasdeloup in 1874; *Symphonie sur un air montagnard français;* and *La forêt enchantée* (1896). His one-act comic opera *Attendez-moi sous l'orme* (1882) was practically a failure, but he retrieved himself in 1895 with the music drama *Fervaal*, of which he wrote both words and music.

INEBRIETY. See INTOXICATION.

INED'UCABIL'IA (Neo-Lat. nom. pl., not educable, from Lat. *in-*, not + Neo-Lat. *educabilis*, educable, from Lat. *educere*, to educate, from *e*, out + *ducere*, to lead). A division of mammals, proposed by Gill, embracing the rodents, edentates, insectivores, and bats, based upon the character that in all these the cerebrum is small, and does not cover the olfactory lobes or cerebellum, as in other Eutheria. This division does not enter into current classifications. It is, nevertheless, approved as marking a fact of interest.

INEQUALITY (Lat. *inæqualitas*, from *inæqualis*, unequal, from *in-*, not + *æqualis*, equal, from *æquus*, even). The relation between two magnitudes which are not equal. If a 1-1 correspondence can be set up between the individuals of two groups, a, b, they are said to be equal. But if this correspondence extends to all of the individuals of a and to only a part of those of b, then $b > a$, and vice versa.

INERTIA, In-ẽr'shĭ-â (Lat., sluggishness, from *iners*, idle, from *in-*, not + *ars*, art). A general property of matter of which we become conscious through our muscle-senses whenever by our muscles we change the motion of matter, e.g. throw or stop a ball, open a door, stop a revolv-

ing wheel, etc. It is noticed that the intensity of the sensation depends both on the material body itself and on the *rate* at which its motion is changed. Similarly, if the motion of the body is stopped by some inanimate object, the effect on the latter is proportional to the rate of decrease and varies with the body stopped; e.g. if a moving body meets a spiral spring and compresses it until it is brought to rest. If two moving bodies are brought to rest by a given spring in the same time and produce the same amount of compression, they may be said to have the same inertia. (On this definition is based the system for measuring quantities of matter, q.v.). If it takes longer to bring the first body to rest, it is said to have the greater inertia. It is believed that, if there were nothing external to the moving body affecting it, it would continue to maintain its motion unaltered forever. Galileo was the first to advance this idea; and it is now assumed as one of the principles of mechanics. On the other hand, if there is some external action on the body it takes time to produce a change in its motion, and the change produced in a given time will vary inversely as the inertia; or, to produce a given change in motion, the external action required varies directly as the inertia. It is to Newton that we owe our ideas of inertia as a measurable fundamental property of matter. Up to his time weight was the only property of matter used as a measure of the 'quantity of matter.'

INESCUTCHEON (*in* + *escutcheon*, from OF. *escusson*, *escuçon*, Fr. *écusson*, escutcheon, from OF. *escut*, *escu*, Fr. *écu*, shield, from Lat. *scutum*, shield). In heraldry (q.v.), a single shield borne as a charge.

INES DE CASTRO, ē'nĕs de kä'strô. See CASTRO, INEZ DE.

INESILLA DE CANTARILLA, ē'nā-sē'lyä dā kän'tä-rē'lyä. In Le Sage's *Gil Blas*, a character who retained the power of charming men during the whole of a long life.

INEXPIABLE WAR, THE. A war of extermination waged by Carthage against her unpaid mercenaries in B.C. 241-238. The scenes of this war are pictured in Flaubert's *Salammbô*.

I'NEZ, *Span. pron.* ē'nāth, DONNA. In Byron's *Don Juan*, the mother of Don Juan.

INFALLIBILITY (from ML. *infallibilis*, infallible, from *in-*, not + *fallibilis*, fallible, from *fallere*, to deceive, Gk. σφάλλειν, *sphallein*, to overthrow, AS. *feallan*, OHG. *fallan*, Ger. *fallen*, Eng. *fall*). The immunity from error, in all that regards faith and morals, which is claimed by the Roman Catholic Church, and, at least as regards the past, by the Greek Church, as represented in the decrees of the councils which that Church looks upon as ecumenical. The latter claim, however, which does not go beyond that of inerrancy, or actual exemption from error up to the present time, differs widely from that of infallibility as put forward by the Roman Church, which involves not alone an actual historical immunity from error, but also such a positive and abiding assistance by the Spirit of God as will at all times both protect against the possibility of error, and guide and direct in the faithful teaching of all necessary truth. The infallibility claimed by the Roman Church is thus of two kinds, passive and active—the first (Matt. xvi. 18), in virtue of which the Church never can receive or embrace any erroneous doctrine, no matter by whom proposed; the second, in virtue of which she is charged with the function (Matt. xxviii. 19; Mark xvi. 15; Ephes. iv. 11-16) of permanently teaching to the world the essential truths of God, of actively resisting every access of error, and of authoritatively deciding every controversy by which the oneness of belief among the faithful may be endangered. Catholics regard this gift as a natural and necessary accompaniment of the authority in the matters of faith with which they believe the Church to be invested, and which, if not guided in its exercise by such infallible assistance, would be but a false light, and an attractive but dangerous delusion. They have always agreed that the body of bishops throughout the Church, acting in common with the Pope, constitute the most perfect organ of the infallibility of the Church; and hence, that when they unite in any way, whether as assembled in a general council or separated in place, their judgment is infallible. Thus, if a doctrinal decree were addressed officially by the Pope to the whole Church, and either expressly confirmed or tacitly accepted by the bishops, this decree was held to be infallible. In like manner, if a doctrinal decree, emanating even from a local council, as that of a national or even a provincial Church, should be universally accepted by the Pope and the bishops, that decree also was held to be infallible. In a word, wherever there is found the united judgment of the Pope and the bishops, all agreed in accepting it as the infallible judgment of the Church. But should the Pope alone judge without the bishops, there arose the well-known dispute of the Gallican and Ultramontane divines; the latter affirming, the former denying, the Papal judgment to be infallible, but all agreeing that it was not binding as an article of Catholic faith so long as it had not received the assent of the body of the bishops. The formal definition of Papal infallibility as *de fide* dates from the Vatican Council of 1870. The minority of bishops who opposed the decree did so, as a rule, not because they disbelieved the doctrine, but because they considered its imposition as a necessary article of faith inexpedient. As formally declared, the definition is that the doctrinal decrees of the Pope teaching *ex cathedra*—that is, when in discharge of the office of pastor and doctor of all Christians, by virtue of his supreme apostolic authority, he defines a doctrine regarding faith and morals to be held by the universal Church—are to be accepted as possessing the same infallibility which attaches to the teaching of the Church. See COUNCIL.

On the matter of subjects to which the gift of infallibility extends Catholics are agreed in one principle, that it embraces all those subjects, and those only, which are necessary for the maintenance of divine truth in the Church. Hence, presupposing divine revelation, either written or oral, it embraces all questions of faith and morality, all subjects of general discipline, so far at least as to preclude the introduction, by authority of the Church, of any discipline which should be injurious to faith or to morality. On the other hand, it does not embrace questions of science, or matters of fact, or abstract opinions unconnected with religion. Thus the popular misconception that the decision in the case of Galileo bears on the question of this

power to invent and enforce new doctrines, but can only declare and define those which have been held either implicitly or explicitly in the Church from the beginning. See Foster, *Fundamental Ideas of the Roman Catholic Church* (Philadelphia, 1899); Hefele, *Honorius und das sechste allgemeine Concil* (Tübingen, 1870); Salmon, *The Infallibility of the Church* (London, 1888); Rive, *Unfehlbarkeit des Papstes* (Paderborn, 1870); Manning, *Privilegium Petri* (London, 1871); Andrie, *Cathedra Romana* (Mainz, 1872).

INFAMOUS CRIME (OF. *infameux*, from ML. *infamosus*, from Lat. *infamis*, infamous, from *in-*, not + *fama*, fame). An offense which is deemed to reveal such an absence of moral principle as to indicate that the culprit would totally disregard the obligation of an oath. Such crimes are punished according to their character, and the disabilities of infamy are imposed as an incident thereto. At the early common law treason, felony, forgery, and offenses tending to pervert the administration of justice by falsehood and fraud, such as perjury, conspiracy, and cheating, were included in this classification. The Constitution of the United States provides that "no person shall be held to answer for a capital or otherwise infamous crime unless on presentment and indictment of a grand jury." The Federal courts have included all crimes punishable by imprisonment in a State prison or penitentiary in this category, and many of the State courts have adopted their classification. See INFAMY. Consult the authorities referred to under CRIMINAL LAW.

INFAMY (from Lat. *infamia*, from *infamis*, infamous). The condition of legal disability and discredit imposed upon a person convicted of an infamous crime (q.v.). The term originated in the Roman law, under which system many derelictions of duty, such as a simple breach of certain contracts, as well as certain crimes, were punished with the civil and political disabilities of infamy. In the early English law the doctrine of attainder (q.v.) attached to the more serious crimes, and infamy only involved incompetency as a witness and incapacity to serve on a jury. The disabilities attaching to infamy are largely regulated by statute to-day, and in England and many of the United States all disqualifications on this account have been abolished. See ATTAINDER; INFAMOUS CRIME.

INFANCY, ARABIC GOSPEL OF THE. See APOCRYPHA, NEW TESTAMENT.

INFANT. At common law, any male or female person under the age of twenty-one years. As the common law makes no account of a fraction of a day except when a question of property is involved, an infant is held to become of age on the day before the twenty-first anniversary of his birth. It has always been the policy of the law to safeguard infants from the consequences of their own indiscretion by modification of many of the rules of law applicable to adults. Thus an infant's contracts are voidable (not void like the contracts of married women). That is, they are binding upon an adult contracting with the infant, but they may be avoided by the infant upon the ground of his infancy; but if the infant expressly or by implication ratifies the retains them after he is of age, he will be deemed to have ratified his contract to pay the purchase price even though he disclaims such intention. In a similar manner, an infant may avoid and set aside his conveyance of real estate at any time during his infancy, or within a reasonable time afterwards, unless he has ratified his conveyance after attaining his majority. Whenever an infant disaffirms his contracts or conveyance he is entitled upon principles of quasi-contract (q.v.) to recover from the other party to the contract the reasonable value of the consideration or performance which he (the infant) has given under the contract, even though he has (before coming of age) squandered the consideration which he has received under the contract. If, however, the infant have any money or property which he received under the contract, he must return it to the other party to the contract in order to disaffirm the contract. While an infant is not bound by his contract, he is bound to pay for necessaries (see NECESSARY) purchased by him, his liability being based on the theory of quasi-contract (q.v.). An infant may also pledge his parent's credit for necessaries upon theory of implied agency if the parent does not supply them. A parent is not liable as a matter of law to pay for articles supplied to his child by a third person; but a parent may so act as to estop himself from denying the authority of the infant to act as his agent, as by regularly paying for articles purchased by the infant.

In general, infants are liable for their torts. Where, however, the effect of holding the infant for his tort is indirectly to enforce his contract, the courts have denied his liability in tort. The practical application of this rule involves some very nice discrimination for the court. Thus an infant who hires a horse, and so negligently cares for him that the horse is injured, is not liable for tort or upon his contract; but if the infant appropriates the horse to his own use by going to some place other than that specified in the contract for him, the infant is deemed to have abandoned his contract and to be liable in tort. Upon similar grounds it has been held that, while an infant is generally liable for deceit (q.v), one who fraudulently represents himself to be of full age and thereby procures another to enter into a contract with him is not liable for the tort, but the soundness of the position has been questioned.

An infant who is a property-holder is subject to the laws of taxation, and his land is liable to be taken from him by eminent domain as if he were of age. At common law a legal marriage might be contracted between a boy of fourteen and a girl of twelve. See AGE.

An infant if sufficiently intelligent to have criminal intent is responsible for any crimes that he may commit. It is a rule of the common law that this responsibility can never arise before the infant is seven years of age. After that period until he is fourteen the law presumes nothing for or against him. His capacity to understand the nature and consequence of his act must be proved by the prosecution in order to establish his guilt. After he is fourteen he is presumed to have capacity to commit crime, and the burden of

creating a reasonable doubt of his capacity rests upon him. See further under AGE; CONSENT; etc.

The parents are entitled to the custody of the infant child during infancy, and are also entitled to earnings until this right is voluntarily renounced by them, when the infant is said to be emancipated. As between the father and the mother, the father was at common law entitled to the custody of the child. The modern tendency of the courts is to accord the custody in case of dispute to the parent best able and qualified to care for the child, whether it be the father or the mother.

In many States male infants of eighteen years or over may serve as executors and administrators.

Infants are not permitted to sue in their own name and right in either courts of law or equity. The action must be brought by the infant's near friend (*prochain ami*) or guardian *ad litem*, who is a relative, a friend, or other proper person permitted by the court to prosecute the action in the infant's behalf. Courts of equity early constituted themselves the especial protectors of children, giving them relief in various ways, particularly by appointing guardians over their person and property. The care of an infant's property by guardian is now generally regulated by statute (see GUARDIAN), the effect of which is to place the infant's property in the possession of a guardian appointed by the court, who is required to invest and care for the property as a trustee for the infant. See the articles CONTRACT; RAPE; etc., and consult the authorities referred to under such titles and under DOMESTIC RELATIONS.

INFANTE, ên-fän'tâ (Sp., Port., infant). The title given in Spain and Portugal to the princes of the royal family, with the exception of the heir apparent, the corresponding title of Infanta being given to the princesses. Since the fourteenth century the heir apparent to the throne in Spain has been styled Prince of Asturias, and the heir apparent in Portugal, until the separation of Brazil from the mother country, bore the title of Prince of Brazil. The personal domain of an infante or infanta is called the *infantado*.

INFANTE, JOSÉ MIGUEL (1778-1844). A South American statesman, born in Santiago de Chile. He played a prominent part in the Revolution of 1810, which resulted in the independence of Spanish America. He was President of the Government Junta in Chile after 1814, and went on a diplomatic mission to the Argentine State in 1817. His patriotism was unselfish; he came out against arbitrary authority, and refused office when he thought his country in no need of his services. In 1843 he declined the position of Chief Justice of the Supreme Court, offered him as a mark of the nation's gratitude. He contributed greatly toward the emancipation of slaves in Chile and took active part in the establishment of the common-school system.

INFANTICIDE. The killing of an infant or newly born child; often in a broader sense, the killing of an infant, whether entirely born, or in the act of being born, or of the matured fœtus in the womb.

As an institution or customary practice infanticide has existed in most savage or semi-civilized races, and still survives in many; as an occasional or abnormal act it has existed in all times and among all peoples, ancient or modern.

Some authorities, as McLennan, have claimed that the custom has been practically universal among primitive races; but the researches of other investigators, as Spencer and Westermarck, have shown it to have been much less widespread than this. Infanticide as practiced among early peoples is to be traced ultimately to conditions of hardship attached to the bringing up of children. Thus among the Abipones, where the women often practice infanticide, the boy was generally sacrificed; for when a son grew up it was necessary to buy a wife for him, while a grown-up daughter would always demand her price. But this hardship more usually attaches to the bringing up of female children, and it is therefore the females who are usually killed rather than the males. This is said to be especially true of those tribes who are surrounded by enemies, and who are forced by their manner of living to lead a migratory life. Among them sons were a source of strength, and daughters an element of weakness. The result of the practice of killing female children among these people often left the primitive hordes with very few young women, so that they were forced to prey upon each other for their wives. This by some has been considered to account for the rise and growth of exogamy; while others have (with less reason) attributed infanticide to the custom of exogamy. In Africa, on the other hand, where the warm climate and the abundance of tropical fruits make the conditions of existence easy, there are no well-authenticated cases of the habit of destroying new-born children; and the ancient writers state that the practice was unknown to the Egyptians.

The natives of two-thirds of the South Sea Islands practice infanticide probably more extensively than any other peoples known to history, either because of lack of food for their infants, or because the rearing of the child diminished the charms of the wife, or because of the disagreeableness of the rearing of the infants. The chief reason, however, was probably the fact that the islands are of very limited extent, and were as thickly populated as they could be and support life by the natural products of the soil. In parts of Australia it is said that the *mother* destroyed all but two boys and one girl, while in Samoa and other Pacific Islands and in some parts of Australia the custom is unknown. Generally speaking, therefore, infanticide is most commonly observed among races living where the struggle for subsistence is most severe, or where customs impose the most burdens upon those rearing children. The best-known instances of infanticide are those which existed in various forms through India, but which are now mostly suppressed in the territory under the control of the British Government by a system of compulsory reporting of births and deaths and of police supervision in districts suspected of it. It was practiced among certain of the tribes of lower caste, as well as among the Rajputs, although forbidden by the Koran and the Vedas. Among some tribes it was due to hardship attaching to the procuring of the means of subsistence, and among others its origin, or the persistence of it, was due to artificial hardships attendant

upon child-rearing, as among the Rajputs, with whom it was dishonorable for a girl to remain unmarried, and the necessary expenses of her marriage were a ruinous burden upon the parents. A similar condition obtains among certain of the American Indians of the Northwest, among whom the potlatch exists as a necessary incident to the marriage of a daughter.

When infanticide has become established as a custom among a savage race, its practice, like all practices connected with birth or marriage, frequently assumes a sacrificial or religious import, and it is by some considered to be the explanation of the origin of the practice of sacrificing children to the gods, the custom of exogamy as above noted, and other rites or ceremonies. So, also the method of killing becomes, in many cases, a matter of custom, as by casting into the Ganges in some parts of India (whence the reverence paid to the alligator, who fed upon the children), or poisoning with opium or datura smeared upon the mother's breast, or by sacrifice to some god. Where the practice survives as a sacrifice it is usually the boy child that is killed. Any change which makes child-rearing less of a burden tends to decrease or do away with infanticide; thus, it is observed that with the growth of industrialism, so that the child labor becomes of value, the practice disappears. It may, however, still be permitted or survive as a means of disposing of the weak or defective, as was the case to a late date in ancient Greece, where the killing of weak children was enjoined in the ideal systems of Aristotle and Plato, and by the actual laws of Lycurgus and Solon.

Infanticide, as it exists among peoples whose laws or customs forbid its practice, is due to special abnormal causes, as of extreme destitution, insanity, abnormal antipathy to the child, fear of disgrace, etc. The usual cause among modern civilized nations is the desire on the part of the mother to escape the shame of illicit child-bearing, or to escape the burden of caring for an illegitimate child. The frequency of cases due to this cause are, of course, directly related to the general standard of morality of the people, as well as to local causes, such as prostitution, etc. They occur most frequently in rural districts and in the densely populated cities, and more frequently in Europe than in the United States. (See ILLEGITIMACY.) In some cases, as in France, laws have been passed which aid the mother in supporting her illegitimate child without exposure or undue burden; and these laws are said to have reduced the proportionate number of infanticides, but to have increased the number of cases of illegitimacy.

The laws of all modern civilized nations treat infanticide as a crime, but they vary too greatly to admit of being specifically stated here. Some of them treat it as a special crime of less gravity than murder, restricting infanticide to the killing of an infant which is newly born (within the time limited by the law); and others make no distinction between infanticide and murder, the question as to when the infant was born being immaterial. The latter is the case at the common law of England and the United States, where the unlawful killing of a fully born child (see BIRTH) is murder, as distinguished from the killing of an unborn child, which is abortion (see ABORTION). On account of the difficulty of proving the fact of birth alive in alleged cases of infanticide, various statutes have been passed affecting cases where a mother has abandoned an infant found dead, or has concealed the birth of an infant found dead, some of which laws were unduly harsh and have been repealed.

See, further, under such titles as BIRTH; ABORTION; EXPOSURE; FOUNDLING HOSPITAL; ILLEGITIMACY; MURDER, etc. Consult, for the full discussion of the law as to infanticide and much of the general history, the works referred to under MEDICAL JURISPRUDENCE, such as Taylor, *Principles and Practice of Medical Jurisprudence* (3d ed., Philadelphia, 1883); *Manual of Medical Jurisprudence* (12th Amer. ed., Philadelphia, 1897); Wharton and Stillé, *Medical Jurisprudence* (4th Amer. ed., Philadelphia, 1884). For the other aspects of infanticide, consult the works referred to under MAN; MARRIAGE; CRIMINOLOGY; SOCIOLOGY, etc., such as Lubbock, *Prehistoric Time* (5th ed., London, 1889); *The Origin of Civilization, and the Primitive Condition of Man* (3d ed., London, 1874); Lecky, *A History of European Morals* (3d ed., London, 1877); Westermarck, *The History of Marriage* (New York, 1891); McLennan, *Studies in Ancient History, etc.* (London, 1876); and for the history of the subject in India, consult Browne, *Infanticide: Its Origin, Progress, and Suppression* (London, 1857).

INFANT PHENOMENON, THE. Ninetta Crummles, a character in Dickens's *Nicholas Nickleby*, the daughter of Vincent Crummles, the theatrical manager.